

162/MP/2024

BEFORE THE CENTRAL ELECTRICITY REGULATORY COMMISSION
3rd AND 4th FLOOR, CHANDRALOK BUILDING
36, JANPATH, NEW DELHI – 110 001
PETITION NO. /MP/2024

IN THE MATTER OF:

North Eastern Electric Power Corporation Limited - Petitioners

Versus

Assam Power Distribution Company Ltd and Others - Respondents

INDEX OF PAPERS

S. NO.	PARTICULARS	PAGES NOS.
1.	Memo of Parties	A-B
2.	Petition under Sections 61, 62, 64 as read with Section 79(1)(a) of the Electricity Act, 2003, and the Proviso to Regulation 3(73) as read with Regulation 27 of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019, and Regulation 65 of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 for Approval of Proposal for Life Extension beyond the useful life in respect of the 291 MW Assam gas based power station of North Eastern Electric Power Corporation	1-19
3.	Annexure 'I': A copy of the Report dated 28.02.2019 issued by NTPC	20-46
4.	Annexure 'II': A copy of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019	47-188
5.	Annexure 'III': A copy of the Tariff Order dated 27.01.2022 passed by this Hon'ble Commission in Petition No. 280/GT/2020	189-230
6.	Annexure 'IV': A copy of the letter dated 14.07.2023 from the CEA to NEEPCO	231

7.	Annexure 'V': A copy of the letter dated 22.08.2023 from Clarke Energy to NEEPCO	232-233
8.	Annexure 'VI' (Colly): Copies of the letters dated 05.09.2023 & 12.09.2023 from BHEL to NEEPCO	234-235
9.	Annexure 'VII': A copy of the letter dated 05.09.2023 from Mitsubishi to NEEPCO	236
10.	Annexure 'VIII': A copy of the Minutes of the Meeting dated 20.10.2023	237-240
11.	Annexure 'IX': A copy of the letter dated 23.02.2024 from OIL to NEEPCO	241
12.	Annexure 'X': A copy of the Intimation dated 28.03.2024 to the Procurers seeking their individual consent	242-244
13.	Annexure 'XI': A copy of the Detail Project Report issued in March, 2024 issued by NEEPCO	245-1599
14.	FORM-1	1600-1601
15.	Vakalatnma	1602

(POORVA SAIGAL)

COUNSEL FOR THE PETITIONER
R ASSOCIATES

C-61, JANGPURA EXTENSION
NEW DELHI - 110014

PH: 011-40743543

Email: office@rassociates.in

DATE: 28.03.2024

PLACE: NEW DELHI

**BEFORE THE CENTRAL ELECTRICITY REGULATORY COMMISSION
3RD AND 4TH FLOOR, CHANDRALOK BUILDING,
36, JANPATH, NEW DELHI – 110 001**

PETITION NO. ___/MP/2024

IN THE MATTER OF:

PETITION UNDER SECTIONS 61, 62, 64 AS READ WITH SECTION 79(1)(A) OF THE ELECTRICITY ACT, 2003, AND THE PROVISO TO REGULATION 3(73) AS READ WITH REGULATION 27 OF THE CENTRAL ELECTRICITY REGULATORY COMMISSION (TERMS AND CONDITIONS OF TARIFF) REGULATIONS, 2019, AND REGULATION 65 OF THE CENTRAL ELECTRICITY REGULATORY COMMISSION (CONDUCT OF BUSINESS) REGULATIONS, 2023 FOR APPROVAL OF PROPOSAL FOR LIFE EXTENSION BEYOND THE USEFUL LIFE IN RESPECT OF THE 291 MW ASSAM GAS BASED POWER STATION OF NORTH EASTERN ELECTRIC POWER CORPORATION.

AND IN THE MATTER OF:

North Eastern Electric Power Corporation Limited - Petitioner

Versus

Assam Power Distribution Company Ltd & Ors. - Respondents

MEMO OF PARTIES

AND IN THE MATTER OF:

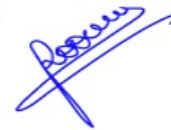
North Eastern Electric Power Corporation Limited,
Brookland Compound, Lower New Colony
Shillong - 7900 003
Meghalaya
Email id- neepcocommercial@gmail.com

- Petitioner

Versus

1. Assam Power Distribution Company Ltd.,
Through its Managing Director
Bijulee Bhawan, Paltan Bazar,
Guwahati-782 001

2. Meghalaya Power Distribution Corporation Ltd,
Through its Managing Director
Meter Factory Area,
Short Round Road Integrated Office Complex
Shillong-793 001
 3. Tripura State Electricity Corporation Ltd,
Through its Managing Director
Bidyut Bhavan, North Banamalipur,
Agartala-799001
 4. Power and Electricity Department, Government of Mizoram,
Through its Secretary
P&E Office Complex, Electric Veng,
Aizawl- 796001
 5. Manipur State Power Distribution Company Ltd,
Through its Managing Director
Electrical Complex, Khawai Bazar, Keishampat,
Imphal - 795001
 6. Department of Power, Vidyut Bhawan,
Through its Secretary
Government of Arunachal Pradesh, Itanagar-791111
 7. Department of Power, Government of Nagaland,
Through its Secretary
Kohima-797001, Nagaland
- Respondents



(POORVA SAIGAL/SHUBHAM ARYA)

COUNSEL FOR THE PETITIONER

R ASSOCIATES

C-61, JANGPURA EXTENSION

NEW DELHI - 110014

PH: 011-40743543

Email: office@rassociates.in

DATE: 28.03.2024

PLACE: NEW DELHI

**BEFORE THE CENTRAL ELECTRICITY REGULATORY COMMISSION
3RD AND 4TH FLOOR, CHANDRALOK BUILDING,
36, JANPATH, NEW DELHI – 110 001**

PETITION NO. ___/MP/2024

IN THE MATTER OF:

PETITION UNDER SECTIONS 61, 62, 64 AS READ WITH SECTION 79(1)(A) OF THE ELECTRICITY ACT, 2003, AND THE PROVISO TO REGULATION 3(73) AS READ WITH REGULATION 27 OF THE CENTRAL ELECTRICITY REGULATORY COMMISSION (TERMS AND CONDITIONS OF TARIFF) REGULATIONS, 2019, AND REGULATION 65 OF THE CENTRAL ELECTRICITY REGULATORY COMMISSION (CONDUCT OF BUSINESS) REGULATIONS, 2023 FOR APPROVAL OF PROPOSAL FOR LIFE EXTENSION BEYOND THE USEFUL LIFE IN RESPECT OF THE 291 MW ASSAM GAS BASED POWER STATION OF NORTH EASTERN ELECTRIC POWER CORPORATION.

AND

IN THE MATTER OF:

North Eastern Electric Power Corporation Limited,
Brookland Compound, Lower New Colony
Shillong - 7900 003
Meghalaya
Email id- neepcocommercial@gmail.com

- Petitioner

Versus

1. Assam Power Distribution Company Ltd.,
Through its Managing Director
Bijulee Bhawan, Paltan Bazar,
Guwahati-782 001
2. Meghalaya Power Distribution Corporation Ltd,
Through its Managing Director
Meter Factory Area,
Short Round Road Integrated Office Complex
Shillong-793 001

3. Tripura State Electricity Corporation Ltd,
Through its Managing Director
Bidyut Bhavan, North Banamalipur,
Agartala-799001
4. Power and Electricity Department, Government of Mizoram,
Through its Secretary
P&E Office Complex, Electric Veng,
Aizawl- 796001
5. Manipur State Power Distribution Company Ltd,
Through its Managing Director
Electrical Complex, Khawai Bazar, Keishampat,
Imphal - 795001
6. Department of Power, Vidyut Bhawan,
Through its Secretary
Government of Arunachal Pradesh, Itanagar-791111
7. Department of Power, Government of Nagaland,
Through its Secretary
Kohima-797001, Nagaland - Respondents

PETITION UNDER SECTIONS 61, 62, 64 AS READ WITH SECTION 79(1)(A) OF THE ELECTRICITY ACT, 2003, AND THE PROVISIO TO REGULATION 3(73) AS READ WITH REGULATION 27 OF THE CENTRAL ELECTRICITY REGULATORY COMMISSION (TERMS AND CONDITIONS OF TARIFF) REGULATIONS, 2019, AND REGULATION 65 OF THE CENTRAL ELECTRICITY REGULATORY COMMISSION (CONDUCT OF BUSINESS) REGULATIONS, 2023 FOR APPROVAL OF PROPOSAL FOR LIFE EXTENSION BEYOND THE USEFUL LIFE IN RESPECT OF THE 291 MW ASSAM GAS BASED POWER STATION OF NORTH EASTERN ELECTRIC POWER CORPORATION.

MOST RESPECTFULLY SHOWETH:

1. The Petitioner - North Eastern Electric Power Corporation Limited ('**NEEPCO**') is a Government of India Enterprise incorporated under the provisions of the Companies Act, 1956, and is Generating Company within the meaning of Section 2(28) of the Electricity Act, 2003 engaged in the

business of generation and sale of electricity, including from the 291 MW Assam Gas Based Power Plant (**'Project'**).

2. The Respondent Nos. 1 to 7 are the Distribution Licensees in the States of Assam, Meghalaya, Tripura, Mizoram, Manipur, Arunachal Pradesh and Nagaland- the Procurers of electricity from the above-mentioned Project of NEEPCO.
3. The Petitioner- NEEPCO is a wholly owned Central Government Undertaking with 100% shareholding held by NTPC. Therefore, the operation, generation and sale of electricity including adjudication of disputes and/or determination of tariff, terms and conditions in regard to the same are subject to the regulatory control of this Hon'ble Commission in terms of Section 79(1) of the Electricity Act, 2003.
4. The Project is a combined cycle generating station comprising of six Gas turbines each of 33.5 MW capacity and three Steam Turbines each of 30 MW capacity. The Commercial Operation Date (**'COD'**) of the units of the generating station are as follows:

	COD	Capacity (MW)
GT-I	01.05.1995	33.5
GT-II	01.05.1995	33.5
GT-III	01.07.1995	33.5
GT-IV	01.08.1995	33.5
GT-V	01.04.1997	33.5
GT-VI	01.04.1997	33.5
ST-I	01.04.1999	30
ST-II	01.04.1999	30
ST-III	01.04.1999	30
Generating Station	01.04.1999	291

5. The generation and operation profile of the Project is as under:

YEAR	ACTUAL GEN	Aux. Con.		GAS CONSUMPTION	SP.GAS CON.	HEAT RATE		PAFY	PLFY		
	Actual Gen.	MU	%			SCM	SCM/KWH			On NCV	On GCV
	MU									Kcal/KWh	%
1994/95 (W.E.F.1 6.03.95)	0.1502			61,210	0.4075		3947	Not calculated	0.13		
1995-96	336.3599			10,58,48,846	0.3147	2678	Not calculated		13.19		
1996-97	530.0353	30.62850	5.78	21,29,93,406	0.4018	3461			20.79		
1997-98	702.5982	21.33960	3.04	29,65,84,047	0.4221	3636			27.56		
1998-99	743.3997	14.98090	2.02	33,17,12,939	0.4462	3841			29.16		
1999- 2000	1106.7539	28.61400	2.59	41,31,01,322	0.3733	3178			43.42		
2000-01	1233.4334	39.66100	3.22	41,09,82,438	0.3332	2830			48.39		
2001-02	1323.7056	40.39790	3.05	41,45,09,484	0.3131	2652	2940	51.93			
2002-3	1010.9551	32.61312	3.23	32,96,24,485	0.3261	2738	3037	39.66			
2003-4	15.91.4506	45.08916	2.83	44,24,29,926	0.2780	2328	2583	62.26			
2004-5	1618.1036	47.63130	2.94	47,42,37,217	0.2931	2419	2683	77.59	63.48		
2005-6	1723.6353	49.64228	2.88	49,21,49,551	0.2855	2321	2573	72.18	67.72		
2006-7	1805.3608	51.69766	2.86	52,57,48,836	0.2912	2376	2637	71.80	70.44		
2007-8	1727.4049	50.75037	2.94	50,07,16,751	0.2899	2400	2661	69.46	68.36		
2008-9	1767.4072	43.24920	2.45	51,48,26,011	0.2913	2403	2665	70.88	70.49		
2009-10	1749.5220	45.74496	2.62	48,34,64,238	0.2763	2315	2565	69.94	69.14		
2010-11	1835.4186	44.7481	2.44	52,41,27,700	0.2856	2406	2666	73.94	72.73		
2011-12	1765.0883	40.7149	2.31	50,58,83,698	0.2866	2469	2733	70.02	69.86		
2012-13	1680.2625	45.0688	2.68	50,25,82,022	0.2991	2543	2817	66.39	65.80		
2013-14	1726.3242	36.7812	2.13	51,71,48,595	0.2996	2545	2817	68.64	68.47		
2014-15	1741.0803	43.08227	2.47	48,69,38,966	0.2797	2410	2666	69.26	68.15		
2015-16	1759.1713	43.8825	2.49	49,18,42,787	0.2796	2415	2674	69.91	66.86		
2016-17	1572.6115	39.4059	2.51	42,45,49,664	0.2700	2268	2514	62.07	57.20		
2017-18	1598.4619	38.5134	2.41	43,58,86,153	0.2727	2242	2486	62.43	59.20		
2018-19	1639.4554	41.9743	2.56	44,54,45,619	0.2717	2223	2467	64.2	60.74		
2019-20	1704.0297	42.9360	2.52	48,12,37,499	0.2824	2358	2616	69.44	63.43		
2020-21	1570.1879	39.02368	2.47	45,85,94,448	0.2921	2405	2670	64.69	58.95		

2021-22	1787.0962	37.9823	2.15	51,99,70,930	0.2910	2406	2671	71.51	69.16
2022-23	1689.8261	39.9921	2.37	49,49,71,941	0.2929	2441	2708	73.29	63.13
2023-24 (UPTO DEC'23)	1612.1705	45.7115	2.84	47,13,64,214	0.3049	2501	2687	85.18	66.70

6. On 19.01.2009, this Hon'ble Commission notified the Central Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff) Regulations, 2009 ('**Tariff Regulations, 2009**') prescribing the terms and conditions applicable for the determination of tariff for the period from 01.04.2009 to 31.03.2014. In terms of Regulation 26(i)(e) of the Tariff Regulations, 2009, the Target Availability for the Project was fixed at 72%.
7. On 21.02.2014, this Hon'ble Commission notified the Central Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff) Regulations, 2014 ('**Tariff Regulations, 2014**') wherein the Normative Availability of the Project was fixed at 72% for the period 01.04.2014-31.03.2019
8. Therefore, considering the Plant Availability Factor ('**PAF**') from the COD till date, and the full scheduling of power by the beneficiaries to the extent of the availability declared by NEEPCO, in 2019, NEEPCO initiated studies for Life Extension ('**LE**') beyond the useful life of 25 years.
9. On 28.02.2019, NEEPCO awarded a contract to NTPC for "*Consultancy services for assessment of equipment for RLA study of 291 MW AGBPS, Kathalguri, Assam and 135 MW AGTCCPP, Agartala, Tripura.*"
A copy of the Report issued by NTPC is attached hereto and marked as **Annexure 'I'**.
10. On 07.03.2019, this Hon'ble Commission notified the Central Electricity Regulatory Commission (Terms and Conditions of Determination of Tariff)

Regulations, 2019 (**'Tariff Regulations, 2019'**) applicable for the control period 01.04.2019 to 31.03.2024. The relevant extract from the Tariff Regulations, 2019 reads as under:

3. Definitions -

.....

(24) 'Extended Life' means the life of a generating station or unit thereof or transmission system or element thereof beyond the period of useful life, as may be determined by the Commission on case to case basis;

.....

(73) 'Useful Life' in relation to a unit of a generating station, integrated mines, transmission system and communication system from the date of commercial operation shall mean the following:

<i>(a) Coal/Lignite based thermal generating station</i>	<i>25 years</i>
<u>(b) Gas/Liquid fuel based thermal generating station</u>	<u>25 years</u>
<i>(c) AC and DC sub-station</i>	<i>25 years</i>
<i>(d) Gas Insulated Substation (GIS)</i>	<i>25 years</i>
<i>(e) Hydro generating station including pumped storage hydro generating stations</i>	<i>40 years</i>
<i>(f) Transmission line (including HVAC & HVDC)</i>	<i>35 years</i>
<i>(g) Communication system</i>	<i>15 years</i>

Provided that the extension of life of the projects beyond the completion of their useful life shall be decided by the Commission on case to case basis;

.....

27. Additional Capitalisation on account of Renovation and Modernisation

(1) The generating company or the transmission licensee, as the case may be, intending to undertake renovation and modernization (R&M) of the generating station or unit thereof or transmission system or element thereof for the purpose of extension of life beyond the originally recognised useful life for the purpose of tariff, shall file a petition before the Commission for approval of the proposal with a Detailed Project Report giving complete scope, justification, cost-benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure, schedule of completion, reference price level, estimated completion cost including foreign exchange component, if any, and any other information considered to be relevant by the generating company or the transmission licensee:

Provided that the generating company making the applications for renovation and modernization (R&M) shall not be eligible for Special Allowance under Regulation 28 of these regulations;

Provided further that the generating company or the transmission licensee intending to undertake renovation and modernization (R&M) shall be required to obtain the consent of the beneficiaries or the long term customers, as the case may be, for such renovation and modernization (R&M) and submit the same along with the petition.

(2) Where the generating company or the transmission licensee, as the case may be, makes an application for approval of its proposal for renovation and modernisation (R&M), approval may be granted after due consideration of reasonableness of the proposed cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost-benefit analysis, expected duration of life extension, consent of the beneficiaries or long term customers, if obtained, and such other factors as may be considered relevant by the Commission.

(3) In case of gas/ liquid fuel based open/ combined cycle thermal generating station after 25 years of operation from date of commercial operation, any additional capital expenditure which has become necessary for renovation of gas turbines/steam turbine or additional capital expenditure necessary due to obsolescence or non-availability of spares for efficient operation of the stations shall be allowed:

Provided that any expenditure included in the renovation and modernisation (R&M) on consumables and cost of components and spares which is generally covered in the O&M expenses during the major overhaul of gas turbine shall be suitably deducted from the expenditure to be allowed after prudence check.

(4) After completion of the renovation and modernisation (R&M), the generating company or the transmission licensee, as the case may be, shall file a petition for determination of tariff. Expenditure incurred or projected to be incurred and admitted by the Commission after prudence check, and after deducting the accumulated depreciation already recovered from the admitted project cost, shall form the basis for determination of tariff.

.....

Norms of operation for thermal generating station

49. The norms of operation as given hereinunder shall apply to thermal generating stations:

(A) Normative Annual Plant Availability Factor (NAPAF)

.....
 (d) For following Gas based Thermal Generating Stations of NEEPCO

Assam GPS	72%
-----------	-----

.....
 (C) Gross Station Heat Rate:
 (a) Existing thermal Generating Stations

.....
 (vi) Open Cycle Gas turbine/Combined Cycle Generating Stations: For the following gas based thermal generating stations:

Name of generating station	Combined Cycle (kCal/kWh)	Open Cycle (kCal/kWh)
Assam GPS	2,600	3,578

(Emphasis Supplied)

In terms of the Useful Life prescribed by this Hon'ble Commission, the Project is completing 25 years on 31.03.2024.

A copy of the Tariff Regulations, 2019 is attached hereto and marked as **Annexure-II.**

- 11.** On 27.01.2022, this Hon'ble Commission passed the Order in Petition No. 280/GT/2020 approving the tariff of the Project for the tariff period - 2019 to 2024, and granted a liberty to NEEPCO to approach the Hon'ble Commission with an appropriate application for Life extension of units of the Project in terms of the Regulation 27 of the Tariff Regulations, 2019. The relevant extract from the Order dated 27.01.2022 reads as under:

36. The Petitioner has claimed total additional capital expenditure of Rs.10965.50 lakh towards Renovation & Modernisation activities for the 2019-24 tariff period, in terms of Regulation 25(2) of 2019 Tariff Regulations (i.e. additional capital expenditure within original scope and after the cut-off date) without any proposal for life extension of the generating station. Since the additional capitalisation of these assets/ items are on account of R&M, we are of the view that the matter would fall within the ambit of Regulation 27 of the 2019 Tariff

*Regulations (Additional Capitalisation on account of Renovation & Modernisation). **We, therefore, grant liberty to the Petitioner to approach the Commission with appropriate application for Renovation & Modernisation/ Life extension of units/ generating station in terms of Regulation 27 of the 2019 Tariff Regulations.** In this background, the projected additional capital expenditure of Rs.10965.50 lakh claimed towards R&M activities is not allowed.*

(Emphasis Supplied)

A copy of the Tariff Order dated 27.01.2022 passed by this Hon'ble Commission is attached hereto and marked as **Annexure-III**.

- 12.** On 14.07.2023, in response to NEEPCO's letter dated 26.04.2023, the CEA suggested that NEEPCO may directly approach this Hon'ble Commission for approval of the Detailed Project Report ('**DPR**') and further action. The letter dated 14.07.2023, inter-alia, reads as under:

"... it is mentioned that after the enactment of the Electricity Act, 2003, Generation has become a delicensed activity. Therefore, carrying out R&M/LE activities may be decided by the utility considering the power supply position, feasibility of compliance of present environment norms and techno economic viability of units based on the basis of Residual Life Assessment (RLA) / Condition Assessment (CA)/Destructive test studies and Energy Audit studies after cost benefit analysis.

Therefore, it is suggested that NEEPCO may directly approach CERC for approval of DPR and further action."

A copy of the letter dated 14.07.2023 from the CEA to NEEPCO is attached herewith and marked as **Annexure-IV**.

- 13.** On 22.08.2023, one of the Original Equipment Manufacturer ('**OEM**') -Clarke Energy sent a letter to NEEPCO, in response to the query dated 25.07.2023, confirming that the life of the engines can be extended by 15 years with effect from 22.08.2023, subject to the maintenance conditions, etc., as specified by Clarke Energy.

A copy of the letter dated 22.08.2023 from Clarke Energy to NEEPCO is attached hereto and marked as **Annexure-V**.

- 14.** On 05.09.2023 and 12.09.2023, another OEM- BHEL sent letters to NEEPCO informing that it was possible to extend the life of the power plant equipment - gas turbine generator and the steam turbine generator, by another 15 years.

Copies of the letters dated 05.09.2023 & 12.09.2023 from BHEL to NEEPCO are attached hereto and marked as **Annexure-VI (Colly.)**.

- 15.** On 05.09.2023, another OEM -Mitsubishi Heavy Industries, sent a letter to NEEPCO informing that the Life Extension ('**LE**') of the Project by another 15 years is possible. The relevant extract from the letter dated 05.09.2023 from Mitsubishi reads as under:

"... we (Mitsubishi Heavy Industries Ltd.) recognizes that Gas Turbined which installed at NEEPCO Assam power Station as Original Equipment Manufacturer (OEM) may be able to life extension by 15 years if NEEPCO Assam Power Station follows the guidance of the OEM, perform proper maintenance, and replace parts."

A copy of the letter dated 05.09.2023 from Mitsubishi to NEEPCO is attached hereto and marked as **Annexure-VII**.

- 16.** Therefore, it is evident from the above, that it is possible to extend the life of the Project by 15 years beyond the useful life of 25 years.
- 17.** On 21.09.2023, the 49th Commercial sub-committee meeting of the North Eastern Regional Power Committee ('**NERPC**') was held wherein the proposal for the LE of the Project was made by NEEPCO before the North Eastern region Beneficiaries for their consideration and consent. On 20.10.2
- 18.** On 20.10.2023, the NERPC held its 49th Meeting. The relevant extract from the Minutes of the Meeting dated 20.10.2023 reads as under:

Deliberation of the Sub-committee

NEEPCO presented a proposal for the R&M of the 291 MW Assam Gas Based Power Station. CGM (Commercial), NEEPCO informed that the estimated cost for the R&M project is approximately Rs. 883.12 crores. The R&M would extend the useful life of the power station by an additional 20 years.

In accordance with the Regulations 17(1) and 27(1) of the Tariff Regulations 2019, NEEPCO sought the consent of NER Beneficiaries for proceeding with the R&M project.

The forum acknowledged NEEPCO's proposal and expressed its interest in seeking the consent of NER Beneficiaries individually. All the States present in the meeting agreed in-principle for the R & M of the Power Station. However, it was decided that NEEPCO would take written consent from all beneficiaries individually.

The forum strongly urged NER Beneficiaries to positively consider and provide their consent for this crucial power station R&M, emphasizing its potential benefits and the importance of ensuring the continued efficient operation of the 291 MW Assam Gas Based Power Station.

The Sub-committee noted as above.

Action: concerned utilities"

(Emphasis Supplied)

A copy of the Minutes of the Meeting dated 20.10.2023 is attached hereto and marked as **Annexure-VIII**.

- 19.** On 23.02.2024, Oil India Limited ('OIL') sent a letter to NEEPCO confirming that, based on the existing reserve estimates, Natural Gas shall be available for supply to NEECPO at the rate of 1.4 MMSCMD for the next 15 years. The relevant extract from the letter dated 23.02.2024 from OIL to NEEPCO reads as under:

"1.0 In response to your request, we hereby confirm availability of Natural Gas in the region for supply at the rate of 1.4 MMSCMD for the next 15 years."

A copy of the letter dated 23.02.2024 from OIL to NEEPCO is attached hereto and marked as **Annexure-IX**.

20. NEEPCO has also written to the Procurers seeking their individual consent after the preparation of the DPR. A copy of the Intimation dated 28.03.2024 are attached hereto and marked as **Annexure – X**.
21. In March 2024, NEEPCO issued the Detailed Project Report in respect of the 'Life Extension' of 291 MW Assam Gas Based Power Station'. The salient aspects contained in the DPR are as under:
- a) An assessment of the need and objectives of LE of the Project in view of the condition and age of the Project, recommendations of the OEMs, upgradation of technologies and so on;
 - b) Justifications for the proposed LE of the Project;
 - c) Methodology of implementation of the LE works;
 - d) Cost- benefit analysis of LE of the Project in comparison with the construction of new project of a similar size;
 - e) Report on Residual Life Assessment ('**RLA**') of the equipment and components in terms of the NTPC Report dated 28.02.2019;
 - f) Detailed analysis of the LE of gas turbines, steam turbine, gas booster stations, ventilation system, project electricity system and so on.

A copy of the DPR issued in March, 2024 issued by NEEPCO is attached hereto and marked as **Annexure – XI**.

SUBMISSIONS

22. The Project has been in operation for over 24 years, with the average generation by the power plant in the last 15 years being 1709.45 MU per year. As is evident from the Generation Profile at para 5 above, the power from the Project is being regularly scheduled by the existing Procurers.
23. NEEPCO submits that the estimated expenditure of Additional capitalization for LE is Rs 455.33 crores (at Dec'23 Price Level, after decapitalization), which translates to Rs 1.56 crores/MW. Further, post the LE of the Project, the

expected tariff of the Project in the 1st year is likely to be Rs. 1.80 per unit and the levelised tariff is likely to be Rs. 2.13 per unit. The existing normative tariff for the plant is Rs 1.895 per unit. In case NEEPCO opts for large case Renovation & Modernization ('**R&M**'), the expected capital expenditure will be around Rs 887.00 crores including IDC. Therefore, in order to minimize the cost, considering that about half the cost can be reduced in the Additional Capitalization route, it is proposed to opt for Additional Capitalization to fund the Real Life Extension instead of large scale R&M for extending the life of the plant by a period of 15 years. Also, capital infusion of Rs. 1.50 crores/MW is much less than the cost per MW likely to be incurred in case of setting up of a new Thermal (coal or gas) power plant. A comparison of tariffs in different scenarios is presented in the table below:

Comparison of tariffs									
Year	Existing CERC Tariff			Through ADD CAP			Through R&M		
	AFC (IN Rs Cr.)	Tariff(Rs/Kwhr)	Levelled tariff for 15 yrs	AFC (IN Rs Cr.)	Tariff(Rs/Kwhr)	Levelled tariff for 15 yrs	AFC (IN Rs Cr.)	Tariff(Rs/Kwhr)	Levelled for 15 yrs
2024-25	328.782	1.895		311.77	1.80	2.13	320.13	1.84	2.07
2025-26				318.54	1.84	2.13	323.84	1.87	2.07
2026-27				326.24	1.88	2.13	328.48	1.89	2.07
2027-28				334.48	1.93	2.13	333.67	1.92	2.07
2028-29				343.30	1.98	2.13	339.43	1.96	2.07

24. Therefore, LE of the Project is a more efficient alternative to the construction of a new thermal (coal or gas) based plant in as much as it provides reliable, and environment friendly electric power at economical rates to the consumers of the North Eastern Region. Unlike in the case of a coal/lignite-based power plant, there is no requirement to install a Flue Gas Desulphurization ('**FGD**') mechanism in a Combined Cycle Generating Station such as the Project, and that would lead to significant savings in so far as the capital cost is concerned.

25. A gas-based generation plant has significant advantages in comparison to thermal based generation plant such as less usage of land and water, quick ramping by gas based plant, etc. In this regard, the relevant extract from the National Electricity Plan (January, 2018) issued by the CEA reads as under:

“Gas based power plants require significantly less land and water in comparison to coal based power plant of the same capacity. In addition, gas based plants with quick ramping can support the renewable balancing power requirements. This gains importance especially in the context of India's aspiration to rapidly scale up renewable generation. Besides, gas based capacity will minimize the need for other alternative modes of power generation during peak hours of power shortage such as using diesel generators etc., which are not only costlier but also result in more environmental pollution. It may also be noted that gas based power generation would reduce carbon emissions, as emissions from gas based power generation is less as compared to Diesel or coal based generation.

.....

8.5 GAS BASED POWER PLANTS AS PEAKING PLANTS

Government of India has chalked out a program of massive capacity addition from RES by 2022. The total RES capacity by March, 2022 is planned to be 175 GW. The generation from RES shall be treated as must-run. Therefore, at any instant, the net system demand after absorbing the generation from RES (i.e. Net Demand = Total Demand - generation from RES) needs to be met through conventional generation sources. The solar generation would be maximum during the day time when the system demand is quite low and would be "NIL" during evening peak hours. This would make the Net Demand Curve very steep and would require generation from conventional sources which can ramp up very fast. This necessitates dedicated peaking plants.

Further, infusion of significant quantum of RES into the grid will also need availability of adequate balancing power to take care of the variability and uncertainty associated with RES generation. Balancing requirement as well as ramping requirement of the grid can be sourced in order of priority from Hydro plants, Pumped Storage Plants and Open Cycle Gas Turbine Plants followed by Closed Cycle Gas Turbine Plants. Now, out of the total hydro capacity of 44,478.42 MW as on 31st March, 2017, 25,727.75 MW are storage type, 3611.67 MW are run-of the river type and 15,139 MW are run-of the river with

pondage type irrigational requirement, failure of monsoon etc. limit the availability of hydro power. Again, capacity addition from hydro plants are taking place at a very limited pace due to a host of reasons like delay in environmental and forest clearance, R&R problems etc. Adequate Pumped Storage Plants are also not available. Therefore, for balancing, gas based plants has to be utilised. Gas based plants are of two types namely open cycle gas plants and combined cycle gas plants. Open cycle gas plants are very suitable for balancing and ramping requirement of the grid because of its quick start and stop time. But open cycle gas based plants are less efficient than closed cycle ones. Now, of the total monitored gas based capacity of 24,037 MW, 350 MW is only open cycle and the balance are closed cycle plants. However, the new gas based combined cycle power plants offer higher efficiency and can go from start to full load quicker. The total start-up time is just 30 minutes (from warm start) and shutdown time is 30 minutes. These are single shaft machines, can operate at a minimum load of 20%, and therefore are best suited to cater the variability of RES.

Presently, there is acute shortage of domestic gas for the Gas Based Power Plants. During the year 2016-17, Gas Based Plants were running at a PLF of around 22.86%. To run gas plant at a PLF of 85%, normative gas requirement would be about 110 MMSCMD. This is significantly more than the present availability of 29.88 MMSCMO. The role of gas based plants during evening to meet the balancing power an ramping requirement is vital for the Indian grid.

Optimisation studies showed that for integrating renewables of 175 GW by 2021-22 and to meet the peaking and ramping requirement of the system, PLF of gas based capacity during 2021-22 is likely to be around 37% compared to around 22% at present. The gas requirement is of the order of about 45.27 MMSCMD. It has been observed from the studies that the gas based capacities are utilised maximum during the peak hours to meet the peak and the ramping requirement. The actual gas requirement may substantially get reduced in the event of any or all of the followings:

- *Maximisation of utilisation of domestic gas during peak hours to meet the peaking and the ramping requirement.*
- *Utilisation of full peaking potential of the hydro plants.*
- *Operation of some of the coal based thermal power plants in two shift.*

Efforts should be made for exploring the modalities of implementation of the above keeping in view the grid stability, and commercial issues involved therein."

26. Further, the gas-based units have faster response to load changes and higher ramp rates and are thus better suited for flexible operation. The advantages of Gas based generation have also been noted by this Hon'ble Commission in its Approach paper to the Tariff Regulations, 2019 -

"C. Gas based Thermal Generation

5.3.1 The gas based thermal generating station offer greater capability of ramping up and ramping down. Thus, gas based generating station can provide alternative source for balancing power to address the intermittency of renewable generation. However, the gas based generating stations having concluded PPA are facing problem due to shortage of supply of gas from domestic source. The alternative may be to source costlier gas either from spot market or R-LNG.

.....

Gas based Thermal Generations

10.6 The use of gas based generating station Is important because of possibility of immediate ramp up and ramp down for balancing the variations of renewable generation."

27. The CEA Report of December, 2017 regarding the Study of Optimal Location of Various Types of Balancing Energy Sources/Energy Storage Devices to Facilitate Grid Integration of Renewable Energy Sources and Associated Issues specifically noted that Gas Plants are suitable for balancing the variation from renewable generators -

"CHAPTER 3 - OPTIMUM METHOD OF BALANCING

3.1 Ideal plants for balancing in order to see that balancing is done in the most optimum manner, resulting in least cost to Discoms and hence to consumers, it would be best to balance the variations from renewable generation with gas and hydro generation, which are the fastest to respond to fluctuations and affected to a lesser extent as compared to coal based stations While using hydro generation for balancing has a limitation, also being related to irrigation needs, gas generation is presently not being varied because of gas being supplied on almost a constant rate as per existing practice. Hydro generation, under the existing /imitations, could also provide flexibility by irrigating the fields when higher generation from hydro is required. The feasibility of this in different States would have to be studied. Gas generation can be varied during the day, if it Is

connected to a gas grid pipe line, and not too much in the case of gas being consumed locally or Is off grid, since the storage capacity of the gas lies in the grid pipe line. This can be done, within the supply constraints available in the gas pipe line and keeping total daily gas supply as before, and can be facilitated by GAIL and RELIANCE in their pipe lines. GAIL has already, in-principle, agreed to this."

- 28.** NEEPCO submits that LE of the Project would also facilitate the adoption of modern equipment and foster technical upgradation, thereby, increasing the efficiency of the Project. Further, the LE work will be undertaken in phases, depending on the availability of particular system and unit shutdown, which will minimize the unit shutdown requirement, and thus, any loss in the generation.
- 29.** In view of the generation and operation profile of the Project (Ref. Para 5), the confirmations/recommendations provided by the OEMs, and the assurance of fuel availability from OIL, it is submitted that LE of the Project will be instrumental in ameliorating the power scenario in the North Eastern Region, and the economical tariff would be beneficial to the consumers of the North Eastern Region. In the circumstances, the LE of the Project as indicated in the DPR issued in March 2024 may be approved by this Hon'ble Commission. This is particularly when the beneficiaries of the Project, which have been regularly scheduling power from the Project (Ref. Para 5 above), have consented to and have sought for the life extension of the Project
- 30.** NEEPCO has paid the requisite court fees.
- 31.** In the facts and circumstances mentioned above, it is respectfully prayed that this Hon'ble Commission may be pleased to:
 - a) Admit the present petition;
 - b) Extend the life of the Project by 15 years w.e.f. 31.03.2024; and

- C) Pass any other or further orders which this Hon'ble Commission may deem fit and proper in the facts and circumstances of this case.



PETITIONER

NORTH EASTERN ELECTRIC POWER CORPORATION

THROUGH

ADVOCATE

DATE: 28.03.2024

PLACE: NEW DELHI

BEFORE THE CENTRAL ELECTRICITY REGULATORY COMMISSION

3rd AND 4th FLOOR, CHANDRALOK BUILDING

36, JANPATH, NEW DELHI - 110 001

PETITION NO. /MP/2024

IN THE MATTER OF:

North Eastern Electric Power Corporation	=	Petitioner
Versus		
Assam Power Distribution Company Ltd and others	=	Respondent

AFFIDAVIT

I, Elizabeth Pyrobot, D/o of Shri J.C. Singh aged about 52 resident of Vasant Kunj, New Delhi do hereby solemnly affirm and state as under.

1. I am the Dy. General Manager(E) of North Eastern Electric Power Corporation and I am well conversant with the facts of the case and able to depose to the present affidavit.
2. I have gone through the contents of the accompanying Petition and I say that the contents stated therein are based on the records of the NEEPCO maintained in the normal course of business and believed by the deponent to be true. The annexures are true and correct copies of the original.

3. There is no other case that is pending before any other forum or any other court on the subject matter filed by NEEPCO in the present petition.



I identified the deponent as a deponent who has given the affidavit.

E Pyrobot
DEPONENT

VERIFICATION:

I, the deponent above named do hereby verify that the contents of my above affidavit are true to my knowledge, no part of it is false and nothing material has been concealed there from.

28 MARCH 2024

Verified at on this..... day of March, 2024.

E Pyrobot
DEPONENT



CERTIFIED THAT THE DEPONENT
Elizabeth Pyrobot
 D/o of Shri J.C. Singh
 28/3/24
 Dy. General Manager (E)
 North Eastern Electric Power Corporation
RUP SINGH
 Notary Public, Delhi

28 MARCH 2024



ANNEXURE-II
***(RLA REPORT OF AGBP BY NTPC
CONSULTANT)***



Consultancy services for Assessment
of equipment for RLA study of
291MW in AGBP, Kathalguri, Assam.

(From 22/05/19 to 24/05/19)

BY
CONSULTANCY WING
NTPC LTD.,
A-28, SECTOR 24, NOIDA, UP.

Doc. No.: CW-OM-11003/Assessment for RLA/AGBP

CONTENTS

S. No.	Description	Page No.
1	EXECUTIVE SUMMARY.....	4
2	INTRODUCTION.....	7
3	BRIEF ABOUT THE PLANT.....	7
	3.1 - PLANT DETAILS.....	8
	3.2 - PLANT FEATURES AND RUNNING HOURS	9
	3.3 - WORKING PRINCIPLE.....	9
	3.4 - COMBINED CYCLE POWER PLANT.....	10
4	PURPOSE OF THIS ASSESSMENT.....	11
5	METHODOLOGY.....	11
6	EFFICIENCY AND PERFORMANCE CALCULATION.....	12
	6.1 - GAS TURBINE COMPRESSORS.....	12
	6.2 - WHRS PERFORMANCE	13
	6.3 - CONDENSER PERFORMANCE	14
	6.4 - COOLING TOWER PERFORMANCE.....	15
	6.5 - RECOMMENDATIONS OF EFFICIENCY TEST.....	16
7	MAJOR OBSERVATIONS AND RECOMMENDATIONS	17
8	CONCLUSION	21
9	PHOTO GALLERY.....	22

FORWARD

There are two gas based power plants of NEEPCO, one at Kathalguri, Assam 291MW AGBP and other one at Agartala, Tripura 135MW AGTCCPP. In both the stations, the units have crossed or nearly crossing 20 years of life and completing the normative life of 25 years in 2023-24. Thereafter, the company is planning for R&M to extend the life of the power plant.

The Gas turbines in these stations are running with less efficiency due to various reasons. Before going for R&M the company has felt the need of assessment of equipment for RLA study at these stations. Hence, a contract has been awarded to NTPC "Consultancy services for assessment of equipment for RLA study of 291MW AGBP, Kathalguri, Assam and 135MW AGTCCPP, Agartala, Tripura", vide PO no: NEEPCO/ED(O&M)/AGBP-25/2018-19/3798 dated 28/02/2019.

NTPC team has visited the AGBP from 22/05/19 to 24/05/19 and studied the systems, condition of the equipment, running parameters and efficiency. The equipment which require RLA and the equipment which does not require RLA are indicated in the report with reasons. M/S NEEPCO may plan to carry out RLA for these plant equipment.

Sandeep Gupta
AGM (OS)
NTPC Ltd.

1.0 EXECUTIVE SUMMARY

The 291 MW NEEPCO AGBP has normative heat rate 2600kcal/kWh and APC 2.75% as per CERC norms 2019-24. The plant is achieving this normative parameters. The plant is more than 20years old.

After studying the equipment data, calculation of efficiency and checking of healthiness of the equipment, the suggestions for RLA are summarised as below:

Gas Turbines:

GTs are running normal but with reduced capacity. Compressor offline washing is to be done once every 2000 running hours or at the earliest possible opportunity to achieve the rated load. The HGPI components are to be replaced from time to time as per OEM recommendations. Timely inspections/overhauling of units as per OEM recommendation are required to be carried out to ensure machine safety and healthiness.

No RLA is required in GTs at present. The requirement may be reviewed after five years.

Steam Turbines:

The steam turbines are running normal. They are not able to generate designed load due to *sub optimal* condenser performance, Cooling Towers performance and inter stage seals problems. The standby rotor is to be kept ready after refurbishment for use and to be kept under proper preservation for any future requirement.

No RLA is required for steam turbines at present. It may be reviewed after five years.

WHRS:

The boiler tubes are in good condition except the fins are covered with dust. This can be removed by dry ice blasting.

The boiler body has hot spots of temperature 150-170degC (but no leakages were observed). The internal insulation appear to be deteriorated or displaced. It may be rectified in consultation with OEM.

All the WHRS have exceeded the running hours of 1Lakh. As per Regulation 391A of IBR act 1950, RLA of boilers is to be carried out at 1 Lakh running hours and every five years thereafter. **Therefore RLA of all the WHRS must be carried out at the earliest** as all the WHRS have crossed 1 Lakh running hours.

Condensers:

The condenser backpressure is more, which is due to the high CW inlet temperature Condenser & additional heat load to the condenser. The heat load is more due to ejector drain open to the condenser and passing of few Main Steam line drains to the condenser. They are to be arrested or may be taken to separate tank and pump the water to deaerator.

Cooling Towers:

The Cooling Tower outlet temperature is high. Continuous chlorine dosing not taking place. Algae formation in every cell is observed. The cooling fan blade angle needs to be adjusted and requisite number of cooling fans are to be kept in service to ensure rated cooling tower outlet temperature.

Civil structures and foundations:

The Spalling phenomenon was noticed on the civil structure of CW pump House and Cooling tower area. Since, all civil structures including Gas Turbine and Steam Turbine foundations are more than 20 years old now, the RLA of Civil structures and foundations is required. The paint work of steel structure is to be carried at regular interval of 2-3 years to keep them healthy.

Control system of Combined cycle:

Many critical parameters are not available in control room. Upgradation of the control system and governing system are necessary for safe control, data capturing and efficient operation.

2.0 INTRODUCTION

NTPC consultancy wing has been awarded contract by M/S NEEPCO Ltd. vide ref. no: NEEPCO/ED(O&M)/AGBP-25/2018-19/3798 dated 28/02/2019, for carrying out Assessment of equipment for RLA study of 291MW AGBP, Kathalguri, Assam and 135MW AGTCCPP, Agartala, Tripura.

This report pertains to 291MW AGBP, Khatalguri, Assam.

The report for 135MW AGTCCPP, Agartala, Tripura is being submitted subsequently.

3.0 BRIEF ABOUT AGBP POWER PLANT

The Assam Gas Based Power Project with 291 MW installed capacity was conceived in the year 1986 as a Central Sector Project and executed by NEEPCO with loan assistance from the Overseas Economic Cooperation Fund of Japan (now named as Japan Bank of International Cooperation). The Power Station consists of three (3) modules. Each Module comprises of 2 Nos. Gas Turbine Units, 2 Nos. WHRBs and 1 No Steam Turbine Unit. The Design Details of the Units are as under:

3.1 PLANT DETAILS

<u>Name</u> :-	ASSAM GAS BASED POWER PLANT (291 MW)
<u>Capacity</u> :-	Gas Turbine :(33.50 MW x 4) MHI make, (33.50 MW x 2) GE make
	Steam Turbine : 90 MW(30.00 MW x 3 Nos) BHEL Make
	Total capacity = 291 MW
<u>Location</u> :-	Bokuloni, Dist: - Dibrugarh (Assam), PIN – 786 191
<u>Commissioned Date</u> :-	Unit – I : On 16.03.1995
	Unit – II : On 22.03.1995
	Unit – III : On 30.06.1995
	Unit – IV : On 30.07.1995
	Unit – V : On 02.03.1996
	Unit – VI : On 15.10.1996
	Unit – VII : On 01.03.1998
	Unit – VIII : On 28.03.1998
	Unit – IX : On 05.07.1998
<u>Beneficiary States</u> :-	Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura.
<u>Technical Features</u> :-	Fuel & source – Natural Gas.,Oil field of M/S OIL
	Quantity: 1.4 MMSCMD
	Source of water for consumptive use : River Buridihing
	Turbine Type : Single Cylinder Frame – VI
	Generator Type : 2 pole Cylindrical Rotor, Indoor. Evacuation: 220KV lines.

3.2 Plant Features and running hours: -

The Project is fuelled by Natural Gas from M/S Oil India Ltd., supplied at an off take point located nearly 7 km away from the Project. The commitment for drawl of gas is 1.4 MMSCMD(with subsidised up to 1MMSCMD and above is market rate). The gas from the OIL's off take point is transported through a pipeline laid, owned and maintained by M/S Assam Gas Company Ltd. The gas received at the Project being at low pressure (5 kg/cm²) is compressed to 21 kg/cm² by a Gas Booster Station installed in the Project. The Gas Booster consists of four numbers of compressor units of Dresser Rand, USA make driven by respective Gas Engines of Waukesha, (USA) make.

The beneficiary States of the Power Plant are Assam, Manipur, Meghalaya, Tripura, Arunachal Pradesh, Nagaland and Mizoram.

The running hours as on 22/05/19 are as follows:

Unit I	: 169547
Unit II	: 167120
Unit III	: 170542
Unit IV	: 169790
Unit V	: 138738
Unit VI	: 131641
Unit VII	: 140022
Unit VIII	: 139393
Unit IX	: 139789

3.3 Working principle:

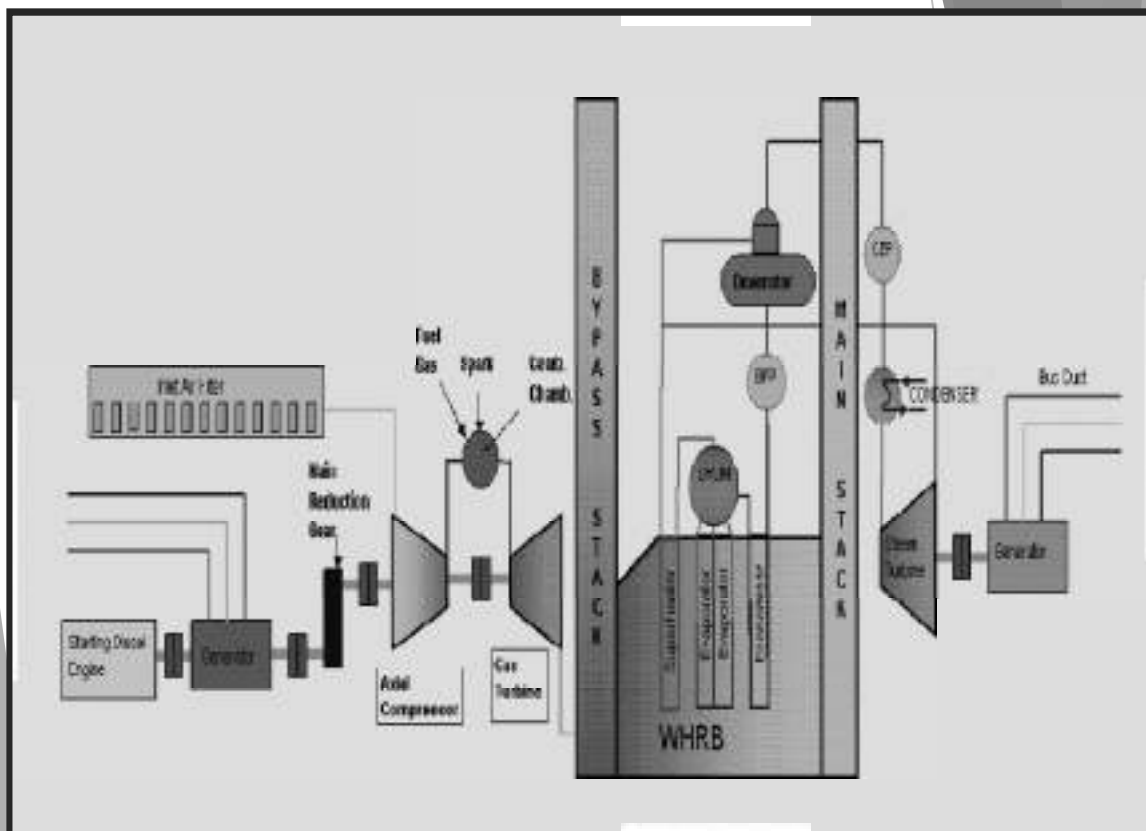
Natural Gas is used as the fuel. Air for combustion is drawn through large inlet section where it is cleaned, controlled and sent through large air compressor which is connected in the same shaft of the gas turbine. This compressed air is sent for combustion with fuel in combustion chamber.

The combusted flue gas is allowed to expand through a gas turbine, where the work is done by the gas turbine which is coupled with generator to generate electricity. The flue gas exits the gas turbine at a very high temperature. This high temperature flue gas is passed through heat recovery steam generators where the heat is utilized to generate steam. This steam is used to generate power through steam cycle in a steam turbine.

3.4 Combine Cycle Power Plant:



COMBINED CYCLE POWER PLANT



4. PURPOSE OF THIS ASSESSMENT

The plant has become more than 20 years old and the units are running at low capacity and not achieving the design load. The plant is completing its life of 25 years in 2023-24. After that R&M with life extension has to be carried out for keeping the station under commercial operation. In this line as preparatory for R&M, the contract for assessment of equipment to identify the problematic area/equipment for RLA of Gas turbine/ Steam turbine and WHRS has been awarded to NTPC.

5. METHODOLOGY

The plant was visited by NTPC team consisting of three members having expertise in GT, WHRS, ST, BOP and Efficiency (O&E) areas, from 22/05/19 to 24/05/2019.

The team visited the plant site, interacted with the concerned executives and collected data. From the running parameters efficiency are calculated. The healthiness of the equipment, age, running parameters, deviations, maintenance practices, spares replacement as per OEM guidelines were studied and the report is prepared.

A preliminary report on site observations was presented in the closing meeting on 24/05/2019.

6. EFFICIENCY AND PERFORMANE CALCULATION

6.1 Gas Turbine Compressors

Parameter	Unit	GT#1	GT#2	GT#3	GT#4	GT#5	GT#6
Compressor inlet temp.	C	26.40	26.00	26.18	26.25	26.0	26.0
Compressor inlet pressure	(mm WC)	-151.60	-151.60	-151.60	-151.60	-151.60	-151.60
Compressor inlet temp.	C	374.50	369.00	373.30	373.60	390.00	390.00
Compressor outlet pressure	(KSC)	9.74	9.65	9.88	9.62	9.00	9.00
Compressor efficiency	%	82.76	83.47	83.56	82.36	75.80	75.80
Compressor efficiency Design	%	89.32	89.32	89.32	89.32	89.32	89.32

The compressor efficiency are low. Offline wet washing has to be carried out regularly once in 2000 running hours or at the earliest available opportunity to restore compressor efficiency and to prevent deterioration

The Gas turbine efficiency and heat rate could not calculated as individual gas flow meter of each GT are not working at present.

6.2 WHRS performance

	Flue Gas Inlet temp C	Flue Gas outlet temp C	Ambient Temperature	Effectiveness (Inlet temp.- outlet temp.) / (inlet temp. – ambient temp.)
HRSG#1	536	219	32	62.90
HRSG#2	525	219	32	62.06
HRSG#3	529	187	33	68.85
HRSG#4	534	187	33	69.16
HRSG#5	536	NA	32	NA
HRSG#6	563	NA	32	NA

The effectiveness of HRSG#1 and 2 are less compared to 3 and 4. Deposits are observed over the fins of SH and economizer tube fins of U#6 which can be removed by dry ice cleaning. As the boilers are more than 20 years old, it is suggested to do carry out dry ice cleaning for all the boilers for better effectiveness.

6.3 Condenser performance

Unit #1 Unit#1 condenser was checked for heat load and condenser flow.
The results are as follows:

Heat load in condenser (Kcal/Hr)		
1	HEAT Load(Heat added by HP/LP STEAM +attemperation-Power Output)/10 ⁸	0.6111936
2	Design Heat Load	0.549
3	Actual/Design	1.1132853
CW Flow in Condenser		
1	CW inlet temperature (Deg C)	39
2	CW Outlet temperature (Deg C)	50
3	CW flow (T/Hr)	5556
4	Design CW flow (T/Hr)	6100
5	CW flow % of design	91.08
6	Cond CW inlet pressure (Ksc)	2.2
7	Cond CW outlet pressure (Ksc)	0.8

Comments

Condenser back pressure is 0.27 Ata against design 0.08 Ata due to following reasons:

- 1) High CW inlet 39 C against the design 27 C increasing the condenser back pressure.
- 2) High heat load. It is seen that heat load is higher than design by 11 %.

*We know by the characteristic of Rankine cycle, that heat rejected increases with increase in condenser back pressure.

- 3) In addition, heat load also increased due to passing of high energy drains to condenser.

Being a Single casing turbine, it is not possible to calculate cylinder efficiency.

Remedial measures:

- 1) Keep all available cells in cooling tower in service. The increase in load due to reduction in back pressure is much more than APC consumed by fans. (In the trial it was seen that ST#1 load increased by 0.5 MW by taking an additional cell in service (Design Power of fan is 75 KW).
- 2) CW pumps impellers, casing and bowls may be coated with polymer energy saving coating for better performance.

6.4 Cooling Tower performance

Cooling Tower Performance				
Sl. No	Parameter	Units	Design	Actual
1	Hot Water Temperature	C	36	46
2	Cold Water Temperature	C	27	40
3	Wet Bulb Temperature	C	20.5	29
4	Dry Bulb Temperature	C	23	30
5	Range(1-2)	C	9	6
6	Approach (2-3)	C	6.5	11
7	Effectiveness(5/(5+6)*100)	%	58.1	35.3
8	Fan currents (1to 6)	Amp	70,80,85,88,85,78	

Blade angle may be increased slightly by 1 to 2deg wherever the fans taking less amperage. GRP blades may be replaced with FRP blades to reduce Auxiliary Power Consumption.

6.5 Recommendations of Efficiency Test

- Install field instruments and extend the input to the DCS for all the parameters required for compressor efficiency evaluation.
- Evaluate the efficiency of compressor immediately after compressor off-line washing and determine a base line data for all the Gas Turbines.
- Carry out offline compressor washing once every 2000 EOH or at the earliest possible opportunity.
- Carry out the inspections within the stipulated time period given by OEMs.

7. MAJOR OBSERVATIONS AND RECOMMENDATIONS

Sl. No	Area	Observation	Recommendations
1a	GT 1-4	<ul style="list-style-type: none"> - GT 3&4 CRR is done in 2015 and 2017 respectively. - For GT 1&2 CRR is under process. - HGP components are being replaced from time to time. 	<ul style="list-style-type: none"> - RLA is not required. To be reviewed after five years. - To be replaced as per OEM recommended schedule.
1b	GT 5-6	<ul style="list-style-type: none"> - HGP components are being replaced from time to time. 	<ul style="list-style-type: none"> - To be replaced as per OEM recommended schedule. - As the running hours are reaching 1.5lakh EOH, comprehensive rotor refurbishment may be planned in line with OEM recommendation. - All stages of compressor blades coating is suggested for better performance - No separate RLA is required
1c	All GTs	<p>The compressor efficiency found to be low (normal 89%):</p> <ul style="list-style-type: none"> 1 - 82.76% 2 - 83.47% 3 - 83.56% 4 - 82.36% 5 - Stopped condition 6 - 75.8% 	<ul style="list-style-type: none"> - Offline washing is suggested in every 2000 EOH or at the earliest possible opportunity.

1d	Fin fan coolers	Healthiness found OK	
2	STs	<ul style="list-style-type: none"> - There is no problem observed in ST parameters 	<ul style="list-style-type: none"> - Spare rotor to be refurbished and kept ready for future use. - No RLA is required
3a	WHRBs	<ul style="list-style-type: none"> - WHRB 	<ul style="list-style-type: none"> - Deposits observed over the fins of SH and economizer tube fins which can be removed by dry ice cleaning
3b		<ul style="list-style-type: none"> - Boiler body temperature are more for all the boilers. Many hot spots with temperature upto 170-180 deg C are seen. WHRB 3&4 are having more hot spots. Insulation are either deteriorated or displaced 	<ul style="list-style-type: none"> - Regular thermography to be carried out and necessary repair to be done to prevent further damages.
3c		<ul style="list-style-type: none"> - Boiler structure painting 	<ul style="list-style-type: none"> - Recommended once in 2-3 years
3d		<p>Boiler effectiveness are (design 63%):</p> <p>1 - 62.9%</p> <p>2 - 62.06%</p> <p>3 - 68.85</p> <p>4 - 69.16</p> <p>5 – Not available</p> <p>6 – Not available</p>	<ul style="list-style-type: none"> - As per section 391A of IBR 1950, RLA is to be carried out at 1lakh running hours and at every five years interval thereafter. - RLA to be carried out at the earliest.
4a	Condensers	<ul style="list-style-type: none"> - Condenser back pressure is higher (0.27,0.25, 0.19KSC) than design value(0.088KSc) in all machines. - The vac. is low due to high CW inlet temp 40degC against design 27degC and high heat 	<ul style="list-style-type: none"> - PRDS drain may be diverted to open tank and then pump it to D/A with 5-10HP pump.

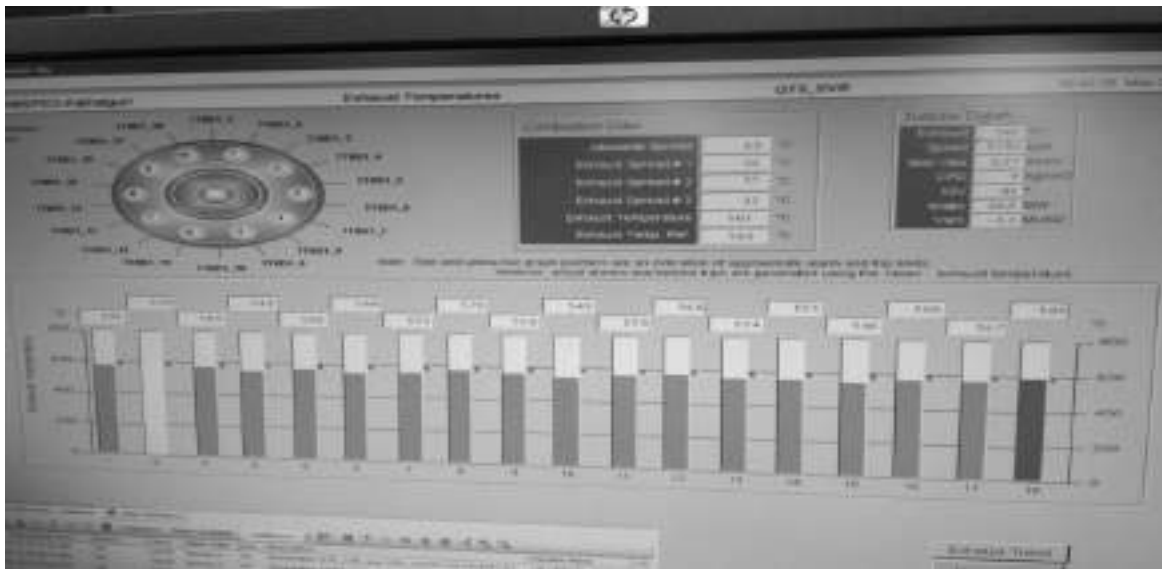
		<p>around 11% high than design value, the reasons are follows:</p> <ul style="list-style-type: none"> -PRDS drain kept open to condenser in all the units, - MS drains found passing in U#4, and -Turbine bypass valve passing in U#4 -Low vac. leads to higher heat rejection in condenser 	
4b		<ul style="list-style-type: none"> - When starting ejector was taken in service in ST#1 the vac. found improved by 0.015KSC and load by 0.3MW indicating the main ejector performance is not upto the mark(both main ejectors in service always). Reason may be: <ul style="list-style-type: none"> - PRDS parameters are not maintained - Ejector orifice may be worned out 	<ul style="list-style-type: none"> - Thorough inspection of ejector system to be carried out to improve the performance. - Alternately, possibility of its replacement with Vacuum pump may be explored. - In next major overhauling of ST, RLA of condenser may be planned. - Epoxy coating of water box may be carried out .
5a	Cooling tower	<ul style="list-style-type: none"> - Continuous Cl₂ dosing not taking place, lot of algae formation observed - Each CT is taking 45-57KW (current 70-88A) power against rating 75KW 	<ul style="list-style-type: none"> - Latest technology is dosing of ClO₂ in place of Cl₂. It is more effective and safe. - CT capability test to be carried out to identify the gaps. Meanwhile, blade angle of the fans taking less load may be increased by 1-

		<ul style="list-style-type: none"> - CW temperature more 	<p>2deg for better performance.</p> <ul style="list-style-type: none"> - FRP blades are recommended in place of GRP blades for reducing APC. - All the available CT fans may be run as it increases better vacuum and generation (on experimental basis standby fan was taken into service and found there was gain of 0.5MW in station)
		CW pumps	<ul style="list-style-type: none"> - Internal coating of CW pumps may be carried out for better efficiency
6a	General	<ul style="list-style-type: none"> - Civil 	<ul style="list-style-type: none"> - As the units are more than twenty years old Structural and civil foundation inspection may be carried out
6b		<ul style="list-style-type: none"> - BFP discharge pressure 80KSc, Drum pressure 38KSc 	<ul style="list-style-type: none"> - BFP DE-staging may be considered to reduce APC
6c		<ul style="list-style-type: none"> - Flue gas temperature at chimney is 210degC 	<ul style="list-style-type: none"> - The excess heat can be utilized by installing vapor absorption system for air conditioning of the plant.
7	ST control system	<ul style="list-style-type: none"> - Many critical parameters are not available - Control system is obsolete 	<ul style="list-style-type: none"> - Up gradation of the control system and governing system of combined cycle area for safe control, data capturing and efficient operation

8. CONCLUSION

- Regular parts replacement from time to time as per OEM recommendation is required to keep Gas Turbines in good health
- RLA of boilers must be carried out at 1 lakh running hours and then after every five years in line with IBR act.
- **The civil structure and foundations RLA to be carried out** as they have already crossed twenty years.

9. PHOTO GALLERY



GT exhaust parameters are within the limits.



MHI Gas Turbine U#3



Algae formation in CT cells



CW pump house civil structure



Cooling tower doors damaged



Hot spots in WHRS



WHRS economiser tubes - dust on the fins



Closing meeting with preliminary findings presentation

CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

No.L-1/236/2018/CERC

Dated 7th March, 2019

NOTIFICATION

In exercise of powers conferred under section 178 of the Electricity Act, 2003 (36 of 2003) read with Section 61 thereof and all other powers enabling it in this behalf, and after previous publication, the Central Electricity Regulatory Commission hereby makes the following regulations, namely:

CHAPTER - 1

PRELIMINARY

1. **Short title and commencement.** (1) These regulations may be called the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019.

(2) These regulations shall come into force on 1.4.2019, and unless reviewed earlier or extended by the Commission, shall remain in force for a period of five years from 1.4.2019 to 31.3.2024:

Provided that where a generating station or unit thereof and transmission system or an element thereof, has been declared under commercial operation before the date of commencement of these regulations and whose tariff has not been finally determined by the Commission till that date, tariff in respect of such generating station or unit thereof and transmission system or an element thereof for the period ending 31.3.2019 shall be determined in accordance with the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 as amended from time to time.

2. Scope and extent of application. (1) These regulations shall apply in all cases where tariff for a generating station or a unit thereof and a transmission system or an element thereof is required to be determined by the Commission under section 62 of the Act read with section 79 thereof:

Provided that any generating station for which agreement(s) have been executed for supply of electricity to the beneficiaries on or before 5.1.2011 and the financial closure for the said generating station has not been achieved by 31.3.2019, such projects shall not be eligible for determination of tariff under these regulations unless fresh consent of the beneficiaries is obtained and furnished.

(2) These regulations shall not apply to the following cases:-

- (a) Generating stations or transmission systems whose tariff has been discovered through tariff based competitive bidding in accordance with the guidelines

issued by the Central Government and adopted by the Commission under section 63 of the Act;

- (b) Generating stations based on renewable sources of energy whose tariff is determined in accordance with the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017.

3. Definitions. - In these regulations, unless the context otherwise requires:-

- (1) '**Act**' means the Electricity Act, 2003 (36 of 2003);
- (2) '**Additional Capital expenditure**' means the capital expenditure incurred, or projected to be incurred after the date of commercial operation of the project by the generating company or the transmission licensee, as the case may be, in accordance with the provisions of these regulations;
- (3) '**Additional Capitalisation**' means the additional capital expenditure admitted by the Commission after prudence check, in accordance with these regulations;
- (4) '**Admitted capital cost**' means the capital cost which has been allowed by the Commission for servicing through tariff after due prudence check in accordance with the relevant tariff regulations;

(5) '**Auxiliary Energy Consumption**' or '**AUX**' in relation to a period in case of a generating station means the quantum of energy consumed by auxiliary equipment of the generating station, such as the equipment being used for the purpose of operating plant and machinery including switchyard of the generating station and the transformer losses within the generating station, expressed as a percentage of the sum of gross energy generated at the generator terminals of all the units of the generating station;

Provided that auxiliary energy consumption shall not include energy consumed for supply of power to housing colony and other facilities at the generating station and the power consumed for construction works at the generating station and integrated coal mine;

Provided further that auxiliary energy consumption for compliance of revised emission standards, sewage treatment plant and external coal handling plant (jetty and associated infrastructure) shall be considered separately.

(6) '**Auditor**' means an auditor appointed by a generating company or a transmission licensee, as the case may be, in accordance with the provisions of sections 224, 233B and 619 of the Companies Act, 1956 (1 of 1956), as amended from time to time or Chapter X of the Companies Act, 2013 (18 of 2013) or any other law for the time being in force;

(7) '**Bank Rate**' means the one year marginal cost of lending rate (MCLR) of the State Bank of India issued from time to time plus 350 basis points;

(8) '**Beneficiary**' in relation to a generating station covered under clauses (a) or (b) of sub-section 1 of section 79 of the Act, means a distribution licensee who is purchasing electricity generated at such generating station by entering into a Power Purchase Agreement either directly or through a trading licensee on payment of capacity charges and energy charges;

Provided that where the distribution licensee is procuring power through a trading licensee, the arrangement shall be secured by the trading licensee through back to back power purchase agreement and power sale agreement.

Provided further that beneficiary shall also include any person who has been allocated capacity in any inter-State generating station by Government of India.

(9) '**Capital Cost**' means the capital cost as determined in accordance with Regulation 19 of these regulations;

(10) '**Change in Law**' means occurrence of any of the following events:

- (a) enactment, bringing into effect or promulgation of any new Indian law; or
- (b) adoption, amendment, modification, repeal or re-enactment of any existing Indian law; or
- (c) change in interpretation or application of any Indian law by a competent court, Tribunal or Indian Governmental Instrumentality which is the final authority under law for such interpretation or application; or
- (d) change by any competent statutory authority in any condition or covenant of

any consent or clearances or approval or licence available or obtained for the project; or

- (e) coming into force or change in any bilateral or multilateral agreement or treaty between the Government of India and any other Sovereign Government having implication for the generating station or the transmission system regulated under these regulations.

(11) '**Commission**' means the Central Electricity Regulatory Commission referred to in sub-section (1) of section 76 of the Act;

(12) '**Communication System**' means communication system as defined in sub-clause (h) of clause (i) of Regulation 2 of the Central Electricity Regulatory Commission (Communication System for inter-State transmission of electricity) Regulations, 2017;

(13) '**Competitive Bidding**' means a transparent process for procurement of equipment, services and works in which bids are invited by the project developer by open advertisement covering the scope and specifications of the equipment, services and works required for the project, and the terms and conditions of the proposed contract as well as the criteria by which bids shall be evaluated, and shall include domestic competitive bidding and international competitive bidding;

(14) '**Cut-off Date**' means the last day of the calendar month after thirty six months from the date of commercial operation of the project;

(15) '**Date of Commercial Operation**' or '**COD**' shall have the same meaning as defined in the Grid Code as amended from time to time;

(16) '**Declared Capacity**' or '**DC**' in relation to a generating station means, the capability to deliver ex-bus electricity in MW declared by such generating station in relation to any time-block of the day as defined in the Grid Code or whole of the day, duly taking into account the availability of fuel or water, and subject to further qualification in these regulations;

(17) '**De-capitalisation**' for the purpose of the tariff under these regulations, means reduction in Gross Fixed Assets of the project as admitted by the Commission corresponding to inter-unit transfer of assets or the assets taken out from service;

(18) '**De-commissioning**' means removal from service of a generating station or a unit thereof or transmission system including communication system or element thereof, after it is certified by the Central Electricity Authority or any other authorized agency, either on its own or on an application made by the project developer or the beneficiaries or both, that the project cannot be operated due to non-performance of the assets on account of technological obsolescence or uneconomic operation or a combination of these factors;

(19) '**Design Energy**' means the quantum of energy which can be generated in a 90% dependable year with 95% installed capacity of the hydro generating station;

(20) **'Element'** means an asset which has been distinctively defined under the scope of the transmission project in the Investment Approval such as transmission lines including line bays and line reactors, substations, bays, compensation device, Interconnecting Transformers;

(21) **'Existing Project'** means a project which has been declared under commercial operation on a date prior to 1.4.2019;

(22) **'Expansion project'** shall include any addition of new capacity to the existing generating station or augmentation of the transmission system, as the case may be;

(23) **'Expenditure Incurred'** means the fund, whether the equity or debt or both, actually deployed and paid in cash or cash equivalent, for creation or acquisition of a useful asset and does not include commitments or liabilities for which no payment has been released;

(24) **'Extended Life'** means the life of a generating station or unit thereof or transmission system or element thereof beyond the period of useful life, as may be determined by the Commission on case to case basis;

(25) **'Force Majeure'** for the purpose of these regulations means the events or circumstances or combination of events or circumstances including those stated below which partly or fully prevents the generating company or transmission licensee to complete the project within the time specified in the Investment Approval, and only if

such events or circumstances are not within the control of the generating company or transmission licensee and could not have been avoided, had the generating company or transmission licensee taken reasonable care or complied with prudent utility practices:

- (a) Act of God including lightning, drought, fire and explosion, earthquake, volcanic eruption, landslide, flood, cyclone, typhoon, tornado, geological surprises, or exceptionally adverse weather conditions which are in excess of the statistical measures for the last hundred years; or
- (b) Any act of war, invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, terrorist or military action; or
- (c) Industry wide strikes and labour disturbances having a nationwide impact in India; or
- (d) Delay in obtaining statutory approval for the project except where the delay is attributable to project developer;

(26) '**Fuel Supply Agreement**' means the agreement executed between the generating company and the fuel supplier for generation and supply of electricity to the beneficiaries;

(27) '**Generating Station**' shall have the same meaning as defined under sub-Section 30 of Section 2 of the Act and for the purpose of these regulations shall also include stages or blocks or units of a generating station;

(28) '**Generating Unit**' or '**Unit**' in relation to a thermal generating station (other than combined cycle thermal generating station) means steam generator, turbine-generator and auxiliaries, or in relation to a combined cycle thermal generating station, means turbine-generator and auxiliaries or combustion turbine-generator, associated waste heat recovery boiler, connected steam turbine- generator and auxiliaries, and in relation to a hydro generating station means turbine-generator and its auxiliaries;

(29) '**Grid Code**' means the Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2010;

(30) '**Gross Calorific Value**' or '**GCV**' in relation to a thermal generating station means the heat produced in kCal by complete combustion of one kilogram of solid fuel or one litre of liquid fuel or one standard cubic meter of gaseous fuel, as the case may be;

(31) '**GCV as Received**' means the GCV of coal as measured at the unloading point of the thermal generating station through collection, preparation and testing of samples from the loaded wagons, trucks, ropeways, Merry-Go-Round (MGR), belt conveyors and ships in accordance with the IS 436 (Part-1/ Section 1)- 1964:

Provided that the measurement of coal shall be carried out through sampling by third party to be appointed by the generating companies in accordance with the guidelines, if any, issued by Central Government:

Provided further that samples of coal shall be collected either manually or through hydraulic augur or through any other method considered suitable keeping in view the safety of personnel and equipment:

Provided also that the generating companies may adopt any advance technology for collection, preparation and testing of samples for measurement of GCV in a fair and transparent manner;

(32) '**Gross Station Heat Rate**' or '**SHR**' means the heat energy input in kCal required to generate one kWh of electrical energy at generator terminals of a thermal generating station;

(33) '**Implementation Agreement**' means any agreement or covenant entered into (i) between the transmission licensee and the generating company or (ii) between transmission licensee and developer of the interconnected transmission system for the execution of generation and transmission projects in a coordinated manner, laying down the project implementation schedule and mechanism for monitoring the progress of the projects;

(34) '**Indian Governmental Instrumentality**' means the Government of India, Governments of State (where the project is located) and any ministry or department or board or agency controlled by Government of India or Government of State where the project is located, or quasi-judicial authority constituted under the relevant statutes in India;

(35) '**Infirm Power**' means electricity injected into the grid prior to the date of commercial operation of a unit of the generating station in accordance with Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009;

(36) '**Input Price**' means the price of coal or lignite sourced from the integrated mines at which the coal or lignite is transferred to the generating station for the purpose of computing the energy charges for generation and supply of electricity to the beneficiaries and determined in accordance with Chapter 9 of these regulations;

(37) '**Installed Capacity**' or '**IC**' means the summation of the name plate capacities of all the units of the generating station or the capacity of the generating station reckoned at the generator terminals, as may be approved by the Commission from time to time;

(38) '**Integrated Mine**' means the captive mine (allocated for use in one or more identified generating station) or basket mine (allocated to a generating company for use in any of its generating stations) or both being developed by the generating company for supply of coal or lignite to one or more specified end use generating stations for generation and sale of electricity to the beneficiaries;

(39) '**Inter-State Generating Station**' or '**ISGS**' has the meaning as assigned in the Grid Code;

(40) '**Investment Approval**' means approval by the Board of the generating company or the transmission licensee or Cabinet Committee on Economic Affairs (CCEA) or any other competent authority conveying administrative sanction for the project including funding of the project and the timeline for the implementation of the project:

Provided that the date of Investment Approval shall reckon from the date of the resolution of the Board of the generating company or the transmission licensee where the Board is competent to accord such approval and from the date of sanction letter of competent authority in other cases;

(41) '**Landed Fuel Cost**' means the total cost of coal (including biomass in case of co-firing), lignite or the gas delivered at the unloading point of the generating station and shall include the base price or input price, washery charges wherever applicable, transportation cost (overseas or inland or both) and handling cost, charges for third party sampling and applicable statutory charges;

(42) '**Long-Term Customer**' shall have the same meaning as 'Long Term Customer' as defined in the Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009;

(43) '**Maximum Continuous Rating**' or '**MCR**' in relation to a generating unit of the thermal generating station means the maximum continuous output at the generator terminals, guaranteed by the manufacturer at rated parameters, and in relation to a

block of a combined cycle thermal generating station means the maximum continuous output at the generator terminals, guaranteed by the manufacturer with water or steam injection (if applicable) and corrected to 50 Hz grid frequency and specified site conditions;

(44) **'New Project'** means the generating station or unit thereof and the transmission system or element thereof achieving its commercial operation on or after 1.4.2019;

(45) **'Operation and Maintenance Expenses'** or **'O&M expenses'** means the expenditure incurred for operation and maintenance of the project, or part thereof, and includes the expenditure on manpower, maintenance, repairs and maintenance spares, consumables, insurance and overheads and fuel other than used for generation of electricity;

(46) **'Original Project Cost'** means the capital expenditure incurred by the generating company or the transmission licensee, as the case may be, within the original scope of the project up to the cut-off date, and as admitted by the Commission;

(47) **'Plant Availability Factor'** or **'(PAF)'** in relation to a generating station for any period means the average of the daily declared capacities (DCs) for all the days during the period expressed as a percentage of the installed capacity in MW less the normative auxiliary energy consumption;

(48) **'Plant Load Factor'** or **'(PLF)'** in relation to thermal generating station or unit for a

given period means the total sent out energy corresponding to scheduled generation during the period, expressed as a percentage of sent out energy corresponding to installed capacity in that period and shall be computed in accordance with the following formula:

$$PLF = 10000 \times \frac{\sum_{i=1}^N SG_i}{\{N \times IC \times (100 - AUX_n)\}} \%$$

Where,

- IC = Installed Capacity of the generating station or unit in MW,
 SG_i = Scheduled Generation in MW for the ith time block of the period,
 N = Number of time blocks during the period, and
 AUX_n = Normative Auxiliary Energy Consumption as a percentage of gross energy generation;

(49) '**Procedure Regulations**' means the Central Electricity Regulatory Commission (Procedure for making of application for determination of tariff, publication of the application and other related matters) Regulations, 2004;

(50) '**Project**' means:

- i) in case of thermal generating station, all components of the thermal generating station and includes integrated coal mine, biomass pellet handling system, pollution control system, effluent treatment plan, as may be required;
- ii) in case of hydro generating station, all components of the hydro generating station and includes dam, intake water conductor system, power generating

station, as apportioned to power generation; and

- iii) in case of transmission, all components of the transmission system including communication system;

(51) '**Prudence Check**' means scrutiny of reasonableness of any cost or expenditure incurred or proposed to be incurred in accordance with these regulations by the generating company or the transmission licensee, as the case may be;

(52) '**Pumped Storage Hydro Generating Station**' means a hydro generating station which generates power through energy stored in the form of water energy, pumped from a lower elevation reservoir to a higher elevation reservoir;

(53) '**Rated Voltage**' means the manufacturer's design voltage at which the transmission system is designed to operate and includes such lower voltage at which any transmission line is charged or for the time being charged, in consultation with long-term customers;

(54) '**Revised Emission Standards**' in respect of thermal generating station means the revised norms notified as per Environment (Protection) Amendment Rules, 2015 or any other Rules as may be notified from time to time;

(55) '**Run-of-River Generating Station**' means a hydro generating station which does not have upstream pondage;

(56) '**Run-of-River Generating Station with Pondage**' means a hydro generating

station with sufficient pondage for meeting the diurnal variation of power demand;

(57) **'Scheduled Commercial Operation Date or 'SCOD'** shall mean the date(s) of commercial operation of a generating station or generating unit thereof or transmission system or element thereof and associated communication system as indicated in the Investment Approval or as agreed in power purchase agreement or transmission service agreement as the case may be, whichever is earlier;

(58) **'Scheduled Energy'** means the quantum of energy scheduled by the concerned Load Despatch Centre to be injected into the grid by a generating station for a given time period;

(59) **'Scheduled Generation' or 'SG'** at any time or for any period or time block means schedule of ex-bus generation in MW or MWh, given by the concerned Load Despatch Centre;

Note:

For open cycle gas turbine generating station or a combined cycle generating station if the average frequency for any time-block, is below 49.52 Hz but not below 49.02 Hz and the scheduled generation is more than 98.5% of the declared capacity, the scheduled generation shall be deemed to have been reduced to 98.5% of the declared capacity, and if the average frequency for any time-block is below 49.02 Hz and the scheduled generation is more than 96.5% of the declared capacity, the scheduled generation shall be deemed to have been reduced to 96.5% of the declared capacity. In such an event of

reduction of scheduled generation of gas turbine generating station, the corresponding drawl schedule of beneficiaries shall be corrected in proportion to their scheduled drawl with adjustment of transmission losses on post facto basis.

(60) '**Sharing Regulations**' means Central Electricity Regulatory Commission (Sharing of Transmission Charges and Losses in inter-State Transmission System) Regulations, 2010;

(61) '**Small Gas Turbine Generating Station**' means and includes open cycle gas turbine or combined cycle generating station with gas turbines in the capacity range of 50 MW or below;

(62) '**Start Date or Zero Date**' means the date indicated in the Investment Approval for commencement of implementation of the project and where no such date has been indicated, the date of Investment Approval shall be deemed to be Start Date or Zero Date;

(63) '**Statutory Charges**' comprises taxes, cess, duties, royalties and other charges levied through Acts of the Parliament or State Legislatures or by Indian Government Instrumentality under relevant statutes;

(64) '**Storage Type Generating Station**' means a hydro generating station associated with storage capacity to enable variation of generation of electricity according to demand;

(65) '**Thermal Generating Station**' means a generating station or a unit thereof that generates electricity using fossil fuels such as coal, lignite, gas, liquid fuel or combination of these as its primary source of energy or co-firing of biomass with coal;

(66) '**Transmission Line**' shall have the same meaning as defined in sub-section (72) of Section 2 of the Act;

(67) '**Transmission Service Agreement**' means the agreement entered into between the transmission licensee and the Designated ISTS Customers in accordance with the Sharing Regulations and shall include the Bulk Power Transmission Agreement and Long Term Access Agreement;

(68) '**Transmission System**' means a line or a group of lines with or without associated sub-station, equipment associated with transmission lines and sub-stations identified under the scheme as per the Investment Approval(s) and shall include associated communication system;

(69) '**Trial Operation**' in relation to transmission system shall have the same meaning as specified in Clause (5) of Regulation 6.3A of Grid Code;

(70) '**Trial Run**' in relation to generating station shall have the same meaning as specified in Clause (3) of Regulation 6.3A of Grid Code;

(71) '**Sub-Station**' shall have the same meaning as defined in sub-section (69) of section 2 of the Act;

(72) **'Unloading Point'** means the point within the premises of the coal or lignite based thermal generating station where the coal or lignite is unloaded from the rake or truck or any other mode of transport;

(73) **'Useful Life'** in relation to a unit of a generating station, integrated mines, transmission system and communication system from the date of commercial operation shall mean the following:

(a)	Coal/Lignite based thermal generating station	25 years
(b)	Gas/Liquid fuel based thermal generating station	25 years
(c)	AC and DC sub-station	25 years
(d)	Gas Insulated Substation (GIS)	25 years
(e)	Hydro generating station including pumped storage hydro generating stations	40 years
(f)	Transmission line (including HVAC & HVDC)	35 years
(g)	Communication system	15 years

Provided that the extension of life of the projects beyond the completion of their useful life shall be decided by the Commission on case to case basis;

(74) The words and expressions used in these regulations and not defined herein but defined in the Act or any other regulations of the Commission, shall have the meaning assigned to them under the Act or any other regulations of the Commission.

4. Interpretations:- In these regulations, unless the context otherwise requires:

- (1) **'Day'** means a calendar day consisting of 24 hours period starting at 0000 hours;
- (2) **'kCal'** means a unit of heat energy contents in mineral, measured in one kilo calories or one thousand calories of heat produced at any instantaneous period;
- (3) **'Kilowatt-Hour' or 'kWh'** means a unit of electrical energy, measured in one kilowatt or one thousand watts of power produced or consumed over a period of one hour;
- (4) **'Quarter'** means the period of three months commencing on the first day of April, July, October and January of each financial year in case of existing project, and in case of a new project, in respect of the first quarter, from the date of commercial operation to the last day of June, September, December or March, as the case may be;
- (5) **'Year'** means a financial year from 1st April to 31st March in case of an existing project, and from date of commercial operation to 31st March in case of a new project;
- (6) Reference to any Act, Rules and Regulations shall include amendment or consolidation or re-enactment thereof.

CHAPTER - 2

DATE OF COMMERCIAL OPERATION

5. Date of Commercial Operation: (1) The date of commercial operation of a generating station or unit thereof or a transmission system or element thereof and associated communication system shall be determined in accordance with the provisions of the Grid Code.

(2) In case the transmission system or element thereof executed by a transmission licensee is ready for commercial operation but the interconnected generating station or the transmission system of other transmission licensee as per the agreed project implementation schedule is not ready for commercial operation, the transmission licensee may file petition before the Commission for approval of the date of commercial operation of such transmission system or element thereof:

Provided that the transmission licensee seeking the approval of the date of commercial operation under this clause shall give prior notice of at least one month, to the generating company or the other transmission licensee and the long term customers of its transmission system, as the case may be, regarding the date of commercial operation:

Provided further that the transmission licensee seeking the approval of the date of commercial operation of the transmission system under this clause shall be required to submit the following documents along with the petition:

- (a) Energisation certificate issued by the Regional Electrical Inspector under Central Electricity Authority;
- (b) Trial operation certificate issued by the concerned RLDC for charging element with or without electrical load;
- (c) Implementation Agreement, if any, executed by the parties;
- (d) Minutes of the coordination meetings or related correspondences regarding the monitoring of the progress of the generating station and transmission systems;
- (e) Notice issued by the transmission licensee as per the first proviso under this clause and the response;
- (f) Certificate of the CEO or MD of the company regarding the completion of the transmission system including associated communication system in all respects.

6. Treatment of mismatch in date of commercial operation: (1) In case of mismatch of the date of commercial operation of the generating station and the transmission system, the liability for the transmission charges shall be determined as under:

- (a) Where the generating station has not achieved the commercial operation as on the date of commercial operation of the associated transmission system (which is not before the SCOD of the generating station) and the Commission has approved the date of commercial operation of such transmission system in terms

of clause (2) of the Regulation 5 of these regulations, the generating company shall be liable to pay the transmission charges of the associated transmission system in accordance with clause (5) of Regulation 14 of these regulations to the transmission licensee till the generating station or unit thereof achieves commercial operation:

(b) Where the associated transmission system has not achieved the commercial operation as on the date of commercial operation of the concerned generating station or unit thereof (which is not before the SCOD of the transmission system), the transmission licensee shall make alternate arrangement for the evacuation from the generating station at its own cost, failing which, the transmission licensee shall be liable to pay the transmission charges to the generating company as determined by the Commission, in accordance with clause (5) of Regulation 14 of these regulations, till the transmission system achieves the commercial operation.

(2) In case of mismatch of the date of commercial operation of the transmission system and the transmission system of other transmission licensee, the liability for the transmission charges shall be determined as under:

(a) Where an interconnected transmission system of other transmission licensee has not achieved the commercial operation as on the date of commercial operation of the transmission system (which is not before the SCOD of the

interconnected transmission system) and the Commission has approved the date of commercial operation of such transmission system in terms of clause (2) of Regulation 5 of these regulations, the other transmission licensee shall be liable to pay the transmission charges of the transmission system in accordance with clause (5) of Regulation 14 of these regulations to the transmission licensee till the interconnected transmission system achieves commercial operation:

- (b) Where the transmission system has not achieved the commercial operation as on the date of commercial operation of the interconnected transmission system of other transmission licensee (which is not before the SCOD of the transmission system), the transmission licensee shall be liable to pay the transmission charges of such interconnected transmission system to the other transmission licensee or as may be determined by the Commission, in accordance with clause (5) of Regulation 14 of these regulations, till the transmission system achieves the commercial operation.

7. Sale of Infirm Power: Supply of infirm power shall be accounted as deviation and shall be paid for from the regional deviation settlement fund accounts in accordance with the Central Electricity Regulatory Commission (Deviation Settlement Mechanism and Related matters) Regulations, 2014:

Provided that any revenue earned by the generating company from supply of infirm power after accounting for the fuel expenses shall be applied in adjusting the capital cost accordingly.

CHAPTER - 3

PROCEDURE FOR TARIFF DETERMINATION

8. Tariff determination

(1) Tariff in respect of a generating station may be determined for the whole of the generating station or unit thereof, and tariff in respect of a transmission system may be determined for the whole of the transmission system or element thereof or associated communication system:

Provided that:

- (i) In case of commercial operation of all the units of a generating station or all elements of a transmission system prior to 1.4.2019, the generating company or the transmission licensee, as the case may be, shall file consolidated petition in respect of the entire generating station or transmission system for the purpose of determination of tariff for the period 1.4.2019 to 31.3.2024:
- (ii) In case of commercial operation of units of generating station or elements of the transmission system on or after 1.4.2019, the generating company or the transmission licensee shall file a consolidated petition, in accordance with the provisions of the Procedure Regulations, combining all the units of the generating station or all elements of the transmission system which are anticipated to achieve commercial operation during the next two months from the date of application:
- (iii) Tariff of the associated communication system forming part of transmission

system which has achieved commercial operation prior to 1.4.2014 shall be as per the methodology approved by the Commission prior to 1.4.2014.

(2) Where only a part of the generation capacity of a generating station is tied up for supplying power to the beneficiaries through long term power purchase agreement, the units for such part capacity shall be clearly identified and in such cases, the tariff shall be determined for such identified capacity. Where the unit(s) corresponding to such part capacity cannot be identified, the tariff of the generating station may be determined with reference to the capital cost of the entire project, but tariff so determined shall be applicable corresponding to the part capacity contracted for supply to the beneficiaries.

(3) In case of expansion of existing generating station, the tariff shall be determined for the expanded capacity in accordance with these regulations:

Provided that the common infrastructure of existing generating station, shall be utilized for the expanded capacity and the benefit of new technology in the expanded capacity, as determined by the Commission, shall be extended to the existing capacity.

(4) Assets installed for implementation of the revised emission standards shall form part of the existing generation project and tariff thereof shall be determined separately on submission of the completion certificate by the Board of the generating company.

(5) Energy charge component of tariff of the generating station sourcing coal or lignite from the integrated mine shall be determined based on the input price of coal or lignite,

as the case may be, from such integrated mines:

Provided that the generating company shall maintain the account of the integrated mine separately and submit the cost of integrated mine, in accordance with these regulations, duly certified by the Auditor.

(6) Tariff of generating station using coal washery rejects developed by Central or State PSUs or Joint Venture between a Government Company and company other than Government Company shall be determined in accordance with these regulations:

Provided that in case of Joint Venture between a Government Company and a Company other than Government Company, the shareholding of the company other than Government Company either directly or through any of its subsidiary company or associate company shall not exceed 26% of the paid up share capital:

Provided further that the energy charge component of the tariff of such generating station or unit thereof shall be determined based on the fixed cost and the variable cost of the coal washery project:

Provided also that the Gross Calorific Value of coal rejects shall be as measured jointly by the generating company and the beneficiaries.

(7) In case of multi-purpose hydro schemes, with irrigation, flood control and power components, the capital cost chargeable to the power component of the scheme only shall be considered for determination of tariff.

(8) If an existing transmission project is granted licence under section 14 of the Act

read with clause (c) of Regulation 6 of the Central Electricity Regulatory Commission (Terms and Conditions of grant of Transmission Licence for inter-State Transmission of electricity and related matters) Regulations, 2009, the tariff of such project shall be applicable from the date of grant of transmission licence or from the date as indicated in the transmission licence, as the case may be. In such cases, the applicant shall file petition as per **Annexure-I (Part III)** to these regulations, clearly demarcating the assets which form part of the business of generation and transmission, the value of such assets, source of funding and other relevant details after adjusting the cumulative depreciation and loan repayment, duly certified by the Auditor.

9. Application for determination of tariff

(1) The generating company or the transmission licensee may make an application for determination of tariff for new generating station or unit thereof or transmission system or element thereof in accordance with the Procedure Regulations within 60 days of the anticipated date of commercial operation:

Provided that where the transmission system comprises various elements, the transmission licensee shall file an application for determination of tariff for a group of elements on incurring of expenditure of not less than 70% of the cost envisaged in the Investment Approval or Rs. 200 Crore, whichever is lower, as on the anticipated date of commercial operation:

Provided further that the generating company or the transmission licensee, as the

case may be, shall submit Auditor Certificate and in case of non-availability of Auditor Certificate, a Management Certificate duly signed by an authorised person, not below the level of Director of the company, indicating the capital cost incurred as on the date of commercial operation and the projected additional capital expenditure for respective years of the tariff period 2019-24:

Provided also that where interim tariff of the generating station or unit thereof and the transmission system or element thereof including communication system has been determined based on Management Certificate, the generating company or the transmission licensee shall submit the Auditor Certificate not later than 60 days from date of granting interim tariff.

(2) In case of an existing generating station or unit thereof, or transmission system or element thereof, the application shall be made by the generating company or the transmission licensee, as the case may be, by 31.10.2019, based on admitted capital cost including additional capital expenditure already admitted and incurred up to 31.3.2019 (either based on actual or projected additional capital expenditure) and estimated additional capital expenditure for the respective years of the tariff period 2019-24 along with the true up petition for the period 2014-19 in accordance with the CERC (Terms and Conditions of Tariff) Regulations, 2014.

(3) In case of emission control system required to be installed in existing generating station or unit thereof to meet the revised emission standards, an application shall be

made for determination of supplementary tariff (capacity charges or energy charge or both) based on the actual capital expenditure duly certified by the Auditor.

(4) Where the generating company has the arrangement for supply of coal or lignite from an integrated mine(s) to one or more of its generating stations, the generating company shall file a petition for determination of the input price for determining the energy charge along with the tariff petitions for one or more generating stations in accordance with the provision of Chapter 9 of these regulations.

10. Determination of tariff

(1) The generating company or the transmission licensee, as the case may be, shall file petition before the Commission as per **Annexure-I** to these regulations containing the details of underlying assumptions for the capital expenditure and additional capital expenditure incurred and projected to be incurred, wherever applicable.

(2) If the petition is inadequate in any respect as required under **Annexure-I** to these regulations, the application shall be returned to the generating company or transmission licensee, as the case may be, for resubmission of the petition within one month after rectifying the deficiencies as may be pointed out by the staff of the Commission.

(3) If the information furnished in the petition is in accordance with these regulations and is adequate for carrying out prudence check of the claims made, the Commission

may consider granting interim tariff in case of new projects.

(4) In case of the existing projects, the generating company or the transmission licensee, as the case may be, shall continue to bill the beneficiaries or the long term customers at the capacity charges or the transmission charges respectively as approved by the Commission and applicable as on 31.3.2019 for the period starting from 1.4.2019 till approval of final capacity charges or transmission charges by the Commission in accordance with these regulations:

Provided that the billing for energy charges w.e.f. 1.4.2019 shall be as per the operational norms specified in these regulations.

(5) The Commission shall grant final tariff in case of existing and new projects, after considering the replies received from the respondents, and suggestions and objections, if any, received from the general public and any other person permitted by the Commission including the consumers or consumer associations.

(6) The Commission may hear the petitioner, the respondents and any other person permitted including the consumers or consumer associations while granting interim or final tariff.

(7) The difference between the tariff determined in accordance with clauses (3) and (5) above and clauses (4) and (5) above, shall be recovered from or refunded to, the beneficiaries or the long term customers, as the case may be, with simple interest at the

rate equal to the bank rate prevailing as on 1st April of the respective year of the tariff period, in six equal monthly instalments.

(8) Where the capital cost considered by the Commission on the basis of projected additional capital expenditure exceeds the actual additional capital expenditure incurred on year to year basis by more than 10%, the generating company or the transmission licensee shall refund to the beneficiaries or the long term customers as the case may be, the tariff recovered corresponding to the additional capital expenditure not incurred, as approved by the Commission, along with interest at 1.20 times of the bank rate as prevalent on 1st April of the respective year.

(9) Where the capital cost considered by the Commission on the basis of projected additional capital expenditure falls short of the actual additional capital expenditure incurred by more than 10% on year to year basis, the generating company or the transmission licensee shall recover from the beneficiaries or the long term customers as the case may be, the shortfall in tariff corresponding to difference in additional capital expenditure, as approved by the Commission, along with interest at the bank rate as prevalent on 1st April of the respective year.

11. In-principle approval in specific circumstances: The generating company or the transmission licensee undertaking any additional capitalization on account of change in law events or force majeure conditions may file petition for in-principle approval for

incurring such expenditure after prior notice to the beneficiaries or the long term customers, as the case may be, along with underlying assumptions, estimates and justification for such expenditure if the estimated expenditure exceeds 10% of the admitted capital cost of the project or Rs.100 Crore, whichever is lower.

12. Truing up of tariff for the period 2014-19: The tariff of the generating stations and the transmission systems for the period 2014-19 shall be trued up in accordance with the provisions of Regulation 8 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 along with the tariff petition for the period 2019-24. The capital cost admitted as on 31.3.2019 based on the truing up shall form the basis of the opening capital cost as on 1.4.2019 for the tariff determination for the period 2019-24.

13. Truing up of tariff for the period 2019-24: (1) The Commission shall carry out truing up exercise for the period 2019-24 along with the tariff petition filed for the next tariff period, for the following:

- a) the capital expenditure including additional capital expenditure incurred up to 31.3.2024, as admitted by the Commission after prudence check at the time of truing up:
- b) the capital expenditure including additional capital expenditure incurred up to 31.3.2024, on account of Force Majeure and Change in Law.

(2) The generating company or the transmission licensee, as the case may be, shall make an application, as per **Annexure-I** to these regulations, for carrying out truing up exercise in respect of the generating station or a unit thereof or the transmission system or an element thereof by 30.11.2024.

(3) The generating company or the transmission licensee, as the case may be, may make an application for interim truing up of tariff in the year 2021-22, if the annual fixed cost increases by more than 20% over the annual fixed cost as determined by the Commission for the respective years of the tariff period:

Provided that if the actual additional capital expenditure falls short of the projected additional capital expenditure allowed under provisions of Chapter 7 of these regulations, the generating company or the transmission licensee, as the case may be, shall not be required to file any interim true up petition for this purpose and shall refund to the beneficiaries or the long term customers, as the case may be, the excess tariff recovered corresponding to the projected additional capital expenditure not incurred at the bank rate as on 1st April of the respective years, under intimation to the Commission:

Provided further that the generating company or the transmission licensee shall submit the complete details along with the calculations of the refunds made to the beneficiaries or the long term customers, as the case may be, at the time of true up.

(4) After truing up, if the tariff already recovered exceeds or falls short of the tariff

approved by the Commission under these regulations, the generating company or the transmission licensee, shall refund to or recover from, the beneficiaries or the long term customers, as the case may be, the excess or the shortfall amount along with simple interest at the rate equal to the bank rate as on 1st April of the respective years of the tariff period in six equal monthly instalments.

CHAPTER - 4

TARIFF STRUCTURE

14. Components of Tariff: (1) The tariff for supply of electricity from a thermal generating station shall comprise two parts, namely, capacity charge (for recovery of annual fixed cost consisting of the components as specified in Regulation 15 of these regulations) and energy charge (for recovery of primary and secondary fuel cost and cost of limestone and any other reagent, where applicable as specified in Regulation 16 of these regulations).

(2) The supplementary capacity charges for additional capitalization and supplementary energy charges, on account of implementation of revised emission standards in existing generating station or new generating station, as the case may be, shall be determined by the Commission separately.

(3) The capacity charge and energy charge of a generating station shall be determined in accordance with the provisions of Chapter 11 of these regulations. The input price of coal or lignite from the integrated mine as determined in accordance with the provisions of Chapter 9 of these regulations shall form part of energy charge of the generating station.

(4) The tariff for supply of electricity from a hydro generating station shall comprise capacity charge and energy charge to be derived in the manner specified in Regulation 44 or 45 of these regulations, as may be applicable, for recovery of annual fixed cost consisting of the components referred to in Regulation 15 of these regulations.

(5) The tariff for transmission of electricity on inter-State transmission system shall comprise transmission charges for recovery of annual fixed cost consisting of the components specified in Regulation 15 of these regulations.

15. Capacity Charges: The capacity charges shall be derived on the basis of annual fixed cost. The Annual Fixed Cost (AFC) of a generating station or a transmission system including communication system shall consist of the following components:

- (a) Return on equity;
- (b) Interest on loan capital;
- (c) Depreciation;
- (d) Interest on working capital; and
- (e) Operation and maintenance expenses:

Provided that Special Allowance in lieu of R&M, where opted in accordance with Regulation 28 of these regulations, shall be recovered separately and shall not be considered for computation of working capital.

16. Energy Charges: Energy charges shall be derived on the basis of the landed fuel cost (LFC) of a generating station (excluding hydro) and shall consist of the following cost:

- (a) Landed Fuel Cost of primary fuel;
- (b) Cost of secondary fuel oil consumption; and
- (c) Cost of limestone or any other reagent, as applicable:

Provided that any refund of taxes and duties along with any amount received

on account of penalties from fuel supplier shall be adjusted in fuel cost:

Provided further that the supplementary energy charges, if any, on account of meeting the revised emission standards in case of a thermal generating station shall be determined separately by the Commission.

17. Special Provisions for Tariff for Thermal Generating Station which have Completed 25 Years of Operation from Date of Commercial Operation: (1) In respect of a thermal generating station that has completed 25 years of operation from the date of commercial operation, the generating company and the beneficiary may agree on an arrangement, including provisions for target availability and incentive, where in addition to the energy charge, capacity charges determined under these regulations shall also be recovered based on scheduled generation.

(2) The beneficiary shall have the first right of refusal and upon its refusal to enter into an arrangement as above, the generating company shall be free to sell the electricity generated from such station in a manner as it deems fit.

CHAPTER - 5
CAPITAL STRUCTURE

18. Debt-Equity Ratio: (1) For new projects, the debt-equity ratio of 70:30 as on date of commercial operation shall be considered. If the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan:

Provided that:

- i. where equity actually deployed is less than 30% of the capital cost, actual equity shall be considered for determination of tariff:
- ii. the equity invested in foreign currency shall be designated in Indian rupees on the date of each investment:
- iii. any grant obtained for the execution of the project shall not be considered as a part of capital structure for the purpose of debt: equity ratio.

Explanation-The premium, if any, raised by the generating company or the transmission licensee, as the case may be, while issuing share capital and investment of internal resources created out of its free reserve, for the funding of the project, shall be reckoned as paid up capital for the purpose of computing return on equity, only if such premium amount and internal resources are actually utilised for meeting the capital expenditure of the generating station or the transmission system.

(2) The generating company or the transmission licensee, as the case may be, shall submit the resolution of the Board of the company or approval of the competent authority in other cases regarding infusion of funds from internal resources in support of the utilization made or proposed to be made to meet the capital expenditure of the

generating station or the transmission system including communication system, as the case may be.

(3) In case of the generating station and the transmission system including communication system declared under commercial operation prior to 1.4.2019, debt: equity ratio allowed by the Commission for determination of tariff for the period ending 31.3.2019 shall be considered:

Provided that in case of a generating station or a transmission system including communication system which has completed its useful life as on or after 1.4.2019, if the equity actually deployed as on 1.4.2019 is more than 30% of the capital cost, equity in excess of 30% shall not be taken into account for tariff computation;

Provided further that in case of projects owned by Damodar Valley Corporation, the debt: equity ratio shall be governed as per sub-clause (ii) of clause (2) of Regulation 72 of these regulations.

(4) In case of the generating station and the transmission system including communication system declared under commercial operation prior to 1.4.2019, but where debt: equity ratio has not been determined by the Commission for determination of tariff for the period ending 31.3.2019, the Commission shall approve the debt: equity ratio in accordance with clause (1) of this Regulation.

(5) Any expenditure incurred or projected to be incurred on or after 1.4.2019 as may be admitted by the Commission as additional capital expenditure for determination of tariff, and renovation and modernisation expenditure for life extension shall be serviced in the manner specified in clause (1) of this Regulation.

CHAPTER - 6
COMPUTATION OF CAPITAL COST

19. Capital Cost: (1) The Capital cost of the generating station or the transmission system, as the case may be, as determined by the Commission after prudence check in accordance with these regulations shall form the basis for determination of tariff for existing and new projects.

(2) The Capital Cost of a new project shall include the following:

- (a) The expenditure incurred or projected to be incurred up to the date of commercial operation of the project;
- (b) Interest during construction and financing charges, on the loans (i) being equal to 70% of the funds deployed, in the event of the actual equity in excess of 30% of the funds deployed, by treating the excess equity as normative loan, or (ii) being equal to the actual amount of loan in the event of the actual equity less than 30% of the funds deployed;
- (c) Any gain or loss on account of foreign exchange risk variation pertaining to the loan amount availed during the construction period;
- (d) Interest during construction and incidental expenditure during construction as computed in accordance with these regulations;
- (e) Capitalised initial spares subject to the ceiling rates in accordance with these regulations;
- (f) Expenditure on account of additional capitalization and de-capitalisation determined in accordance with these regulations;

- (g) Adjustment of revenue due to sale of infirm power in excess of fuel cost prior to the date of commercial operation as specified under Regulation 7 of these regulations;
- (h) Adjustment of revenue earned by the transmission licensee by using the assets before the date of commercial operation;
- (i) Capital expenditure on account of ash disposal and utilization including handling and transportation facility;
- (j) Capital expenditure incurred towards railway infrastructure and its augmentation for transportation of coal upto the receiving end of the generating station but does not include the transportation cost and any other appurtenant cost paid to the railway;
- (k) Capital expenditure on account of biomass handling equipment and facilities, for co-firing;
- (l) Capital expenditure on account of emission control system necessary to meet the revised emission standards and sewage treatment plant;
- (m) Expenditure on account of fulfilment of any conditions for obtaining environment clearance for the project;
- (n) Expenditure on account of change in law and force majeure events; and
- (o) Capital cost incurred or projected to be incurred by a thermal generating station, on account of implementation of the norms under Perform, Achieve and Trade (PAT) scheme of Government of India shall be considered by the Commission subject to sharing of benefits accrued under the PAT scheme with the beneficiaries.

- (3) The Capital cost of an existing project shall include the following:
- (a) Capital cost admitted by the Commission prior to 1.4.2019 duly trued up by excluding liability, if any, as on 1.4.2019;
 - (b) Additional capitalization and de-capitalization for the respective year of tariff as determined in accordance with these regulations;
 - (c) Capital expenditure on account of renovation and modernisation as admitted by this Commission in accordance with these regulations;
 - (d) Capital expenditure on account of ash disposal and utilization including handling and transportation facility;
 - (e) Capital expenditure incurred towards railway infrastructure and its augmentation for transportation of coal upto the receiving end of generating station but does not include the transportation cost and any other appurtenant cost paid to the railway; and
 - (f) Capital cost incurred or projected to be incurred by a thermal generating station, on account of implementation of the norms under Perform, Achieve and Trade (PAT) scheme of Government of India shall be considered by the Commission subject to sharing of benefits accrued under the PAT scheme with the beneficiaries.
- (4) The capital cost in case of existing or new hydro generating station shall also include:
- (a) cost of approved rehabilitation and resettlement (R&R) plan of the project in conformity with National R&R Policy and R&R package as approved; and
 - (b) cost of the developer's 10% contribution towards Rajiv Gandhi Grameen

Vidyutikaran Yojana (RGGVY) and Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) project in the affected area.

(5) The following shall be excluded from the capital cost of the existing and new projects:

- (a) The assets forming part of the project, but not in use, as declared in the tariff petition;
- (b) De-capitalised Assets after the date of commercial operation on account of replacement or removal on account of obsolescence or shifting from one project to another project:

Provided that in case replacement of transmission asset is recommended by Regional Power Committee, such asset shall be de-capitalised only after its redeployment;

Provided further that unless shifting of an asset from one project to another is of permanent nature, there shall be no de-capitalization of the concerned assets.

- (c) In case of hydro generating stations, any expenditure incurred or committed to be incurred by a project developer for getting the project site allotted by the State Government by following a transparent process;
- (d) Proportionate cost of land of the existing project which is being used for generating power from generating station based on renewable energy; and
- (e) Any grant received from the Central or State Government or any statutory body or authority for the execution of the project which does not carry any liability of repayment.

20. Prudence Check of Capital Cost : The following principles shall be adopted for prudence check of capital cost of the existing or new projects:

(1) In case of the thermal generating station and the transmission system, prudence check of capital cost shall include scrutiny of the capital expenditure, in the light of capital cost of similar projects based on past historical data, wherever available, reasonableness of financing plan, interest during construction, incidental expenditure during construction, use of efficient technology, cost over-run and time over-run, procurement of equipment and materials through competitive bidding and such other matters as may be considered appropriate by the Commission:

Provided that, while carrying out the prudence check, the Commission shall also examine whether the generating company or transmission licensee, as the case may be, has been careful in its judgments and decisions in execution of the project.

(2) The Commission may, for the purpose of vetting of capital cost of hydro generating stations, appoint an independent agency or an expert body:

Provided that the Designated Independent Agency already appointed under the guidelines issued by the Commission under Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2009 shall continue till completion of the assigned project.

(3) Where the power purchase agreement entered into between the generating company and the beneficiaries provides for ceiling of actual capital expenditure, the Commission shall take into consideration such ceiling for prudence check.

(4) The generating company or the transmission licensee, as the case may be, shall

furnish the capital cost for execution of the existing and new projects as per **Annexure-I** to these regulations along with tariff petition for the purpose of creating a database of benchmark capital cost of various components.

21. Interest During Construction (IDC) and Incidental Expenditure during Construction (IEDC)

(1) Interest during construction (IDC) shall be computed corresponding to the loan from the date of infusion of debt fund, and after taking into account the prudent phasing of funds upto SCOD.

(2) Incidental expenditure during construction (IEDC) shall be computed from the zero date, taking into account pre-operative expenses upto SCOD:

Provided that any revenue earned during construction period up to SCOD on account of interest on deposits or advances, or any other receipts shall be taken into account for reduction in incidental expenditure during construction.

(3) In case of additional costs on account of IDC and IEDC due to delay in achieving the COD, the generating company or the transmission licensee as the case may be, shall be required to furnish detailed justifications with supporting documents for such delay including prudent phasing of funds in case of IDC and details of IEDC during the period of delay and liquidated damages recovered or recoverable corresponding to the delay.

(4) If the delay in achieving the COD is not attributable to the generating company or the transmission licensee, IDC and IEDC beyond SCOD may be allowed after prudence

check and the liquidated damages, if any, recovered from the contractor or supplier or agency shall be adjusted in the capital cost of the generating station or the transmission system, as the case may be.

(5) If the delay in achieving the COD is attributable either in entirety or in part to the generating company or the transmission licensee or its contractor or supplier or agency, in such cases, IDC and IEDC beyond SCOD may be disallowed after prudence check either in entirety or on pro-rata basis corresponding to the period of delay not condoned and the liquidated damages, if any, recovered from the contractor or supplier or agency shall be retained by the generating company or the transmission licensee, as the case may be.

22. Controllable and Uncontrollable factors: The following shall be considered as controllable and uncontrollable factors for deciding time over-run, cost escalation, IDC and IEDC of the project:

(1) The “controllable factors” shall include but shall not be limited to the following:

- a. Efficiency in the implementation of the project not involving approved change in scope of such project, change in statutory levies or change in law or force majeure events; and
- b. Delay in execution of the project on account of contractor or supplier or agency of the generating company or transmission licensee.

(2) The “uncontrollable factors” shall include but shall not be limited to the following:

- a. Force Majeure events;

- b. Change in law; and
- c. Land acquisition except where the delay is attributable to the generating company or the transmission licensee.

23. Initial Spares: Initial spares shall be capitalised as a percentage of the Plant and Machinery cost, subject to following ceiling norms:

(a)	Coal-based/lignite-fired thermal generating stations	-	4.0%
(b)	Gas Turbine/Combined Cycle thermal generating stations	-	4.0%
(c)	Hydro generating stations including pumped storage hydro generating station	-	4.0%
(d)	Transmission system		
	(i) Transmission line	-	1.00%
	(ii) Transmission Sub-station		
	- Green Field	-	4.00%
	- Brown Field	-	6.00%
	(iii) Series Compensation devices and HVDC Station	-	4.00%
	(iv) Gas Insulated Sub-station (GIS)		
	- Green Field	-	5.00%
	- Brown Field	-	7.00%
	(v) Communication system	-	3.50%
	(vi) Static Synchronous Compensator	-	6.00%

Provided that:

- i. Plant and Machinery cost shall be considered as the original project cost excluding IDC, IEDC, Land Cost and Cost of Civil Works. The generating

company and the transmission licensee for the purpose of estimating Plant and Machinery Cost, shall submit the break-up of head wise IDC and IEDC in its tariff application;

- ii. where the generating station has any transmission equipment forming part of the generation project, the ceiling norms for initial spares for such equipment shall be as per the ceiling norms specified for transmission system under these regulations.

CHAPTER - 7

COMPUTATION OF ADDITIONAL CAPITAL EXPENDITURE**24. Additional Capitalisation within the original scope and upto the cut-off date**

(1) The additional capital expenditure in respect of a new project or an existing project incurred or projected to be incurred, on the following counts within the original scope of work, after the date of commercial operation and up to the cut-off date may be admitted by the Commission, subject to prudence check:

- (a) Undischarged liabilities recognized to be payable at a future date;
- (b) Works deferred for execution;
- (c) Procurement of initial capital spares within the original scope of work, in accordance with the provisions of Regulation 23 of these regulations;
- (d) Liabilities to meet award of arbitration or for compliance of the directions or order of any statutory authority or order or decree of any court of law;
- (e) Change in law or compliance of any existing law; and
- (f) Force Majeure events:

Provided that in case of any replacement of the assets, the additional capitalization shall be worked out after adjusting the gross fixed assets and cumulative depreciation of the assets replaced on account of de-capitalization.

(2) The generating company or the transmission licensee, as the case may be shall submit the details of works asset wise/work wise included in the original scope of

work along with estimates of expenditure, liabilities recognized to be payable at a future date and the works deferred for execution.

25. Additional Capitalisation within the original scope and after the cut-off date:

(1) The additional capital expenditure incurred or projected to be incurred in respect of an existing project or a new project on the following counts within the original scope of work and after the cut-off date may be admitted by the Commission, subject to prudence check:

- (a) Liabilities to meet award of arbitration or for compliance of the directions or order of any statutory authority, or order or decree of any court of law;
- (b) Change in law or compliance of any existing law;
- (c) Deferred works relating to ash pond or ash handling system in the original scope of work;
- (d) Liability for works executed prior to the cut-off date;
- (e) Force Majeure events;
- (f) Liability for works admitted by the Commission after the cut-off date to the extent of discharge of such liabilities by actual payments; and
- (g) Raising of ash dyke as a part of ash disposal system.

(2) In case of replacement of assets deployed under the original scope of the existing project after cut-off date, the additional capitalization may be admitted by the Commission, after making necessary adjustments in the gross fixed assets and the cumulative depreciation, subject to prudence check on the following grounds:

- (a) The useful life of the assets is not commensurate with the useful life of the project

and such assets have been fully depreciated in accordance with the provisions of these regulations;

- (b) The replacement of the asset or equipment is necessary on account of change in law or Force Majeure conditions;
- (c) The replacement of such asset or equipment is necessary on account of obsolescence of technology; and
- (d) The replacement of such asset or equipment has otherwise been allowed by the Commission.

26. Additional Capitalisation beyond the original scope

(1) The capital expenditure, in respect of existing generating station or the transmission system including communication system, incurred or projected to be incurred on the following counts beyond the original scope, may be admitted by the Commission, subject to prudence check:

- (a) Liabilities to meet award of arbitration or for compliance of order or directions of any statutory authority, or order or decree of any court of law;
- (b) Change in law or compliance of any existing law;
- (c) Force Majeure events;
- (d) Need for higher security and safety of the plant as advised or directed by appropriate Indian Government Instrumentality or statutory authorities responsible for national or internal security;
- (e) Deferred works relating to ash pond or ash handling system in additional to the original scope of work, on case to case basis:

Provided also that if any expenditure has been claimed under Renovation and Modernisation (R&M) or repairs and maintenance under O&M expenses, the same shall not be claimed under this Regulation;

- (f) Usage of water from sewage treatment plant in thermal generating station.
- (2) In case of de-capitalisation of assets of a generating company or the transmission licensee, as the case may be, the original cost of such asset as on the date of de-capitalisation shall be deducted from the value of gross fixed asset and corresponding loan as well as equity shall be deducted from outstanding loan and the equity respectively in the year such de-capitalisation takes place with corresponding adjustments in cumulative depreciation and cumulative repayment of loan, duly taking into consideration the year in which it was capitalised.

27. Additional Capitalisation on account of Renovation and Modernisation

- (1) The generating company or the transmission licensee, as the case may be, intending to undertake renovation and modernization (R&M) of the generating station or unit thereof or transmission system or element thereof for the purpose of extension of life beyond the originally recognised useful life for the purpose of tariff, shall file a petition before the Commission for approval of the proposal with a Detailed Project Report giving complete scope, justification, cost-benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure, schedule of completion, reference price level, estimated completion cost including foreign exchange component, if any, and any other information considered to be relevant by the generating company or the transmission licensee:

Provided that the generating company making the applications for renovation and modernization (R&M) shall not be eligible for Special Allowance under Regulation 28 of these regulations;

Provided further that the generating company or the transmission licensee intending to undertake renovation and modernization (R&M) shall be required to obtain the consent of the beneficiaries or the long term customers, as the case may be, for such renovation and modernization (R&M) and submit the same along with the petition.

(2) Where the generating company or the transmission licensee, as the case may be, makes an application for approval of its proposal for renovation and modernisation (R&M), approval may be granted after due consideration of reasonableness of the proposed cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost-benefit analysis, expected duration of life extension, consent of the beneficiaries or long term customers, if obtained, and such other factors as may be considered relevant by the Commission.

(3) In case of gas/ liquid fuel based open/ combined cycle thermal generating station after 25 years of operation from date of commercial operation, any additional capital expenditure which has become necessary for renovation of gas turbines/steam turbine or additional capital expenditure necessary due to obsolescence or non-availability of spares for efficient operation of the stations shall be allowed:

Provided that any expenditure included in the renovation and modernisation (R&M) on consumables and cost of components and spares which is generally covered

in the O&M expenses during the major overhaul of gas turbine shall be suitably deducted from the expenditure to be allowed after prudence check.

(4) After completion of the renovation and modernisation (R&M), the generating company or the transmission licensee, as the case may be, shall file a petition for determination of tariff. Expenditure incurred or projected to be incurred and admitted by the Commission after prudence check, and after deducting the accumulated depreciation already recovered from the admitted project cost, shall form the basis for determination of tariff.

28. Special Allowance for Coal-based/Lignite fired Thermal Generating station

(1) In case of coal-based/lignite fired thermal generating stations, the generating company, instead of availing renovation and modernization (R&M) may opt to avail a 'special allowance' in accordance with the norms specified in this Regulation, as compensation for meeting the requirement of expenses including renovation and modernisation beyond the useful life of the generating station or a unit thereof and in such an event, upward revision of the capital cost shall not be allowed and the applicable operational norms shall not be relaxed but the Special Allowance shall be included in the annual fixed cost:

Provided that such option shall not be available for a generating station or unit thereof for which renovation and modernization has been undertaken and the expenditure has been admitted by the Commission before commencement of these regulations, or for a generating station or unit which is in a depleted condition or operating under relaxed operational and performance norms;

Provided further that special allowance shall also be available for a generating station which has availed the Special Allowance during the tariff period 2009-14 or 2014-19 as applicable from the date of completion of the useful life.

(2) The Special Allowance admissible to a generating station shall be @ Rs 9.5 lakh per MW per year for the tariff period 2019-24.

(3) In the event of a generating station availing Special Allowance, the expenditure incurred upon or utilized from Special Allowance shall be maintained separately by the generating station and details of same shall be made available to the Commission as and when directed.

(4) The Special Allowance allowed under this Regulation shall be transferred to a separate fund for utilization towards Renovation & Modernisation activities, for which detailed methodology shall be issued separately.

29. Additional Capitalization on account of Revised Emission Standards: (1) A generating company requiring to incur additional capital expenditure in the existing generating station for compliance of the revised emissions standards shall share its proposal with the beneficiaries and file a petition for undertaking such additional capitalization.

(2) The proposal under clause (1) above shall contain details of proposed technology as specified by the Central Electricity Authority, scope of the work, phasing of expenditure, schedule of completion, estimated completion cost including foreign exchange component, if any, detailed computation of indicative impact on tariff to the

beneficiaries, and any other information considered to be relevant by the generating company.

(3) Where the generating company makes an application for approval of additional capital expenditure on account of implementation of revised emission standards, the Commission may grant approval after due consideration of the reasonableness of the cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost-benefit analysis, and such other factors as may be considered relevant by the Commission.

(4) After completion of the implementation of revised emission standards, the generating company shall file a petition for determination of tariff. Any expenditure incurred or projected to be incurred and admitted by the Commission after prudence check based on reasonableness of the cost and impact on operational parameters shall form the basis of determination of tariff.

CHAPTER - 8

COMPUTATION OF ANNUAL FIXED COST

30. **Return on Equity:** (1) Return on equity shall be computed in rupee terms, on the equity base determined in accordance with Regulation 18 of these regulations.

(2) Return on equity shall be computed at the base rate of 15.50% for thermal generating station, transmission system including communication system and run-of-river hydro generating station, and at the base rate of 16.50% for the storage type hydro generating stations including pumped storage hydro generating stations and run-of-river generating station with pondage:

Provided that return on equity in respect of additional capitalization after cut-off date beyond the original scope excluding additional capitalization due to Change in Law, shall be computed at the weighted average rate of interest on actual loan portfolio of the generating station or the transmission system;

Provided further that:

- i. In case of a new project, the rate of return on equity shall be reduced by 1.00% for such period as may be decided by the Commission, if the generating station or transmission system is found to be declared under commercial operation without commissioning of any of the Restricted Governor Mode Operation (RGMO) or Free Governor Mode Operation (FGMO), data telemetry, communication system up to load dispatch centre or protection system based on the report submitted by the respective RLDC;
- ii. in case of existing generating station, as and when any of the

requirements under (i) above of this Regulation are found lacking based on the report submitted by the concerned RLDC, rate of return on equity shall be reduced by 1.00% for the period for which the deficiency continues;

- iii. in case of a thermal generating station, with effect from 1.4.2020:
 - a) rate of return on equity shall be reduced by 0.25% in case of failure to achieve the ramp rate of 1% per minute;
 - b) an additional rate of return on equity of 0.25% shall be allowed for every incremental ramp rate of 1% per minute achieved over and above the ramp rate of 1% per minute, subject to ceiling of additional rate of return on equity of 1.00%:

Provided that the detailed guidelines in this regard shall be issued by National Load Dispatch Centre by 30.6.2019.

31. Tax on Return on Equity. (1) The base rate of return on equity as allowed by the Commission under Regulation 30 of these regulations shall be grossed up with the effective tax rate of the respective financial year. For this purpose, the effective tax rate shall be considered on the basis of actual tax paid in respect of the financial year in line with the provisions of the relevant Finance Acts by the concerned generating company or the transmission licensee, as the case may be. The actual tax paid on income from other businesses including deferred tax liability (i.e. income from business other than business of generation or transmission, as the case may be) shall be excluded for the calculation of effective tax rate.

(2) Rate of return on equity shall be rounded off to three decimal places and shall be computed as per the formula given below:

$$\text{Rate of pre-tax return on equity} = \text{Base rate} / (1-t)$$

Where “t” is the effective tax rate in accordance with clause (1) of this Regulation and shall be calculated at the beginning of every financial year based on the estimated profit and tax to be paid estimated in line with the provisions of the relevant Finance Act applicable for that financial year to the company on pro-rata basis by excluding the income of non-generation or non-transmission business, as the case may be, and the corresponding tax thereon. In case of generating company or transmission licensee paying Minimum Alternate Tax (MAT), “t” shall be considered as MAT rate including surcharge and cess.

Illustration-

(i) In case of a generating company or a transmission licensee paying Minimum Alternate Tax (MAT) @ 21.55% including surcharge and cess:

$$\text{Rate of return on equity} = 15.50 / (1 - 0.2155) = 19.758\%$$

(ii) In case of a generating company or a transmission licensee paying normal corporate tax including surcharge and cess:

- (a) Estimated Gross Income from generation or transmission business for FY 2019-20 is Rs 1,000 crore;
- (b) Estimated Advance Tax for the year on above is Rs 240 crore;

(c) Effective Tax Rate for the year 2019-20 = Rs 240 Crore/Rs 1000 Crore = 24%;

(d) Rate of return on equity = $15.50 / (1-0.24) = 20.395\%$.

(3) The generating company or the transmission licensee, as the case may be, shall true up the grossed up rate of return on equity at the end of every financial year based on actual tax paid together with any additional tax demand including interest thereon, duly adjusted for any refund of tax including interest received from the income tax authorities pertaining to the tariff period 2019-24 on actual gross income of any financial year. However, penalty, if any, arising on account of delay in deposit or short deposit of tax amount shall not be claimed by the generating company or the transmission licensee, as the case may be. Any under-recovery or over-recovery of grossed up rate on return on equity after truing up, shall be recovered or refunded to beneficiaries or the long term customers, as the case may be, on year to year basis.

32. Interest on loan capital: (1) The loans arrived at in the manner indicated in Regulation 18 of these regulations shall be considered as gross normative loan for calculation of interest on loan.

(2) The normative loan outstanding as on 1.4.2019 shall be worked out by deducting the cumulative repayment as admitted by the Commission up to 31.3.2019 from the gross normative loan.

(3) The repayment for each of the year of the tariff period 2019-24 shall be deemed to be equal to the depreciation allowed for the corresponding year/period. In case of

de-capitalization of assets, the repayment shall be adjusted by taking into account cumulative repayment on a pro rata basis and the adjustment should not exceed cumulative depreciation recovered upto the date of de-capitalisation of such asset.

(4) Notwithstanding any moratorium period availed by the generating company or the transmission licensee, as the case may be, the repayment of loan shall be considered from the first year of commercial operation of the project and shall be equal to the depreciation allowed for the year or part of the year.

(5) The rate of interest shall be the weighted average rate of interest calculated on the basis of the actual loan portfolio after providing appropriate accounting adjustment for interest capitalized:

Provided that if there is no actual loan for a particular year but normative loan is still outstanding, the last available weighted average rate of interest shall be considered;

Provided further that if the generating station or the transmission system, as the case may be, does not have actual loan, then the weighted average rate of interest of the generating company or the transmission licensee as a whole shall be considered.

(6) The interest on loan shall be calculated on the normative average loan of the year by applying the weighted average rate of interest.

(7) The changes to the terms and conditions of the loans shall be reflected from the date of such re-financing.

33. Depreciation: (1) Depreciation shall be computed from the date of commercial operation of a generating station or unit thereof or a transmission system or element

thereof including communication system. In case of the tariff of all the units of a generating station or all elements of a transmission system including communication system for which a single tariff needs to be determined, the depreciation shall be computed from the effective date of commercial operation of the generating station or the transmission system taking into consideration the depreciation of individual units:

Provided that effective date of commercial operation shall be worked out by considering the actual date of commercial operation and installed capacity of all the units of the generating station or capital cost of all elements of the transmission system, for which single tariff needs to be determined.

(2) The value base for the purpose of depreciation shall be the capital cost of the asset admitted by the Commission. In case of multiple units of a generating station or multiple elements of a transmission system, weighted average life for the generating station of the transmission system shall be applied. Depreciation shall be chargeable from the first year of commercial operation. In case of commercial operation of the asset for part of the year, depreciation shall be charged on pro rata basis.

(3) The salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the capital cost of the asset:

Provided that the salvage value for IT equipment and software shall be considered as NIL and 100% value of the assets shall be considered depreciable;

Provided further that in case of hydro generating stations, the salvage value shall be as provided in the agreement, if any, signed by the developers with the State Government for development of the generating station:

Provided also that the capital cost of the assets of the hydro generating station

for the purpose of computation of depreciated value shall correspond to the percentage of sale of electricity under long-term power purchase agreement at regulated tariff:

Provided also that any depreciation disallowed on account of lower availability of the generating station or unit or transmission system as the case may be, shall not be allowed to be recovered at a later stage during the useful life or the extended life.

(4) Land other than the land held under lease and the land for reservoir in case of hydro generating station shall not be a depreciable asset and its cost shall be excluded from the capital cost while computing depreciable value of the asset.

(5) Depreciation shall be calculated annually based on Straight Line Method and at rates specified in **Appendix-I** to these regulations for the assets of the generating station and transmission system:

Provided that the remaining depreciable value as on 31st March of the year closing after a period of 12 years from the effective date of commercial operation of the station shall be spread over the balance useful life of the assets.

(6) In case of the existing projects, the balance depreciable value as on 1.4.2019 shall be worked out by deducting the cumulative depreciation as admitted by the Commission upto 31.3.2019 from the gross depreciable value of the assets.

(7) The generating company or the transmission licensee, as the case may be, shall submit the details of proposed capital expenditure five years before the completion of useful life of the project along with justification and proposed life extension. The Commission based on prudence check of such submissions shall approve the depreciation on capital expenditure.

(8) In case of de-capitalization of assets in respect of generating station or unit thereof or transmission system or element thereof, the cumulative depreciation shall be adjusted by taking into account the depreciation recovered in tariff by the de-capitalized asset during its useful services.

34. Interest on Working Capital: (1) The working capital shall cover:

(a) For Coal-based/lignite-fired thermal generating stations:

(i) Cost of coal or lignite and limestone towards stock, if applicable, for 10 days for pit-head generating stations and 20 days for non-pit-head generating stations for generation corresponding to the normative annual plant availability factor or the maximum coal/lignite stock storage capacity whichever is lower;

(ii) Advance payment for 30 days towards cost of coal or lignite and limestone for generation corresponding to the normative annual plant availability factor;

(iii) Cost of secondary fuel oil for two months for generation corresponding to the normative annual plant availability factor, and in case of use of more than one secondary fuel oil, cost of fuel oil stock for the main secondary fuel oil;

(iv) Maintenance spares @ 20% of operation and maintenance expenses including water charges and security expenses;

(v) Receivables equivalent to 45 days of capacity charge and energy charge for sale of electricity calculated on the normative annual plant availability factor; and

(vi) Operation and maintenance expenses, including water charges and

security expenses, for one month.

(b) For Open-cycle Gas Turbine/Combined Cycle thermal generating stations:

(i) Fuel cost for 30 days corresponding to the normative annual plant availability factor, duly taking into account mode of operation of the generating station on gas fuel and liquid fuel;

(ii) Liquid fuel stock for 15 days corresponding to the normative annual plant availability factor, and in case of use of more than one liquid fuel, cost of main liquid fuel duly taking into account mode of operation of the generating stations of gas fuel and liquid fuel;

(iii) Maintenance spares @ 30% of operation and maintenance expenses including water charges and security expenses;

(iv) Receivables equivalent to 45 days of capacity charge and energy charge for sale of electricity calculated on normative plant availability factor, duly taking into account mode of operation of the generating station on gas fuel and liquid fuel; and

(v) Operation and maintenance expenses, including water charges and security expenses, for one month.

(c) For Hydro Generating Station (including Pumped Storage Hydro Generating Station) and Transmission System:

(i) Receivables equivalent to 45 days of annual fixed cost;

(ii) Maintenance spares @ 15% of operation and maintenance expenses including security expenses; and

(iii) Operation and maintenance expenses, including security expenses for one

month.

(2) The cost of fuel in cases covered under sub-clauses (a) and (b) of clause (1) of this Regulation shall be based on the landed fuel cost (taking into account normative transit and handling losses in terms of Regulation 39 of these regulations) by the generating station and gross calorific value of the fuel as per actual weighted average for the third quarter of preceding financial year in case of each financial year for which tariff is to be determined:

Provided that in case of new generating station, the cost of fuel for the first financial year shall be considered based on landed fuel cost (taking into account normative transit and handling losses in terms of Regulation 39 of these regulations) and gross calorific value of the fuel as per actual weighted average for three months, as used for infirm power, preceding date of commercial operation for which tariff is to be determined.

(3) Rate of interest on working capital shall be on normative basis and shall be considered as the bank rate as on 1.4.2019 or as on 1st April of the year during the tariff period 2019-24 in which the generating station or a unit thereof or the transmission system including communication system or element thereof, as the case may be, is declared under commercial operation, whichever is later:

Provided that in case of truing-up, the rate of interest on working capital shall be considered at bank rate as on 1st April of each of the financial year during the tariff period 2019-24.

(4) Interest on working capital shall be payable on normative basis notwithstanding

that the generating company or the transmission licensee has not taken loan for working capital from any outside agency.

35. Operation and Maintenance Expenses:

(1) Thermal Generating Station: Normative Operation and Maintenance expenses of thermal generating stations shall be as follows:

- (1) Coal based and lignite fired (including those based on Circulating Fluidised Bed Combustion (CFBC) technology) generating stations, other than the generating stations or units referred to in clauses (2), (4) and (5) of this Regulation:

(in Rs Lakh/MW)

Year	200/210/ 250 MW Series	300/330/ 350 MW Series	500 MW Series	600 MW Series	800 MW Series and above
FY 2019-20	32.96	27.74	22.51	20.26	18.23
FY 2020-21	34.12	28.71	23.30	20.97	18.87
FY 2021-22	35.31	29.72	24.12	21.71	19.54
FY 2022-23	36.56	30.76	24.97	22.47	20.22
FY 2023-24	37.84	31.84	25.84	23.26	20.93

Provided that where the date of commercial operation of any additional unit(s) of a generating station after first four units occurs on or after 1.4.2019, the O&M expenses of such additional unit(s) shall be admissible at 90% of the operation and maintenance expenses as specified above;

Provided further that operation and maintenance expenses of generating station and the transmission system of Bhakra Beas Management Board (BBMB) and Sardar Sarovar Project (SSP) shall be determined after taking into account provisions of the Punjab Reorganization Act, 1996 and Narmada Water Scheme, 1980 under Section 6-A

of the Inter-State Water Disputes Act, 1956 respectively;

Provided also that operation and maintenance expenses of generating station having unit size of less than 200 MW not covered above shall be determined on case to case basis.

(2) Talcher Thermal Power Station (TPS), Tanda TPS and Chandrapura TPS Unit 3 and Durgapur TPS Unit 1 of DVC:

(in Rs Lakh/MW)

Year	Talcher TPS	Chandrapura TPS (Unit 3), Tanda TPS, Durgapur TPS(Unit 1)
FY 2019-20 to FY 2023-24	56.34	46.16

(3) Open Cycle Gas Turbine/Combined Cycle generating stations:

(in Rs Lakh/MW)

Year	Gas Turbine/ Combined Cycle generating stations other than small gas turbine power generating stations	Small gas turbine power generating stations	Agartala GPS	Advance F Class Machines
FY 2019-20	17.58	36.21	42.85	26.34
FY 2020-21	18.20	37.48	44.35	27.27
FY 2021-22	18.84	38.80	45.91	28.23
FY 2022-23	19.50	40.16	47.52	29.22
FY 2023-24	20.19	41.57	49.19	30.24

(4) Lignite-fired generating stations:

(in Rs Lakh/MW)

Year	125 MW Sets	TPS-I of NLC
FY 2019-20	31.15	42.91
FY 2020-21	32.24	44.42
FY 2021-22	33.37	45.98
FY 2022-23	34.54	47.59
FY 2023-24	35.76	49.26

(5) **Generating Stations based on coal rejects:**

(in Rs Lakh/MW)

Year	O&M Expenses
FY 2019-20	31.15
FY 2020-21	32.24
FY 2021-22	33.37
FY 2022-23	34.54
FY 2023-24	35.76

(6) The Water Charges, Security Expenses and Capital Spares for thermal generating stations shall be allowed separately after prudence check:

Provided that water charges shall be allowed based on water consumption depending upon type of plant and type of cooling water system, subject to prudence check. The details regarding the same shall be furnished along with the petition;

Provided further that the generating station shall submit the assessment of the security requirement and estimated expenses;

Provided also that the generating station shall submit the details of year-wise actual capital spares consumed at the time of truing up with appropriate justification for incurring the same and substantiating that the same is not funded through compensatory allowance as per Regulation 17 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 or Special Allowance or claimed as a part of additional capitalisation or consumption of stores and spares and renovation and modernization.

(7) The additional operation and maintenance expenses on account of implementation of revised emission standards shall be notified separately:

Provided that till the norms are notified, the Commission shall decide the

additional O&M expenses on case to case basis.

(2) Hydro Generating Station: (a) Following operations and maintenance expense norms shall be applicable for hydro generating stations which have been operational for three or more years as on 1.4.2019:

(in Rs Lakh)

Particulars	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
THDC Stage I	27,788.87	29,113.44	30,501.14	31,955.00	33,478.15
KHEP	13,452.46	14,093.68	14,765.46	15,469.26	16,206.61
Bairasul	8,292.11	8,687.36	9,101.45	9,535.28	9,989.78
Loktak	9,538.27	9,992.91	10,469.23	10,968.25	11,491.06
Salal	19,207.75	20,123.29	21,082.48	22,087.39	23,140.19
Tanakpur	10,520.33	11,021.79	11,547.15	12,097.55	12,674.18
Chamera-I	11,773.57	12,334.77	12,922.71	13,538.68	14,184.00
Uri I	9,865.77	10,336.03	10,828.70	11,344.85	11,885.61
Rangit	5,336.17	5,590.53	5,857.00	6,136.18	6,428.66
Chamera-II	10,670.68	11,179.30	11,712.17	12,270.44	12,855.31
Dhauliganga	8,813.40	9,233.50	9,673.61	10,134.71	10,617.79
Dulhasti	18,563.04	19,447.85	20,374.84	21,346.02	22,363.49
Teesta-V	12,186.58	12,767.46	13,376.02	14,013.60	14,681.56
Sewa-II	7,079.34	7,416.78	7,770.31	8,140.68	8,528.71
TLDP III	7,539.76	7,899.14	8,275.66	8,670.12	9,083.39
Chamera III	9,078.72	9,511.46	9,964.83	10,439.81	10,937.43
Chutak	3,536.67	3,705.25	3,881.86	4,066.89	4,260.74
Nimmo Bazgo	3,527.43	3,695.57	3,871.72	4,056.27	4,249.61
Uri II	7,058.82	7,395.28	7,747.78	8,117.08	8,503.99
Parbati III	6,618.29	6,933.76	7,264.26	7,610.51	7,973.27
Indira Sagar	11,728.40	12,287.44	12,873.12	13,486.73	14,129.58
Omkareshwar	7,198.97	7,542.12	7,901.62	8,278.25	8,672.84
Naptha Jhakari	33,326.11	34,914.62	36,578.84	38,322.39	40,149.04
Rampur	12,267.22	12,851.94	13,464.54	14,106.33	14,778.72
Koldam	12,659.94	13,263.39	13,895.59	14,557.93	15,251.84
Karcham Wangtoo	11,710.14	12,268.31	12,853.09	13,465.74	14,107.59
Kopili-I	9,044.47	9,475.58	9,927.24	10,400.43	10,896.17
Kopili-II	1,130.56	1,184.45	1,240.90	1,300.05	1,362.02
Khandong	2,261.12	2,368.90	2,481.81	2,600.11	2,724.04
Doyang	5,654.57	5,924.10	6,206.47	6,502.31	6,812.24

Particulars	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
Ranganadi	12,095.88	12,672.44	13,276.47	13,909.30	14,572.30
Maithon	2,892.40	3,030.26	3,174.70	3,326.03	3,484.56
Panchet	2,191.37	2,295.83	2,405.26	2,519.90	2,640.02
Tilaiya	900.17	943.08	988.03	1,035.13	1,084.47

Note: The impact in respect of revision of minimum wage and GST, if any, will be considered at the time of determination of tariff.

(b) In case of the hydro generating stations declared under commercial operation on or after 1.4.2019, operation and maintenance expenses of first year shall be fixed at 3.5% and 5.0% of the original project cost (excluding cost of rehabilitation & resettlement works, IDC and IEDC) for stations with installed capacity exceeding 200 MW and for stations with installed capacity less than 200 MW, respectively.

(c) In case of hydro generating stations which have not completed a period of three years as on 1.4.2019, operation and maintenance expenses for 2019-20 shall be worked out by applying escalation rate of 4.77% on the applicable operation and maintenance expenses as on 31.3.2019. The operation and maintenance expenses for subsequent years of the tariff period shall be worked out by applying escalation rate of 4.77% per annum.

(c) The Security Expenses and Capital Spares for hydro generating stations shall be allowed separately after prudence check:

Provided further that the generating station shall submit the assessment of the security requirement and estimated expenses, the details of year-wise actual capital spares consumed at the time of truing up with appropriate justification.

(3) **Transmission system:** (a) The following normative operation and maintenance expenses shall be admissible for the transmission system:

Particulars	2019-20	2020-21	2021-22	2022-23	2023-24
Norms for sub-station Bays (Rs Lakh per bay)					
765 kV	45.01	46.60	48.23	49.93	51.68
400 kV	32.15	33.28	34.45	35.66	36.91
220 kV	22.51	23.30	24.12	24.96	25.84
132 kV and below	16.08	16.64	17.23	17.83	18.46
Norms for Transformers (Rs Lakh per MVA)					
765 kV	0.491	0.508	0.526	0.545	0.564
400 kV	0.358	0.371	0.384	0.398	0.411
220 kV	0.245	0.254	0.263	0.272	0.282
132 kV and below	0.245	0.254	0.263	0.272	0.282
Norms for AC and HVDC lines (Rs Lakh per km)					
Single Circuit (Bundled Conductor with six or more sub-conductors)	0.881	0.912	0.944	0.977	1.011
Single Circuit (Bundled conductor with four sub-conductors)	0.755	0.781	0.809	0.837	0.867
Single Circuit (Twin & Triple Conductor)	0.503	0.521	0.539	0.558	0.578
Single Circuit (Single Conductor)	0.252	0.260	0.270	0.279	0.289
Double Circuit (Bundled conductor with four or more sub-conductors)	1.322	1.368	1.416	1.466	1.517
Double Circuit (Twin & Triple Conductor)	0.881	0.912	0.944	0.977	1.011
Double Circuit (Single Conductor)	0.377	0.391	0.404	0.419	0.433
Multi Circuit (Bundled Conductor with four or more sub-conductor)	2.319	2.401	2.485	2.572	2.662
Multi Circuit (Twin & Triple Conductor)	1.544	1.598	1.654	1.713	1.773
Norms for HVDC stations					
HVDC Back-to-Back stations (Rs Lakh per 500 MW) (Except Gazuwaka BTB)	834	864	894	925	958
Gazuwaka HVDC Back-to-Back station (Rs. Lakh per 500 MW)	1,666	1,725	1,785	1,848	1,913
500 kV Rihand-Dadri HVDC bipole scheme (Rs Lakh) (1500 MW)	2,252	2,331	2,413	2,498	2,586
±500 kV Talcher- Kolar HVDC bipole scheme (Rs Lakh) (2000 MW)	2,468	2,555	2,645	2,738	2,834
±500 kV Bhiwadi-Balia HVDC bipole scheme (Rs Lakh) (2500 MW)	1,696	1,756	1,817	1,881	1,947
±800 kV, Bishwanath-Agra HVDC bipole scheme (Rs Lakh) (3000 MW)	2,563	2,653	2,746	2,842	2,942

Provided that the O&M expenses for the GIS bays shall be allowed as worked out by multiplying 0.70 of the O&M expenses of the normative O&M expenses for bays;

Provided further that:

- (i) the operation and maintenance expenses for new HVDC bi-pole schemes commissioned after 1.4.2019 for a particular year shall be allowed pro-rata on the basis of normative rate of operation and maintenance expenses of similar HVDC bi-pole scheme for the corresponding year of the tariff period;
- (ii) the O&M expenses norms for HVDC bi-pole line shall be considered as Double Circuit quad AC line;
- (iii) the O&M expenses of ± 500 kV Mundra-Mohindergarh HVDC bipole scheme (2000 MW) shall be allowed as worked out by multiplying 0.80 of the normative O&M expenses for ± 500 kV Talchar-Kolar HVDC bi-pole scheme (2000 MW);
- (iv) the O&M expenses of ± 800 kV Champa-Kurukshetra HVDC bi-pole scheme (3000 MW) shall be on the basis of the normative O&M expenses for ± 800 kV, Bishwanath-Agra HVDC bi-pole scheme;
- (v) the O&M expenses of ± 800 kV, Alipurduar-Agra HVDC bi-pole scheme (3000 MW) shall be allowed as worked out by multiplying 0.80 of the normative O&M expenses for ± 800 kV, Bishwanath-Agra HVDC bi-pole scheme; and
- (v) the O&M expenses of Static Synchronous Compensator and Static Var Compensator shall be worked at 1.5% of original project cost as on commercial operation which shall be escalated at the rate of 3.51% to work out the O&M expenses during the tariff period. The O&M expenses of Static Synchronous Compensator and Static Var Compensator, if required, may be reviewed after

three years.

(b) The total allowable operation and maintenance expenses for the transmission system shall be calculated by multiplying the number of sub-station bays, transformer capacity of the transformer (in MVA) and km of line length with the applicable norms for the operation and maintenance expenses per bay, per MVA and per km respectively.

(c) The Security Expenses and Capital Spares for transmission system shall be allowed separately after prudence check:

Provided that the transmission licensee shall submit the assessment of the security requirement and estimated security expenses, the details of year-wise actual capital spares consumed at the time of truing up with appropriate justification.

(4) **Communication system:** The operation and maintenance expenses for the communication system shall be worked out at 2.0% of the original project cost related to such communication system. The transmission licensee shall submit the actual operation and maintenance expenses for truing up.

CHAPTER - 9
COMPUTATION OF INPUT PRICE OF COAL AND LIGNITE
FROM INTEGRATED MINE

36. Input Price of coal and lignite for energy charges: (1) Where the generating company has the arrangement for supply of coal or lignite from the integrated mine(s) allocated to it, for use in one or more of its generating stations as end use, the energy charge component of tariff of the generating station shall be determined based on the input price of coal or lignite, as the case may be, from such integrated mines computed in accordance with the regulations to be notified separately by the Commission.

(2) Till the regulation for computation of input price of coal is notified, the generating company shall continue to adopt the notified price of Coal India Limited commensurate with the grade of the coal from the integrated mine:

Provided that after notification of the regulation for input price of coal, the same shall be applicable from 1.4.2019 or the date of commercial operation of the integrated mine, whichever is later, and the difference between the input price of coal so decided and the input price of coal for quantity billed shall be adjusted in accordance with the regulations to be notified.

(3) Till the regulations for computation of input price of lignite is notified, the input price of lignite shall continue to be determined as per the guidelines specified by Ministry of Coal, Government of India.

CHAPTER - 10

COMPONENTS OF ENERGY CHARGE

37. Energy Charge: The energy charge in respect of the thermal generating Stations shall comprise of landed fuel cost of primary fuel, cost of secondary fuel oil consumption and landed cost of reagents on account of implementation of the revised emission standards.

38. Landed Fuel Cost of Primary Fuel: The landed fuel cost of primary fuel for any month shall consist of base price or input price of fuel corresponding to the grade and quality of fuel and shall be inclusive of statutory charges as applicable, washery charges, transportation cost by rail or road or any other means and loading, unloading and handling charges:

Provided that procurement of fuel at a price other than Government notified prices may be considered, if it is based on competitive bidding through transparent process;

Provided further that landed fuel cost of primary fuel shall be worked out based on the actual bill paid by the generating company including any adjustment on account of quantity and quality;

Provided also that in case of coal-fired or lignite based thermal generating station, the Gross Calorific Value shall be measured by third party sampling and the expenses towards the third party sampling facility shall be reimbursed by the beneficiaries.

39. Transit and Handling Losses: For coal and lignite, the transit and handling losses

shall be as per the following norms:-

Thermal Generating Station	Transit and Handling Loss (%)
Pit head	0.20%
Non-pit head	0.80%

Provided that in case of pit-head stations, if coal or lignite is procured from sources other than the pit-head mines which is transported to the station through rail, transit and handling losses applicable for non-pit head station shall apply;

Provided further that in case of imported coal, the transit and handling losses applicable for pit-head station shall apply.

40. Gross Calorific Value of Primary Fuel: (1) The gross calorific value for computation of energy charges as per Regulation 43 of these regulations shall be done in accordance with 'GCV as received' basis.

(2) The generating company shall provide to the beneficiaries of the generating station the details in respect of GCV and price of fuel i.e. domestic coal, imported coal, e-auction coal, lignite, natural gas, RLNG, liquid fuel etc. as per the Form 15 prescribed at **Annexure-I (Part I)** to these regulations:

Provided that the additional details of the weighted average GCV of the fuel on as received basis used for generation during the period, blending ratio of the imported coal with domestic coal, proportion of e-auction coal shall be provided, along with the bills of the respective month;

Provided further that copies of the bills and details of parameters of GCV and

price of fuel such as domestic coal, imported coal, e-auction coal, lignite, natural gas, RLNG, liquid fuel, details of blending ratio of the imported coal with domestic coal, proportion of e-auction coal shall also be displayed on the website of the generating company.

41. Landed Cost of Reagent: (1) Where specific reagents such as Limestone, Sodium Bi-Carbonate, Urea or Anhydrous Ammonia are used during operation of emission control system for meeting revised emission standards, the landed cost of such reagents shall be determined based on normative consumption and purchase price of the reagent through competitive bidding, applicable statutory charges and transportation cost.

(2) The normative consumption of specific reagent for the various technologies installed for meeting revised emission standards shall be notified separately.

CHAPTER - 11

COMPUTATION OF CAPACITY CHARGES AND ENERGY CHARGES**42. Computation and Payment of Capacity Charge for Thermal Generating Stations:**

(1) The fixed cost of a thermal generating station shall be computed on annual basis based on the norms specified under these regulations and recovered on monthly basis under capacity charge. The total capacity charge payable for a generating station shall be shared by its beneficiaries as per their respective percentage share or allocation in the capacity of the generating station. The capacity charge shall be recovered under two segments of the year, i.e. High Demand Season (period of three months) and Low Demand Season (period of remaining nine months), and within each season in two parts viz., Capacity Charge for Peak Hours of the month and Capacity Charge for Off-Peak Hours of the month as follows:

Capacity Charge for the Year (CC_y) =

Sum of Capacity Charge for three months of High Demand Season +

Sum of Capacity Charge for nine months of Low Demand Season

(2) The Capacity Charge payable to a thermal generating station for a calendar month shall be calculated in accordance with the following formulae:

Capacity Charge for the Month (CC_m) =

Capacity Charge for Peak Hours of the Month (CC_p) +

Capacity Charge for Off-Peak Hours of the Month (CC_{op})

Where,

High Demand Season:

$$CC_{p1} = (0.20 \times AFC) \times \left(\frac{1}{12}\right) \times \left(\frac{PAFMp}{NAPAF}\right) \text{ subject to ceiling of } (0.20 \times AFC) \times \left(\frac{1}{12}\right)$$

$$CC_{p2} = \{(0.20 \times AFC) \times \left(\frac{1}{6}\right) \times \left(\frac{PAFMp2}{NAPAF}\right) \text{ subject to ceiling of } (0.20 \times AFC) \times \left(\frac{1}{6}\right)\} - CC_{p1}$$

$$CC_{p3} = \{(0.20 \times AFC) \times \left(\frac{1}{4}\right) \times \left(\frac{PAFMp}{NAPAF}\right) \text{ subject to ceiling of } (0.20 \times AFC) \times \left(\frac{1}{4}\right)\} - (CC_{p1} + CC_{p2})$$

$$CC_{op1} = \{(0.80 \times AFC) \times \left(\frac{1}{12}\right) \times \left(\frac{PAFMop1}{NAPAF}\right) \text{ subject to ceiling of } (0.80 \times AFC) \times \left(\frac{1}{12}\right)\}$$

$$CC_{op2} = \{(0.80 \times AFC) \times \left(\frac{1}{6}\right) \times \left(\frac{PAFMop2}{NAPAF}\right) \text{ subject to ceiling of } (0.80 \times AFC) \times \left(\frac{1}{6}\right)\} - CC_{op1}$$

$$CC_{op3} = \{(0.80 \times AFC) \times \left(\frac{1}{4}\right) \times \left(\frac{PAFMop3}{NAPAF}\right) \text{ subject to ceiling of } (0.80 \times AFC) \times \left(\frac{1}{4}\right)\} - (CC_{op1} + CC_{op2})$$

Low Demand Season:

$$CC_{p1} = \{(0.20 \times AFC) \times \left(\frac{1}{12}\right) \times \left(\frac{PAFMp1}{NAPAF}\right) \text{ subject to ceiling of } (0.20 \times AFC) \times \left(\frac{1}{12}\right)\}$$

$$CC_{p2} = \{(0.20 \times AFC) \times \left(\frac{1}{6}\right) \times \left(\frac{PAFMp2}{NAPAF}\right) \text{ subject to ceiling of } (0.20 \times AFC) \times \left(\frac{1}{6}\right)\} - CC_{p1}$$

$$CC_{p3} = \{(0.20 \times AFC) \times \left(\frac{1}{4}\right) \times \left(\frac{PAFMp3}{NAPAF}\right) \text{ subject to ceiling of } (0.20 \times AFC) \times \left(\frac{1}{4}\right)\} - (CC_{p1} + CC_{p2})$$

$$CC_{p4} = \{(0.20 \times AFC) \times \left(\frac{1}{3}\right) \times \left(\frac{PAFMp4}{NAPAF}\right) \text{ subject to ceiling of } (0.20 \times AFC) \times \left(\frac{1}{3}\right)\} - (CC_{p1} + CC_{p2} + CC_{p3})$$

$$CC_{p5} = \left\{ (0.20 \text{ xAFC})x \left(\frac{5}{12} \right) x \left(\frac{PAFMp5}{NAPAF} \right) \text{ subject to ceiling of } (0.20 \text{ xAFC})x \left(\frac{5}{12} \right) \right\} - (CCp1 + CCp2 + CCp3 + CCp4)$$

$$CC_{p6} = \left\{ (0.20 \text{ xAFC})x \left(\frac{1}{2} \right) x \left(\frac{PAFMp}{NAPAF} \right) \text{ subject to ceiling of } (0.20 \text{ xAFC})x \left(\frac{1}{2} \right) \right\} - (CCp1 + CCp2 + CCp3 + CCp4 + CCp5)$$

$$CC_{p7} = \left\{ (0.20 \text{ xAFC})x \left(\frac{7}{12} \right) x \left(\frac{PAFMp7}{NAPAF} \right) \text{ subject to ceiling of } (0.20 \text{ xAFC})x \left(\frac{7}{12} \right) \right\} - (CCp1 + CCp2 + CCp3 + CCp4 + CCp5 + CCp6)$$

$$CC_{p8} = \left\{ (0.20 \text{ xAFC})x \left(\frac{2}{3} \right) x \left(\frac{PAFMp8}{NAPAF} \right) \text{ subject to ceiling of } (0.20 \text{ xAFC})x \left(\frac{2}{3} \right) \right\} - (CCp1 + CCp2 + CCp3 + CCp4 + CCp5 + CCp6 + CCp7)$$

$$CC_{p9} = \left\{ (0.20 \text{ xAFC})x \left(\frac{3}{4} \right) x \left(\frac{PAFMp}{NAPAF} \right) \text{ subject to ceiling of } (0.20 \text{ xAFC})x \left(\frac{3}{4} \right) \right\} - (CCp1 + CCp2 + CCp3 + CCp4 + CCp5 + CCp6 + CCp7 + CCp8)$$

$$CC_{op1} = \left\{ (0.80 \text{ xAFC})x \left(\frac{1}{12} \right) x \left(\frac{PAFMop1}{NAPAF} \right) \text{ subject to ceiling of } (0.80 \text{ xAFC})x \left(\frac{1}{12} \right) \right\}$$

$$CC_{op2} = \left\{ (0.80 \text{ xAFC})x \left(\frac{1}{6} \right) x \left(\frac{PAFMop2}{NAPAF} \right) \text{ subject to ceiling of } (0.80 \text{ xAFC})x \left(\frac{1}{6} \right) \right\} - CCop1$$

$$CC_{op3} = \left\{ (0.80 \text{ xAFC})x \left(\frac{1}{4} \right) x \left(\frac{PAFMop3}{NAPAF} \right) \text{ subject to ceiling of } (0.80 \text{ xAFC})x \left(\frac{1}{4} \right) \right\} - (CCop1 + CCop2)$$

$$CC_{op4} = \left\{ (0.80 \text{ xAFC})x \left(\frac{1}{3} \right) x \left(\frac{PAFMop4}{NAPAF} \right) \text{ subject to ceiling of } (0.80 \text{ xAFC})x \left(\frac{1}{3} \right) \right\} - (CCop1 + CCop2 + CCop3)$$

$$CC_{op5} = \left\{ (0.80 \text{ xAFC})x \left(\frac{5}{12} \right) x \left(\frac{PAFMop5}{NAPAF} \right) \text{ subject to ceiling of } (0.80 \text{ xAFC})x \left(\frac{5}{12} \right) \right\} - (CCop1 + CCop2 + CCop3 + CCop4)$$

$$CC_{op6} = \left\{ (0.80 \times AFC) \times \left(\frac{1}{2}\right) \times \left(\frac{PAFMop6}{NAPAF}\right) \text{ subject to ceiling of } (0.80 \times AFC) \times \left(\frac{1}{2}\right) \right\} - (CCop1 + CCop2 + CCop3 + CCop4 + CCop5)$$

$$CC_{op7} = \left\{ (0.80 \times AFC) \times \left(\frac{7}{12}\right) \times \left(\frac{PAFMop7}{NAPAF}\right) \text{ subject to ceiling of } (0.80 \times AFC) \times \left(\frac{7}{12}\right) \right\} - (CCop1 + CCop2 + CCop3 + CCop4 + CCop5 + CCop6)$$

$$CC_{op8} = \left\{ (0.80 \times AFC) \times \left(\frac{2}{3}\right) \times \left(\frac{PAFMop8}{NAPAF}\right) \text{ subject to ceiling of } (0.80 \times AFC) \times \left(\frac{2}{3}\right) \right\} - (CCop1 + CCop2 + CCop3 + CCop4 + CCop5 + CCop6 + CCop7)$$

$$CC_{op9} = \left\{ (0.80 \times AFC) \times \left(\frac{3}{4}\right) \times \left(\frac{PAFMop9}{NAPAF}\right) \text{ subject to ceiling of } (0.80 \times AFC) \times \left(\frac{3}{4}\right) \right\} - (CCop1 + CCop2 + CCop3 + CCop4 + CCop5 + CCop6 + CCop7 + CCop8)$$

Provided that in case of generating station or unit thereof under shutdown due to Renovation and Modernisation, the generating company shall be allowed to recover O&M expenses and interest on loan only.

Where,

CC_m = Capacity Charge for the Month;

CC_p = Capacity Charge for the Peak Hours of the Month;

CC_{op} = Capacity Charge for the Off-Peak Hours of the Month;

CC_{pn} = Capacity Charge for the Peak Hours of n^{th} Month in a specific Season;

CC_{opn} = Capacity Charge for the Off-Peak of n^{th} Month in a specific Season;

AFC = Annual Fixed Cost;

PAFM_{pn} = Plant Availability Factor achieved during Peak Hours upto the end of nth Month in a Season;

PAFM_{opn} = Plant Availability Factor achieved during Off-Peak Hours upto the end of nth Month in a Season;

NAPAF = Normative Annual Plant Availability Factor.

(3) Normative Plant Availability Factor for “Peak” and “Off-Peak” Hours in a month shall be equivalent to the NAPAF specified in Clause (A) of Regulation 49 of these regulations. The number of hours of “Peak” and “Off-Peak” periods during a day shall be four and twenty respectively. The hours of Peak and Off-Peak periods during a day shall be declared by the concerned RLDC at least a week in advance. The High Demand Season (period of three months, consecutive or otherwise) and Low Demand Season (period of remaining nine months, consecutive or otherwise) in a region shall be declared by the concerned RLDC, at least six months in advance:

Provided that RLDC, after duly considering the comments of the concerned stakeholders, shall declare Peak Hours and High Demand Season in such a way as to coincide with the majority of the Peak Hours and High Demand Season of the region to the maximum extent possible:

Provided further that in respect of a generating station having beneficiaries across different regions, the High Demand Season and the Peak Hours shall correspond to the High Demand Season and Peak Hours of the region in which majority of its beneficiaries, in terms of percentage of allocation of share, are located.

(4) Any under-recovery or over-recovery of Capacity Charge as a result of under-achievement or over-achievement, vis-à-vis the NAPAF in Peak and Off-Peak Hours of

a Season (High Demand Season or Low Demand Season, as the case may be) shall not be adjusted with under-achievement or over-achievement, vis-à-vis the NAPAF in Peak and Off-Peak Hours of the other Season:

Provided that within a Season, the shortfall in recovery of Capacity Charge for cumulative Off-Peak Hours derived based on NAPAF, shall be allowed to be off-set by over-achievement of PAF, if any, and consequent notional over-recovery of Capacity Charge for cumulative Peak Hours in that Season:

Provided further that within a Season, the shortfall in recovery of Capacity Charge for cumulative Peak Hours derived based on NAPAF, shall not be allowed to be off-set by over-achievement of PAF, if any, and consequent notional over-recovery of Capacity Charge for cumulative Off-Peak Hours in that Season.

(5) The Plant Availability Factor achieved for a Month (PAFM) shall be computed in accordance with the following formula:

$$\text{PAFM} = 1000 \times \sum_{i=1}^N \frac{DC_i}{[N \times IC \times (100 - Aux)]} \%$$

Where,

AUX = Normative auxiliary energy consumption in percentage.

DC_i = Average declared capacity (in ex-bus MW), for the ith day of the period i.e. the month or the year as the case may be, as certified by the concerned load dispatch centre after the day is over.

IC = Installed Capacity (in MW) of the generating station

$N =$ Number of days during the period

Note: DCi and IC shall exclude the capacity of generating units not declared under commercial operation. In case of a change in IC during the concerned period, its average value shall be taken.

(6) In addition to the capacity charge, an incentive shall be payable to a generating station or unit thereof @ 65 paise/ kWh for ex-bus scheduled energy during Peak Hours and @ 50 paise/ kWh for ex-bus scheduled energy during Off-Peak Hours corresponding to scheduled generation in excess of ex-bus energy corresponding to Normative Annual Plant Load Factor (NAPLF) achieved on a cumulative basis within each Season (High Demand Season or Low Demand Season, as the case may be), as specified in Clause (B) of Regulation 49 of these regulations.

(7) The provisions under Clauses (1) to (6) of this Regulation shall come into force with effect from 1.4.2020. Till that date, the capacity charge for a thermal generating station determined under these regulations shall be recovered in accordance with the provisions contained in Clauses (1) to (4) of Regulation 30 of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014, subject to the condition that the NAPAF and NAPLF shall be taken as specified under these regulations.

43. Computation and Payment of Energy Charge for Thermal Generating Stations

(1) The energy charge shall cover the primary and secondary fuel cost and limestone consumption cost (where applicable), and shall be payable by every beneficiary for the

total energy scheduled to be supplied to such beneficiary during the calendar month on ex-power plant basis, at the energy charge rate of the month (with fuel and limestone price adjustment). Total Energy charge payable to the generating company for a month shall be:

$$\text{Energy Charges} = (\text{Energy charge rate in Rs./kWh}) \times \{\text{Scheduled energy (ex-bus) for the month in kWh}\}$$

(2) Energy charge rate (ECR) in Rupees per kWh on ex-power plant basis shall be determined to three decimal places in accordance with the following formulae:

(a) For coal based and lignite fired stations:

$$\text{ECR} = \{(\text{SHR} - \text{SFC} \times \text{CVSF}) \times \text{LPPF} / (\text{CVPF} + \text{SFC} \times \text{LPSFi} + \text{LC} \times \text{LPL}) \times 100 / (100 - \text{AUX})\}$$

(b) For gas and liquid fuel based stations:

$$\text{ECR} = \text{SHR} \times \text{LPPF} \times 100 / \{(\text{CVPF}) \times (100 - \text{AUX})\}$$

Where,

AUX = Normative auxiliary energy consumption in percentage.

CVPF = (a) Weighted Average Gross calorific value of coal as received, in kCal per kg for coal based stations less 85 Kcal/Kg on account of variation during storage at generating station;

(b) Weighted Average Gross calorific value of primary fuel as received, in kCal per kg, per litre or per standard cubic meter, as applicable for lignite, gas and liquid fuel based stations;

(c) In case of blending of fuel from different sources, the weighted average Gross calorific value of primary fuel shall be arrived in proportion to blending ratio:

CVSF = Calorific value of secondary fuel, in kCal per ml;

ECR = Energy charge rate, in Rupees per kWh sent out;

SHR = Gross station heat rate, in kCal per kWh;

LC = Normative limestone consumption in kg per kWh;

LPL = Weighted average landed cost of limestone in Rupees per kg;

LPPF = Weighted average landed fuel cost of primary fuel, in Rupees per kg, per litre or per standard cubic metre, as applicable, during the month. (In case of blending of fuel from different sources, the weighted average landed fuel cost of primary fuel shall be arrived in proportion to blending ratio);

SFC = Normative Specific fuel oil consumption, in ml per kWh;

LPSFi = Weighted Average Landed Fuel Cost of Secondary Fuel in Rs./ml during the month:

Provided that energy charge rate for a gas or liquid fuel based station shall be adjusted for open cycle operation based on certification of Member Secretary of respective Regional Power Committee during the month.

(3) In case of part or full use of alternative source of fuel supply by coal based thermal generating stations other than as agreed by the generating company and beneficiaries in their power purchase agreement for supply of contracted power on account of shortage of fuel or optimization of economical operation through blending, the use of alternative source of fuel supply shall be permitted to generating station:

Provided that in such case, prior permission from beneficiaries shall not be a pre-condition, unless otherwise agreed specifically in the power purchase agreement:

Provided further that the weighted average price of alternative source of fuel shall

not exceed 30% of base price of fuel computed as per clause (5) of this Regulation:

Provided also that where the energy charge rate based on weighted average price of fuel upon use of alternative source of fuel supply exceeds 30% of base energy charge rate as approved by the Commission for that year or exceeds 20% of energy charge rate for the previous month, whichever is lower shall be considered and in that event, prior consultation with beneficiary shall be made at least three days in advance.

(4) Where biomass fuel is used for blending with coal, the landed cost of biomass fuel shall be worked out based on the delivered cost of biomass at the unloading point of the generating station, inclusive of taxes and duties as applicable. The energy charge rate of the blended fuel shall be worked out considering consumption of biomass based on blending ratio as specified by Authority or actual consumption of biomass, whichever is lower.

(5) The Commission through specific tariff orders to be issued for each generating station shall approve the energy charge rate at the start of the tariff period. The energy charge rate so approved shall be the base energy charge rate for the first year of the tariff period. The base energy charge rate for subsequent years shall be the energy charge computed after escalating the base energy charge rate by escalation rates for payment purposes as notified by the Commission from time to time under competitive bidding guidelines.

(6) The tariff structure as provided in this Regulation 42 and Regulation 43 of these regulations may be adopted by the Department of Atomic Energy, Government of India for the nuclear generating stations by specifying annual fixed cost (AFC), normative

annual plant availability factor (NAPAF), installed capacity (IC), normative auxiliary energy consumption (AUX) and energy charge rate (ECR) for such stations.

44. Computation and Payment of Capacity Charge and Energy Charge for Hydro Generating Stations:

(1) The fixed cost of a hydro generating station shall be computed on annual basis, based on norms specified under these regulations, and shall be recovered on monthly basis under capacity charge (inclusive of incentive) and energy charge, which shall be payable by the beneficiaries in proportion to their respective allocation in the saleable capacity of the generating station, i.e., in the capacity excluding the free power to the home State:

Provided that during the period between the date of commercial operation of the first unit of the generating station and the date of commercial operation of the generating station, the annual fixed cost shall provisionally be worked out based on the latest estimate of the completion cost for the generating station, for the purpose of determining the capacity charge and energy charge payment during such period.

(2) The capacity charge (inclusive of incentive) payable to a hydro generating station for a calendar month shall be:

$$\text{AFC} \times 0.5 \times \text{NDM} / \text{NDY} \times (\text{PAFM} / \text{NAPAF}) \text{ (in Rupees)}$$

Where,

AFC = Annual fixed cost specified for the year, in Rupees

NAPAF = Normative plant availability factor in percentage

- NDM = Number of days in the month
- NDY = Number of days in the year
- PAFM = Plant availability factor achieved during the month, in percentage

(3) The PAFM shall be computed in accordance with the following formula:

$$\text{PAFM} = \frac{10000 \times \sum_{i=1}^N \text{DC}_i}{\{N \times \text{IC} \times (100 - \text{AUX})\}} \%$$

Where

AUX = Normative auxiliary energy consumption in percentage

DC_i = Declared capacity (in ex-bus MW) for the ith day of the month which the station can deliver for at least three (3) hours, as certified by the nodal load dispatch centre after the day is over.

IC = Installed capacity (in MW) of the complete generating station

N = Number of days in the month

(4) The energy charge shall be payable by every beneficiary for the total energy scheduled to be supplied to the beneficiary, excluding free energy, if any, during the calendar month, on ex-bus basis, at the computed energy charge rate. Total energy charge payable to the generating company for a month shall be:

$$\text{Energy Charges} = (\text{Energy charge rate in Rs. / kWh}) \times \{\text{Scheduled energy (ex-bus) for the month in kWh}\} \times (100 - \text{FEHS}) / 100$$

(5) Energy charge rate (ECR) in Rupees per kWh on ex-power plant basis, for a hydro generating station, shall be determined up to three decimal places based on the following formula, subject to the provisions of clause (7) of this Regulation:

$$\text{ECR} = \text{AFC} \times 0.5 \times 10 / \{ \text{DE} \times (100 - \text{AUX}) \times (100 - \text{FEHS}) \}$$

Where,

DE = Annual design energy specified for the hydro generating station, in MWh, subject to the provision in clause (6) below.

FEHS = Free energy for home State, in per cent, as mentioned in Note 3 under Regulation 55 of these regulations.

(6) In case the saleable scheduled energy (ex-bus) of a hydro generating station during a year is less than the saleable design energy (ex-bus) for reasons beyond the control of the generating station, the treatment shall be as per clause (7) of this Regulation, on an application filed by the generating company.

(7) Shortfall in energy charges in comparison to fifty percent of the annual fixed cost shall be allowed to be recovered in six equal monthly installments:

Provided that in case actual generation from a hydro generating station is less than the design energy for a continuous period of four years on account of hydrology factor, the generating station shall approach the Central Electricity Authority with relevant hydrology data for revision of design energy of the station.

(8) Any shortfall in the energy charges on account of saleable scheduled energy (ex-bus) being less than the saleable design energy (ex-bus) during the tariff period 2014-19 which was beyond the control of the generating station and which could not be

recovered during the said tariff period shall be recovered in accordance with clause (7) of this Regulation.

(9) In case the energy charge rate (ECR) for a hydro generating station, computed as per clause (5) of this Regulation exceeds one hundred and twenty paise per kWh, and the actual saleable energy in a year exceeds $\{ DE \times (100 - AUX) \times (100 - FEHS) / 10000 \}$ MWh, the energy charge for the energy in excess of the above shall be billed at one hundred and twenty paise per kWh only.

(10) In case of the hydro generating stations located in the State of Jammu and Kashmir, any expenditure incurred for payment of water usage charges to the State Water Resources Development Authority, Jammu under Jammu & Kashmir Water Resources (Regulations and Management) Act, 2010 shall be payable by the beneficiaries as additional energy charge in proportion of the supply of power from the generating stations on month to month basis:

Provided that the provisions of this clause shall be subject to the decision of the Hon'ble High Court of Jammu & Kashmir in OWP No. 604/2011 and shall stand modified in accordance with the decision of the High Court.

45. Computation and Payment of Capacity Charge and Energy Charge for Pumped Storage Hydro Generating Stations:

(1) The fixed cost of a pumped storage hydro generating station shall be computed on annual basis, based on norms specified under these regulations, and recovered on monthly basis as capacity charge. The capacity charge shall be payable by the

beneficiaries in proportion to their respective allocation in the saleable capacity of the generating station, i.e., the capacity excluding the free power to the home State:

Provided that during the period between the date of commercial operation of the first unit of the generating station and the date of commercial operation of the generating station, the annual fixed cost shall be worked out based on the latest estimate of the completion cost for the generating station, for the purpose of determining the capacity charge payment during such period.

(2) The capacity charge payable to a pumped storage hydro generating station for a calendar month shall be:

(AFC x NDM / NDY) (In Rupees), if actual Generation during the month is \geq 75 % of the Pumping Energy consumed by the station during the month and $\{(AFC \times NDM / NDY) \times (Actual\ Generation\ during\ the\ month\ during\ peak\ hours / 75\% \text{ of the Pumping Energy consumed by the station during the month})\}$ (in Rupees)}, if actual Generation during the month is $<$ 75 % of the Pumping Energy consumed by the station during the month.

Where,

AFC = Annual fixed cost specified for the year, in Rupees

NDM = Number of days in the month

NDY = Number of days in the year

Provided that there would be adjustment at the end of the year based on actual generation and actual pumping energy consumed by the station during the year.

(3) The energy charge shall be payable by every beneficiary for the total energy scheduled to be supplied to the beneficiary in excess of the design energy plus 75% of

the energy utilized in pumping the water from the lower elevation reservoir to the higher elevation reservoir, at a flat rate equal to the average energy charge rate of 20 paise per kWh, excluding free energy, if any, during the calendar month, on ex power plant basis.

(4) Energy charge payable to the generating company for a month shall be:

$$= 0.20 \times \{ \text{Scheduled energy (ex-bus) for the month in kWh} - (\text{Design Energy for the month (DEm)} + 75\% \text{ of the energy utilized in pumping the water from the lower elevation reservoir to the higher elevation reservoir of the month}) \} \times (100 - \text{FEHS}) / 100.$$

Where,

DEm = Design energy for the month specified for the hydro generating station,
in MWh

FEHS = Free energy for home State, in per cent, as mentioned in Note 3 under Regulation 55 of these regulations, if any.

Provided that in case the Scheduled energy in a month is less than the Design Energy for the month plus 75% of the energy utilized in pumping the water from the lower elevation reservoir to the higher elevation reservoir of the month, then the energy charges payable by the beneficiaries shall be zero.

(5) The generating company shall maintain the record of daily inflows of natural water into the upper elevation reservoir and the reservoir levels of upper elevation reservoir and lower elevation reservoir on hourly basis. The generator shall be required to maximize the peak hour supplies with the available water including the natural flow of water. In case it is established that generator is deliberately or otherwise without any

valid reason, is not pumping water from lower elevation reservoir to the higher elevation during off-peak period or not generating power to its potential or wasting natural flow of water, the capacity charges of the day shall not be payable by the beneficiary. For this purpose, outages of the unit(s)/station including planned outages and the forced outages up to 15% in a year shall be construed as the valid reason for not pumping water from lower elevation reservoir to the higher elevation during off-peak period or not generating power using energy of pumped water or natural flow of water:

Provided that the total capacity charges recovered during the year shall be adjusted on pro-rata basis in the following manner in the event of total machine outages in a year exceeds 15%:

$$(ACC)_{adj} = (ACC) R \times (100 - ATO) / 85$$

Where,

(ACC)_{adj} – Adjusted Annual Capacity Charges

(ACC) R – Annual Capacity Charges recovered

ATO - Total Outages in percentage for the year including forced and planned outages

Provided further that the generating station shall be required to declare its machine availability daily on day ahead basis for all the time blocks of the day in line with the scheduling procedure of Grid Code.

(6) The concerned Load Despatch Centre shall finalise the schedules for the hydro generating stations, in consultation with the beneficiaries, for optimal utilization of all

the energy declared to be available, which shall be scheduled for all beneficiaries in proportion to their respective allocations in the generating station.

46. Computation and Payment of Transmission Charge for Inter-State Transmission System and Communication System:

(1) The fixed cost of the transmission system or communication system forming part of transmission system shall be computed on annual basis, in accordance with norms contained in these regulations, aggregated as appropriate, and recovered on monthly basis as transmission charge from the users, who shall share these charges in the manner specified in clause (2) of this Regulation.

(2) The Transmission charge (inclusive of incentive) payable for a calendar month for transmission system or part shall be computed for each region separately for AC and DC system as under:

For AC system:

a) For TAFM $n \leq 98.00\%$

$$AFC \times (NDM_n / NDY) \times (TAFM_n / 98.00\%)$$

b) For TAFM n : $98.00\% < TAFM_n < 98.50\%$

$$AFC \times (NDM_n / NDY) \times (1)$$

c) For TAFM n : $98.50\% < TAFM_n \leq 99.75\%$

$$AFC \times (NDM_n / NDY) \times (TAFM_n / 98.50\%)$$

d) For TAFM $n \geq 99.75\%$

$$AFC \times (NDM_n / NDY) \times (99.75\% / 98.50\%)$$

Where,

AFC = Annual Fixed Cost specified for the year in Rupees

NDM_n = Number of days in nth month

NDY = Number of days in the year

TAFM_n = Transmission System availability factor for the nth month, in percent
computed in accordance with Appendix II.

For HVDC bi-pole links and HVDC back-to-back Stations:

$$TC_1 = AFC \times (NDM_1 / NDY) \times (TAFM_1 / NATAF)$$

$$TC_2 = AFC \times (NDM_2 / NDY) \times (TAFM_2 / NATAF) - TC_1$$

$$TC_3 = AFC \times (NDM_3 / NDY) \times (TAFM_3 / NATAF) - (TC_1 + TC_2)$$

$$TC_4 = AFC \times (NDM_4 / NDY) \times (TAFM_4 / NATAF) - (TC_1 + TC_2 + TC_3)$$

....

$$TC_{11} = AFC \times (NDM_{11} / NDY) \times (TAFM_{11} / NATAF) - (TC_1 + TC_2 + \dots + TC_{10})$$

$$TC_{12} = AFC \times (TAFY / NATAF) - (TC_1 + TC_2 + \dots + TC_{11});$$

If,

(i) TAFM: 95.00% < TAFM < 97.50%, then TAFM=NATAF;

(ii) TAFM: 97.50% ≤ TAFM ≤ 99.75%, then NATAF=97.50%; and

(iii) For TAFM ≥ 99.75%, then TAFM=99.75% and NATAF= 97.50%.

Where,

TC_n = Transmission charges inclusive of incentive up to the nth month

AFC = Annual fixed cost specified for the year in rupees

NATAF = Normative Annual Transmission Availability Factor in percentage

NDM_n= No of days upto the end of nth month of the financial year

NDY = No. of days in the year

TAFMn= Transmission availability factor upto the end of the nth month of the year in percentage computed in accordance with Appendix -II

TAFY = Transmission availability factor in percent for the year.

(3) The transmission charges shall be calculated separately for part of the transmission system having different NATAF and aggregated thereafter, according to their sharing by the long term customers. The charges of the communication system shall be a part of the transmission charges and shall be shared by the long term customers.

47. Deviation Charges: (1) Variations between actual net injection and scheduled net injection for the generating stations, and variations between actual net drawl and scheduled net drawl for the beneficiaries shall be treated as their respective deviations and charges for such deviations shall be governed by the Central Electricity Regulatory Commission (Deviation Settlement Mechanism and Related matters) Regulations, 2014.

(2) Actual net deviation of every Generating Station and Beneficiary shall be metered on its periphery through special energy meters (SEMs) installed by the Central Transmission Utility (CTU), and computed in MWh for each 15-minute time block by the concerned Regional Load Despatch Centre.

CHAPTER - 12
NORMS OF OPERATION

48. Recovery of Tariff and Incentive: (1) Recovery of capacity charge, energy charge, transmission charge and incentive by the generating company and the transmission licensee shall be based on the achievement of the operational norms specified in the Regulation 49 to Regulation 52 of these regulations.

(2) The Commission may on its own revise the norms of Station Heat Rate specified in Regulation 49 (C) of these regulations in respect of any of the generating stations for which relaxed norms have been specified.

Norms of operation for thermal generating station

49. The norms of operation as given hereunder shall apply to thermal generating stations:

(A) Normative Annual Plant Availability Factor (NAPAF)

(a) For all thermal generating stations, except those covered under clauses (b), (c), (d), & (e) - 85% ;

(b) For following Lignite-fired Thermal generating stations of NLC India Ltd:

TPS-I	72%
-------	-----

(c) For following Thermal Generating Stations of DVC:

Bokaro TPS	75%
Chandrapura TPS	75%
Durgapur TPS	74%

(d) For following Gas based Thermal Generating Stations of NEEPCO:

Assam GPS	72%
-----------	-----

(e) For Lignite fired Generating Stations using Circulatory Fluidized Bed Combustion (CFBC) Technology and Generating stations based on coal rejects:

1. First Three years from the date of commercial operation - 75%
2. For next year after completion of three years of the date of commercial operation - 80%

(B) Normative Annual Plant Load Factor (NAPLF) for Incentive:

(a) For all thermal generating stations, except those covered under clauses (b), (c) - 85% ;

(b) For following Lignite-fired Thermal generating stations of NLC India Ltd:

TPS -I	75%
--------	-----

(c) For following Thermal Generating Stations of Damodar Valley Corporation (DVC):

Bokaro TPS	80%
Chandrapur TPS	80%
Durgapur TPS	80%

(C) Gross Station Heat Rate:

(a) Existing Thermal Generating Stations

- (i) For existing Coal-based Thermal Generating Stations, other than those covered under clauses (ii) and (iii) below:

200/210/250 MW Sets	500 MW Sets (Sub-critical)
2,430kCal/kWh	2,390kCal/kWh

Note 1

In respect of 500 MW and above units where the boiler feed pumps are electrically operated, the gross station heat rate shall be 40 kCal/kWh lower than the gross station heat rate specified above.

Note 2

For the generating stations having combination of 200/210/250 MW sets and 500 MW and above sets, the normative gross station heat rate shall be the weighted average gross station heat rate of the combinations.

Note 3

The normative gross station heat rate above is exclusive of the compensation specified in Regulation 6.3 B of the Grid Code. The generating company shall, based on unit loading factor, consider the compensation in addition to the normative gross heat rate

above.

Note 4

The gross station heat rate for the unit capacity of less than 200 MW sets, shall be dealt on case to case basis.

(ii) For following Thermal generating stations of NTPC Ltd:

Talcher TPS	2,830 kCal/kWh
Tanda TPS	2,750 kCal/kWh

(iii) For Thermal Generating Stations of Damodar Valley Corporation (DVC):

Bokaro TPS	2,700 kCal/kWh
Chandrapura TPS (Unit 3)	3,000 kCal/kWh
Durgapur TPS	2,750 kCal/kWh

(iv) For Lignite-fired Thermal Generating Stations: For lignite-fired thermal generating stations, except for TPS-I and TPS-II (Stage I & II) of NLC India Ltd, the gross station heat rates specified under sub-clause (i) for coal-based thermal generating stations shall be applied with correction, using multiplying factors as given below:

- (a) For lignite having 50% moisture: 1.10
- (b) For lignite having 40% moisture: 1.07
- (c) For lignite having 30% moisture: 1.04

For other values of moisture content, multiplying factor shall be pro-rated for moisture content between 30-40% and 40-50% depending upon the rated values of multiplying factor for the respective range given under sub-clauses (a) to (c) above.

(v) TPS-I and TPS-II (Stage I & II) of NLC India Ltd:

TPS-I:	4,000 kCal/kWh
TPS-II:	2,890 kCal/kWh
TPS- I (Expansion):	2,720 kCal/kWh

(vi) Open Cycle Gas Turbine/Combined Cycle Generating Stations: For the following gas based thermal generating stations:

Name of generating station	Combined cycle (kCal/kWh)	Open Cycle (kCal/kWh)
Gandhar GPS	2,040	2,960
Kawas GPS	2,050	3,010
Anta GPS	2,075	3,010
Dadri GPS	2,000	3,010
Auraiya GPS	2,100	3,045
Faridabad GPS	1,975	2,900
Kayamkulam GPS	2,000	2,900
Assam GPS	2,600	3,578
Agartala GPS	2,600	3,578
Ratnagiri	1,820	2,641

(b) Thermal Generating Stations achieving COD on or after 1.4.2009:

(i) For Coal-based and lignite-fired Thermal Generating Stations:

1.05 X Design Heat Rate (kCal/kWh)

Where the Design Heat Rate of a generating unit means the unit heat rate guaranteed by the supplier at conditions of 100% MCR, zero percent make up, design coal and design cooling water temperature/back pressure.

Provided that the design heat rate shall not exceed the following maximum design unit heat rates depending upon the pressure and temperature ratings of the units:

Pressure Rating (Kg/cm ²)	150	170	170
SHT/RHT (°C)	535/535	537/537	537/565
Type of BFP	Electrical Driven	Turbine Driven	Turbine Driven
Max Turbine Heat Rate (kCal/kWh)	1955	1950	1935
Min. Boiler Efficiency			
Sub-Bituminous Indian Coal	0.86	0.86	0.86
Bituminous Imported Coal	0.89	0.89	0.89
Max. Design Heat Rate (kCal/kWh)			
Sub-Bituminous Indian Coal	2273	2267	2250
Bituminous Imported Coal	2197	2191	2174

Pressure Rating (Kg/cm ²)	247	247	270	270
SHT/RHT (°C)	537/565	565/593	593/593	600/ 600
Type of BFP	Turbine Driven	Turbine Driven	Turbine Driven	Turbine Driven
Max Turbine Heat Rate (kCal/kWh)	1900	1850	1810	1800
Min. Boiler Efficiency				
Sub-Bituminous Indian Coal	0.86	0.86	0.865	0.865
Bituminous Imported Coal	0.89	0.89	0.895	0.895
Max. Design Heat Rate (kCal/kWh)				
Sub-Bituminous Indian Coal	2222	2151	2105	2081
Bituminous Imported Coal	2135	2078	2034	2022

Provided further that in case pressure and temperature parameters of a unit are different from above ratings, the maximum design heat rate of the unit of the nearest class shall be taken:

Provided also that where heat rate of the unit has not been guaranteed but turbine cycle heat rate and boiler efficiency are guaranteed separately by the same supplier or different suppliers, the design heat rate of the unit shall be arrived at by using guaranteed turbine cycle heat rate and boiler efficiency:

Provided also that where the boiler efficiency is lower than 86% for Sub-bituminous Indian coal and 89% for bituminous imported coal, the same shall be considered as 86% and 89% for Sub-bituminous Indian coal and bituminous imported coal respectively, for computation of station heat rate:

Provided also that maximum turbine cycle heat rate shall be adjusted for type of dry cooling system:

Provided also that in case of coal based generating station if one or more generating units were declared under commercial operation prior to 1.4.2019, the heat rate norms for those generating units as well as generating units declared under commercial operation on or after 1.4.2019 shall be lowest of the heat rate norms considered by the Commission during tariff period 2014-19 or those arrived at by above methodology or the norms as per the sub-clause (C)(a)(i) of this Regulation:

Provided also that in case of lignite-fired generating stations (including stations based on CFBC technology), maximum design heat rates shall be increased using factor for moisture content given in sub-clause (C)(a)(iv) of this Regulation:

Provided also that for Generating stations based on coal rejects, the Commission

shall approve the Station Heat Rate on case to case basis.

Note: In respect of generating units where the boiler feed pumps are electrically operated, the maximum design heat rate of the unit shall be 40 kCal/kWh lower than the maximum design heat rate of the unit specified above with turbine driven Boiler Feed Pump.

(c) For Gas-based/ Liquid-based Thermal Generating Unit(s)/ Block(s) having COD on or after 1.4.2009:

For Natural Gas = $1.050 \times$ Design Heat Rate of the unit/block (kCal/kWh)

For RLNG = $1.071 \times$ Design Heat Rate of the unit/block for Liquid Fuel (kCal/kWh)

Where the Design Heat Rate of a unit shall mean the guaranteed heat rate for a unit at 100% MCR and at site ambient conditions; and the Design Heat Rate of a block shall mean the guaranteed heat rate for a block at 100% MCR, site ambient conditions, zero percent make up, design cooling water temperature/back pressure.

(D) Secondary Fuel Oil Consumption:

- (a) For Coal-based generating stations other than at (c) below: 0.50 ml/kWh
- (b) (i) For Lignite-fired generating stations except TPS-I: 1.0 ml/kWh
(ii) For TPS-I: 1.5 ml/kWh
- (c) For Coal-based generating stations of DVC:

Bokaro TPS	1.5 ml/kWh
Chandrapur TPS	1.5 ml/kWh
Durgapur TPS	2.4 ml/kWh

(d) For Generating Stations based on Coal Rejects: 2.0 ml/kWh

(E) Auxiliary Energy Consumption:

(a) For Coal-based generating stations except at (b) below:

S. No.	Generating Station	With Natural Draft cooling tower or without cooling tower
(i)	200 MW series	8.50%
(ii)	300 MW and above	
	Steam driven boiler feed pumps	5.75%
	Electrically driven boiler feed pumps	8.00%

Provided that for thermal generating stations with induced draft cooling towers and where tube type coal mill is used, the norms shall be further increased by 0.5% and 0.8% respectively:

Provided further that Additional Auxiliary Energy Consumption as follows shall be allowed for plants with Dry Cooling Systems:

Type of Dry Cooling System	(% of gross generation)
Direct cooling air cooled condensers with mechanical draft fans	1.0%
Indirect cooling system employing jet condensers with pressure recovery turbine and natural draft tower	0.5%

Note: The auxiliary energy consumption for the unit capacity of less than 200 MW sets shall be dealt on case to case basis.

(b) For other Coal-based generating stations:

(i)	Talcher Thermal Power Station	10.50%
(ii)	Tanda Thermal Power Station	11.50%
(iii)	Bokaro Thermal Power Station	10.25%
(iv)	Chandrapur Thermal Power Station	9.50%
(v)	Durgapur Thermal Power Station	10.50%

(c) For Gas Turbine /Combined Cycle generating stations:

(i)	Combined Cycle	:	2.75%
(ii)	Open Cycle	:	1.00%

Provided that where the gas based generating station is using electric motor driven Gas Booster Compressor, the Auxiliary Energy Consumption in case of Combine Cycle mode shall be 3.30% (including impact of air-cooled condensers for Steam Turbine Generators):

Provided further that an additional Auxiliary Energy Consumption of 0.35% shall be allowed for Combine Cycle Generating Stations having direct cooling air cooled condensers with mechanical draft fans.

(d) For Lignite-fired thermal generating stations:

(i) For all generating stations with 200 MW sets and above:

The auxiliary energy consumption norms shall be 0.5 percentage point more than the auxiliary energy consumption norms of coal-based generating stations at (E) (a) above.

Provided that for the lignite fired stations using CFBC technology, the auxiliary energy consumption norms shall be 1.5 percentage point more than the auxiliary

energy consumption norms of coal-based generating stations at (E) (a) above.

- (ii) For Barsingsar Generating station of NLC using CFBC technology: 12.50%
- (iii) For TPS-I, TPS-I (Expansion) and TPS-II Stage-I&II of NLC India Ltd.:

TPS-I	12.00%
TPS-II	10.00%
TPS-I (Expansion)	8.50%

- (iv) Limestone consumption for lignite-based generating station using CFBC technology:

Barsingsar : 0.056 kg/kWh

TPS-II (Expansion) : 0.046 kg/kWh

- (e) For Generating Stations based on coal rejects: 10%

50. Norms of Operation for Hydro Generating Stations: The norms of operation as given hereunder shall apply to hydro generating station:

(A) Normative Annual Plant Availability Factor (NAPAF): (1) The following normative annual plant availability factor (NAPAF) shall apply to hydro generating station:

- (a) Storage and Pondage type plants with head variation between Full Reservoir Level (FRL) and Minimum Draw Down Level (MDDL) of up to 8%, and where plant availability is not affected by silt: 90%;
- (b) In case of storage and pondage type plants with head variation between full reservoir level and minimum draw down level is more than 8% and when plant availability is not affected by silt, the month wise peaking capability as provided

by the project authorities in the DPR (approved by CEA or the State Government) shall form basis of fixation of NAPAF;

- (c) Pondage type plants where plant availability is significantly affected by silt: 85%.
Run-of-river generating stations: NAPAF to be determined plant-wise, based on 10-day design energy data, moderated by past experience where available/relevant.
- (2) A further allowance may be made by the Commission in NAPAF determination under special circumstances, e.g. abnormal silt problem or other operating conditions, and known plant limitations.
- (3) A further allowance of 5% may be allowed for difficulties in North East Region.
- (4) Based on the above, the Normative annual plant availability factor (NAPAF) of the hydro generating stations already in operation shall be as follows:-

Station	Type of Plant	Plant Capacity No. of Units x MW	NAPAF (%)
THDC			
THDC Stage I	Storage	4x250	80
KHEP	Storage	4x100	68
NHPC			
Bairasul	Pondage	3x60	90
Loktak	Pondage	3x35	88
Salal	ROR	6x115	64
Tanakpur	ROR	3x31.4	59
Chamera-I	Pondage	3x180	90
Uri I	ROR	4x120	74
Rangit	Pondage	3x20	90
Chamera-II	Pondage	3x100	90
Dhauliganga	Pondage	4x70	78
Dulhasti	Pondage	3x130	90
Teesta-V	Pondage	3x170	87

Station	Type of Plant	Plant Capacity No. of Units x MW	NAPAF (%)
Sewa-II	Pondage	3x40	89
TLDP III	Pondage	4x33	77
Chamera III	Pondage	3x77	87
Chutak	ROR	4x11	48
Nimmo Bazgo	Pondage	3x15	70
Uri II	ROR	4x60	70
Parbati III	Pondage	4x130	43
NHDC			
Indira Sagar	Storage	8x125	87
Omkareshwar	Pondage	8x65	90
NEEPCO			
Kopili I	Storage	4x50	69
Khandong	Storage	2x25	67
Kopili II	Storage	1x25	69
Doyang	Storage	3x25	70
Ranganadi	Pondage	3x135	88
NTPC			
Koldam	Storage	4x200	90
SJVNL			
Nathpa Jhakri	ROR	6x250	90
Rampur	ROR	6x68.67	85
DVC			
Panchet	Storage	2x40	80
Tilaya	Storage	2x2	80
Maithon	Storage	3x20	80
Teesta III	Pondage	6x200	85

(B) In case of pumped storage hydro generating stations, the quantum of electricity required for pumping water from down-stream reservoir to up-stream reservoir shall be arranged by the beneficiaries duly taking into account the transmission and distribution losses up to the bus bar of the generating station. In return, beneficiaries shall be entitled to equivalent energy of 75% of the energy utilized in pumping the

water from the lower elevation reservoir to the higher elevation reservoir from the generating station during peak hours and the generating station shall be under obligation to supply such quantum of electricity during peak hours:

Provided that in the event of the beneficiaries failing to supply the desired level of energy during off-peak hours, there will be pro-rata reduction in their energy entitlement from the station during peak hours:

Provided further that the beneficiaries may assign or surrender their share of capacity in the generating station, in part or in full, or the capacity may be reallocated by the Central Government, and in that event, the owner or assignee of the capacity share shall be responsible for arranging the equivalent energy to the generating station in off-peak hours, and be entitled to corresponding energy during peak hours in the same way as the original beneficiary was entitled.

(C) Auxiliary Energy Consumption (AEC):

Type of Station	AEC	
	Installed Capacity above 200 MW	Installed Capacity upto 200 MW
Surface		
Rotating Excitation	0.7%	0.7%
Static	1.0%	1.2%
Underground		
Rotating Excitation	0.9%	0.9%
Static	1.2%	1.3%

Norms of operation for transmission system

51. Normative Annual Transmission System Availability Factor (NATAF):

(a) For recovery of Annual Fixed Cost, NATAF shall be as under:

(1) AC system: 98.00%;

(2) HVDC bi-pole links 95.00% and HVDC back-to-back stations: 95.00%:

Provided that the normative annual transmission availability factor of the HVDC bi-pole links shall be 85% for first twelve months from the date of commercial operation.

(b) For Incentive, NATAF shall be as under:

(1) AC system: 98.50%;

(2) HVDC bi-pole links and HVDC back-to-back Stations: 97.50%:

Provided that no Incentive shall be payable for availability beyond 99.75%:

Provided further that for AC and HVDC system, actual outage hours shall be considered for computation of availability upto two trippings per year. After two trippings in a year, for every tripping, additional 12 hours outage shall be considered in addition to the actual outage hours:

Provided also that in case of outage of a transmission element affecting evacuation of power from a generating station, outage hours shall be multiplied by a factor of 2.

52. Auxiliary Energy Consumption in the Sub-station

(1) AC System: The charges for auxiliary energy consumption in the AC sub-station for the purpose of air-conditioning, lighting and consumption in other equipment shall be borne by the transmission licensee and included in the normative operation and maintenance expenses.

(2) HVDC sub-station: For auxiliary energy consumption in HVDC sub-stations, the Central Government may allocate an appropriate share from one or more ISGS. The charges for such power shall be borne by the transmission licensee from the normative operation and maintenance expenses.

CHAPTER - 13

SCHEDULING, ACCOUNTING AND BILLING

53. **Scheduling:** The methodology for scheduling and dispatch for the generating station shall be as specified in the Grid Code.

54. **Metering and Accounting:** For metering and accounting, the provisions of the Grid Code shall be applicable.

55. **Billing and Payment of charges:** (1) Bills shall be raised for capacity charge and energy charge by the generating company and for transmission charge by the transmission licensee on monthly basis in accordance with these regulations, and payments shall be made by the beneficiaries or the long term customers directly to the generating company or the transmission licensee, as the case may be:

Provided that the physical copy of the Bill in Original at the office of the Authorised Person of the beneficiary or long term customer, as the case may be, or the scanned copy of Original Bill through official email ID of the Authorised Signatory of the Generating Company or the Transmission Licensee, as the case may be, shall be recognized as valid mode of presentation of Bill:

Provided further that Authorized Signatory or Signatories (official designation only) shall be notified in advance by the Managing Director or Chief Executive Officer of the Company and any change in the list of Authorised Signatory for the purpose, shall be communicated in the same manner.

(2) Payment of the capacity charge for a thermal generating station shall be shared by

the beneficiaries of the generating station as per their percentage shares for the month (inclusive of any allocation out of the unallocated capacity) in the installed capacity of the generating station. Payment of capacity charge and energy charge for a hydro generating station shall be shared by the beneficiaries of the generating station in proportion to their shares (inclusive of any allocation out of the unallocated capacity) in the saleable capacity (to be determined after deducting the capacity corresponding to free energy to home State as per Note 3 herein.

Note 1

Shares or allocations of each beneficiary in the total capacity of Central sector generating stations shall be as determined by the Central Government, inclusive of any allocation made out of the unallocated capacity. The shares shall be applied in percentages of installed capacity and shall normally remain constant during a month. Based on the decision of the Central Government, the changes in allocation shall be communicated by the Member-Secretary, Regional Power Committee in advance, at least three days prior to beginning of a calendar month, except in case of an emergency calling for an urgent change in allocations out of unallocated capacity. The total capacity share of a beneficiary would be sum of its capacity share plus allocation out of the unallocated portion. In the absence of any specific allocation of unallocated power by the Central Government, the unallocated power shall be added to the allocated shares in the same proportion as the allocated shares.

Note 2

The beneficiaries may propose surrendering part of their allocated firm share to other States within or outside the region. In such cases, depending upon the technical

feasibility of power transfer and specific agreements reached by the generating company with other States within or outside the region for such transfers, the shares of the beneficiaries may be re-allocated by the Central Government for a specific period (in complete months) from the beginning of a calendar month. When such re-allocations are made, the beneficiaries who surrender the share shall not be liable to pay capacity charges for the surrendered share. The capacity charges for the capacity surrendered and reallocated as above shall be paid by the State(s) to whom the surrendered capacity is allocated. Except for the period of reallocation of capacity as above, the beneficiaries of the generating station shall continue to pay the full capacity charges as per allocated capacity shares. Any such reallocation and its reversion shall be communicated to all concerned by the Member Secretary, Regional Power Committee in advance, at least three days prior to such reallocation or reversion taking effect.

Note 3

FEHS = Free energy for home State, in percent and shall be taken as 13% or actual whichever is less.

Provided that in cases where the site of a hydro project is awarded to a developer, by the State Government by following a two stage transparent process of bidding, the 'free energy' shall be taken as 13%, in addition to energy corresponding to 100 units of electricity to be provided free of cost every month to every project affected family for a period of 10 years from the date of commercial operation of the generating station:

Provided further that the generating company shall submit detailed

quantification of energy corresponding to 100 units of electricity to be provided free of cost every month to every month to every project affected family for a period of 10 years from the date of commercial operation.

56. Recovery of Statutory Charges: The generating company shall recover the statutory charges imposed by the State and Central Government such as electricity duty, water cess by considering normative parameters specified in these regulations. In case of the electricity duty is applied on the auxiliary energy consumption, such amount of electricity duty shall apply on normative auxiliary energy consumption of the generating station (excluding colony consumption) and apportioned to each of the beneficiaries in proportion to their schedule dispatch during the month.

57. Sharing of Transmission Charges: (1) The sharing of transmission charges shall be governed by the Sharing Regulations.

(2) The charges determined under these regulations in relation to communication system forming part of transmission system shall be shared by the beneficiaries or long term customers in accordance with the Sharing Regulations:

Provided that charges determined under these regulations in relation to communication system other than that of central portion shall be shared by the beneficiaries in proportion to the capital cost belonging to respective beneficiaries.

58. Rebate. (1) For payment of bills of the generating company and the transmission licensee through letter of credit on presentation or through National Electronic Fund Transfer (NEFT) or Real Time Gross Settlement (RTGS) payment mode within a period

of 5 days of presentation of bills by the generating company or the transmission licensee, a rebate of 1.50% shall be allowed.

Explanation: In case of computation of '5 days', the number of days shall be counted consecutively without considering any holiday. However, in case the last day or 5th day is official holiday, the 5th day for the purpose of Rebate shall be construed as the immediate succeeding working day (as per the official State Government's calendar, where the Office of the Authorised Signatory or Representative of the Beneficiary, for the purpose of receipt or acknowledgement of Bill is situated).

(2) Where payments are made on any day after 5 days and within a period of 30 days of presentation of bills by the generating company or the transmission licensee, a rebate of 1% shall be allowed.

59. Late payment surcharge: In case the payment of any bill for charges payable under these regulations is delayed by a beneficiary or long term customers as the case may be, beyond a period of 45 days from the date of presentation of bills, a late payment surcharge at the rate of 1.50% per month shall be levied by the generating company or the transmission licensee, as the case may be.

CHAPTER - 14

SHARING OF BENEFITS

60. **Sharing of gains due to variation in norms:** (1) The generating company or the transmission licensee shall workout gains based on the actual performance of applicable Controllable parameters as under:

- i) Station Heat Rate;
- ii) Secondary Fuel Oil Consumption; and
- iii) Auxiliary Energy Consumption.

(2) The financial gains by the generating company or the transmission licensee, as the case may be, on account of controllable parameters shall be shared between generating company or transmission licensee and the beneficiaries or long term customers, as the case may be on annual basis. The financial gains computed as per the following formulae in case of generating station other than hydro generating stations on account of operational parameters as shown in Clause (1) of this Regulation shall be shared in the ratio of 50:50 between the generating stations and beneficiaries.

$$\text{Net Gain} = (\text{ECR}_N - \text{ECR}_A) \times \text{Scheduled Generation}$$

Where,

ECR_N = Normative Energy Charge Rate computed on the basis of norms specified for Station Heat Rate, Auxiliary Energy Consumption and Secondary Fuel Oil consumption.

ECR_A = Actual Energy Charge Rate computed on the basis of actual Station Heat Rate, Auxiliary Energy Consumption and Secondary Fuel Oil

Consumption for the month.

Provided that in case of hydro generating stations, the net gain on account of Actual Auxiliary Energy Consumption being less than the Normative Auxiliary Energy Consumption, shall be computed as per following formulae provided the saleable scheduled generation is more than the saleable design energy and shall be shared in the ratio of 50:50 between generating station and beneficiaries.:

- (i) When saleable scheduled generation is more than saleable design energy on the basis of normative auxiliary energy consumption and less than or equal to saleable design energy on the basis of actual auxiliary energy consumption:

$$\text{Net gain (Million Rupees)} = [(\text{Saleable Scheduled generation in MUs}) - (\text{Saleable Design energy on the basis of normative auxiliary energy consumption in MUs})] \times [1.20 \text{ or ECR, whichever is lower}]$$

- (ii) When saleable scheduled generation is more than saleable design energy on the basis of actual auxiliary energy consumption:

$$\text{Net gain (Million Rupees)} = \{ \text{Saleable Scheduled generation in MUs} - [(\text{Saleable Scheduled Generation in MUs} \times (100 - \text{normative AEC in } \%)) / (100 - \text{actual AEC in } \%)] \} \times [1.20 \text{ or ECR, whichever is lower}]$$

61. Sharing of saving in interest due to re-financing or restructuring of loan :(1) If re-financing or restructuring of loan by the generating company or the transmission licensee, as the case may be, results in net savings on interest after accounting for cost

associated with such refinancing or restructuring, the same shall be shared between the beneficiaries and the generating company or the transmission licensee, as the case may be, in the ratio of 50:50.

(2) In case of dispute, any of the parties may make an application in accordance with the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 1999 for settlement of the dispute:

Provided that the beneficiaries or the long term customers shall not withhold any payment on account of the interest claimed by the generating company or the transmission licensee during the pendency of any dispute arising out of re-financing of loan.

62. Sharing of Non-Tariff Income: The non-tariff net income in case of generating station and transmission system from rent of land or buildings, sale of scrap and advertisements shall be shared between the beneficiaries or the long term customers and the generating company or the transmission licensee, as the case may be, in the ratio 50:50.

63. Sharing of Clean Development Mechanism Benefits: The proceeds of carbon credit from approved emission reduction projects under Clean Development Mechanism shall be shared in the following manner:-

- (a) 100% of the gross proceeds on account of CDM to be retained by the project developer in the first year after the date of commercial operation of the generating station or the transmission system, as the case may be;
- (b) In the second year, the share of the beneficiaries shall be 10% which shall be

progressively increased by 10% every year till it reaches 50%, where after the proceeds shall be shared in equal proportion, by the generating company or the transmission licensee, as the case may be, and the beneficiaries.

64. Sharing of income from other business of transmission licensee: The income from other business of transmission licensee shall be shared with the long term customer in the manner as specified in the Central Electricity Regulatory Commission (Sharing of revenue derived from utilization of transmission assets for other business) Regulations, 2007.

CHAPTER 15

MISCELLANEOUS PROVISIONS

65. Operational Norms to be ceiling norms: Operational norms specified in these regulations are the ceiling norms and shall not preclude the generating company or the transmission licensee, as the case may be, and the beneficiaries and the long-term customers from agreeing to the improved norms and in case the improved norms are agreed to, such improved norms shall be applicable for determination of tariff.

66. Deviation from ceiling tariff: (1) The tariff determined in these regulations shall be a ceiling tariff. The generating company or the transmission licensee and the beneficiaries or the long-term customer, as the case may be, may mutually agree to charge a lower tariff.

(2) The generating company or the transmission licensee, may opt to charge a lower tariff for a period not exceeding the validity of these regulations on agreeing to deviation from operational parameters, reduction in operation and maintenance expenses, reduced return on equity and incentive specified in these regulations.

(3) If the generating company or the transmission licensee opts to charge a lower tariff for a period not exceeding the validity of these regulations on account of lower depreciation based on the requirement of repayment in such case the unrecovered depreciation on account of reduction of depreciation by the generating company or the transmission licensee during useful life shall be allowed to be recovered after the useful life in these regulations.

(4) The deviation from the ceiling tariff specified by the Commission, shall come into effect from the date agreed to by the generating company or the transmission licensee and the beneficiaries or the long-term customer, as the case may be.

(5) The generating company and the beneficiaries of a generating station or the transmission licensee and the long term customer of transmission system shall be required to approach the Commission for charging lower tariff in accordance with clauses (1) to (3) above. The details of the accounts and the tariff actually charged under clauses (1) to (3) shall be submitted at the time of true up.

67. Deferred Tax liability with respect to previous tariff period: Deferred tax liabilities for the period upto 31st March, 2009 whenever they materialise shall be recoverable directly by the generating companies or transmission licensees from the then beneficiaries or long term customers, as the case may be. Deferred tax liabilities for the period arising from 1.4.2009 to 31.3.2014 if any, shall not be recoverable from the beneficiaries or the long term customers, as the case may be.

68. Hedging of Foreign Exchange Rate Variation: (1) The generating company or the transmission licensee, as the case may be, may hedge foreign exchange exposure in respect of the interest and repayment of foreign currency loan taken for the generating station or the transmission system, in part or in full at their discretion.

(2) If the petitioner enters into hedging arrangement(s) based on its approved hedging policy, the petitioner shall communicate to the beneficiaries concerned, of

entering into such arrangement(s) within thirty days.

(3) Every generating company and transmission licensee shall recover the cost of hedging of foreign exchange rate variation corresponding to the normative foreign debt, in the relevant year on year-to-year basis as expense in the period in which it arises and extra rupee liability corresponding to such foreign exchange rate variation shall not be allowed against the hedged foreign debt.

(4) To the extent the generating company or the transmission licensee is not able to hedge the foreign exchange exposure, the extra rupee liability towards interest payment and loan repayment corresponding to the normative foreign currency loan in the relevant year shall be permissible, provided it is not attributable to the generating company or the transmission licensee or its suppliers or contractors.

69. Recovery of cost of hedging or Foreign Exchange Rate Variation (FERV): (1)

Every generating company and the transmission licensee shall recover the cost of hedging and foreign exchange rate variation on year-to-year basis as income or expense in the period in which it arises.

(2) Recovery of cost of hedging or foreign exchange rate variation shall be made directly by the generating company or the transmission licensee, as the case may be, from the beneficiaries or the long term customers, as the case may be, without making any application before the Commission:

Provided that in case of any objections by the beneficiaries or the long term customers, as the case may be, to the amounts claimed on account of cost of hedging or

foreign exchange rate variation, the generating company or the transmission licensee, as the case may be, may make an appropriate application before the Commission for its decision.

70. Application fee and the publication expenses: The following fees, charges and expenses shall be reimbursed directly by the beneficiary in the manner specified herein:

- (1) The application filing fee and the expenses incurred on publication of notices in the application for approval of tariff, may in the discretion of the Commission, be allowed to be recovered by the generating company or the transmission licensee, as the case may be, directly from the beneficiaries or the long term customers, as the case may be.
- (2) The following fees and charges shall be reimbursed directly by the beneficiaries in proportion of their allocation in the generating stations or by the long term customers in proportion to their share in the inter-State transmission systems determined in accordance with the Central Electricity Regulatory Commission (Sharing of inter-State Transmission Charges and Losses) Regulations, 2010, as amended from time to time.
- (3) Fees and charges paid by the generating companies and inter-State transmission licensees (including deemed inter-State transmission licensee) under the Central Electricity Regulatory Commission (Fees and Charges of Regional Load Despatch Centre and other related matters) Regulations, 2009, as amended from time to time or any subsequent amendment thereof.

- (4) Licence fees paid by the inter-State transmission licensees (including the deemed inter-State transmission licensee) in terms of Central Electricity Regulatory Commission (Payment of Fees) Regulations, 2012.
- (5) Licence fees paid by NHPC Ltd to the State Water Resources Development Authority, Jammu in accordance with the provisions of Jammu & Kashmir Water Resources (Regulations and Management) Act, 2010.
- (6) The Commission may, for the reasons to be recorded in writing and after hearing the affected parties, allow reimbursement of any fee or expenses, as may be considered necessary.

71. Special Provisions relating to NLC India Limited: The tariff of the existing generating stations of NLC India Ltd, namely, TPS-I and TPS-II (Stage I & II) and TPS-I (Expansion), whose tariff for the tariff periods 2004-09, 2009-14 and 2014-19 has been determined by following the Net Fixed Assets approach, shall continue to be determined by adopting Net Fixed Assets approach.

72. Special Provisions relating to Damodar Valley Corporation: (1) Subject to clause (2), this Regulation shall apply to determination of tariff of the projects owned by Damodar Valley Corporation (DVC).

(2) The following special provisions shall apply for determination of tariff of the projects owned by DVC:

- (i) **Capital Cost:** The expenditure allocated to the object 'power', in terms of

sections 32 and 33 of the Damodar Valley Corporation Act, 1948, to the extent of its apportionment to generation and inter-state transmission, shall form the basis of capital cost for the purpose of determination of tariff:

Provided that the capital expenditure incurred on head office, regional offices, administrative and technical centers of DVC, after due prudence check, shall also form part of the capital cost.

(ii) Debt Equity Ratio: The debt equity ratio of all projects of DVC commissioned prior to 01.01.1992 shall be 50:50 and that of the projects commissioned thereafter shall be 70:30.

(iii) Depreciation: The depreciation rate stipulated by the Comptroller and Auditor General of India in terms of section 40 of the Damodar Valley Corporation Act, 1948 shall be applied for computation of depreciation of projects of DVC.

(iv) Funds under section 40 of the Damodar Valley Corporation Act, 1948: The Fund(s) established in terms of section 40 of the Damodar Valley Corporation Act, 1948 shall be considered as items of expenditure to be recovered through tariff.

73. Special Provisions relating to BBMB and SSP: The tariff of generating station and the transmission system of Bhakra Beas Management Board (BBMB) and Sardar Sarovar Project (SSP) shall be determined after taking into consideration, the provisions of the Punjab Reorganization Act, 1996 and Narmada Water Scheme, 1980 under

Section 6-A of the Inter-State Water Disputes Act, 1956, respectively.

74. Special Provisions Relating to Certain Inter-State Generation Projects: The tariff of generating station and the transmission system of Indira Sagar generation project and such other inter-state generation projects shall be determined on case to case basis.

75. Transmission Majoration Factor: Transmission Majoration Factor admissible for the transmission projects executed through JV route in terms of Regulation 4.10A of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2001 shall be available for a period of 25 years from the date of issue of the transmission licence.

76. Power to Relax: The Commission, for reasons to be recorded in writing, may relax any of the provisions of these regulations on its own motion or on an application made before it by an interested person.

77. Power to Remove Difficulty: If any difficulty arises in giving effect to the provisions of these regulations, the Commission may, by order, make such provision not inconsistent with the provisions of the Act or provisions of other regulations specified by the Commission, as may appear to be necessary for removing the difficulty in giving effect to the objectives of these regulations.

Sd/-
(Sanoj Kumar Jha)
Secretary

Appendix I
Depreciation Schedule

Sr. No.	Asset Particulars	Depreciation Rate (Salvage Value=10%) SLM
A	Land under full ownership	0.00%
B	Land under lease	
(a)	for investment in the land	3.34%
(b)	For cost of clearing the site	3.34%
(c)	Land for reservoir in case of hydro generating station	3.34%
C	Assets purchased new	
a.	Plant & Machinery in generating stations	
(i)	Hydro electric	5.28%
(ii)	Steam electric NHRB & waste heat recovery boilers	5.28%
(iii)	Diesel electric and gas plant	5.28%
b.	Cooling towers & circulating water systems	5.28%
c.	Hydraulic works forming part of the Hydro-generating stations	
(i)	Dams, Spillways, Weirs, Canals, Reinforced concrete flumes and siphons	5.28%
(ii)	Reinforced concrete pipelines and surge tanks, steel pipelines, sluice gates, steel surge tanks, hydraulic control valves and hydraulic works	5.28%
d.	Building & Civil Engineering works	
(i)	Offices and showrooms	3.34%
(ii)	Containing thermo-electric generating plant	3.34%
(iii)	Containing hydro-electric generating plant	3.34%
(iv)	Temporary erections such as wooden structures	100.00%
(v)	Roads other than Kutcha roads	3.34%
(vi)	Others	3.34%
e.	Transformers, Kiosk, sub-station equipment & other fixed apparatus (including plant)	
(i)	Transformers including foundations having rating of 100 KVA and over	5.28%
(ii)	Others	5.28%
f.	Switchgear including cable connections	5.28%
g.	Lightning arrestor	
(i)	Station type	5.28%
(ii)	Pole type	5.28%
(iii)	Synchronous condenser	5.28%

Sr. No.	Asset Particulars	Depreciation Rate (Salvage Value=10%) SLM
h.	Batteries	5.28%
(i)	Underground cable including joint boxes and disconnected boxes	5.28%
(ii)	Cable duct system	5.28%
i.	Overhead lines including cable support	
(i)	Lines on fabricated steel operating at terminal voltages higher than 66 KV	5.28%
(ii)	Lines on steel supports operating at terminal voltages higher than 13.2 KV but not exceeding 66 KV	5.28%
(iii)	Lines on steel on reinforced concrete support	5.28%
(iv)	Lines on treated wood support	5.28%
j.	Meters	5.28%
k.	Self propelled vehicles	9.50%
l.	Air Conditioning Plants	
(i)	Static	5.28%
(ii)	Portable	9.50%
m.(i)	Office furniture and furnishing	6.33%
(ii)	Office equipment	6.33%
(iii)	Internal wiring including fittings and apparatus	6.33%
(iv)	Street Light fittings	5.28%
n.	Apparatus let on hire	
(i)	Other than motors	9.50%
(ii)	Motors	6.33%
o.	Communication equipment	
(i)	Radio and high frequency carrier system	6.33%
(ii)	Telephone lines and telephones	6.33%
(iii)	Fibre Optic	6.33%
p.	I. T Equipment including software	15.00%
q.	Any other assets not covered above	5.28%

Note: Where life of the particular asset is less than useful life of the project, the useful life of such particular asset shall be considered as per the provisions of the Companies Act, 2013 and subsequent amendment thereto.

Appendix-II

Procedure for Calculation of Transmission System

Availability Factor for a Month

1. Transmission system availability factor for n^{th} calendar month (“TAFP n ”) shall be calculated by the respective transmission licensee, got verified by the concerned Regional Load Dispatch Centre (RLDC) and certified by the Member-Secretary, Regional Power Committee of the region concerned, separately for each AC and HVDC transmission system and grouped according to sharing of transmission charges. In case of AC system, transmission System Availability shall be calculated separately for each Regional Transmission System and inter-regional transmission system. In case of HVDC system, transmission System Availability shall be calculated on consolidate basis for all inter-state HVDC system.

2. Transmission system availability factor for n^{th} calendar month (“TAFP n ”) shall be calculated by consider following:
 - i) **AC transmission lines:** Each circuit of AC transmission line shall be considered as one element;
 - ii) **Inter-Connecting Transformers (ICTs):** Each ICT bank (three single phase transformer together) shall form one element;
 - iii) **Static VAR Compensator (SVC):** SVC along with SVC transformer shall form one element;
 - iv) **Bus Reactors or Switchable line reactors:** Each Bus Reactors or Switchable line reactors shall be considered as one element;
 - v) **HVDC Bi-pole links:** Each pole of HVDC link along with associated equipment at both ends shall be considered as one element;
 - vi) **HVDC back-to-back station:** Each block of HVDC back-to-back station shall be considered as one element. If associated AC line (necessary for

transfer of inter- regional power through HVDC back-to-back station) is not available, the HVDC back-to-back station block shall also be considered as unavailable;

- vii) **Static Synchronous Compensation (“STATCOM”)**: Each STATCOM shall be considered as separate element.

3. The Availability of AC and HVDC portion of Transmission system shall be calculated by considering each category of transmission elements as under:

TAFMn (in %) for AC system:

$$= \frac{o \times AV_o + (p \times AV_p) + (q \times AV_q) + (r \times AV_r) + (u \times AV_u)}{(o + p + q + r + u)} \times 100$$

Where,

- o = Total number of AC lines.
- AV_o = Availability of o number of AC lines.
- p = Total number of bus reactors/switchable line reactors
- AV_p = Availability of p number of bus reactors/switchable line reactors
- q = Total number of ICTs.
- AV_q = Availability of q number of ICTs.
- r = Total number of SVCs.
- AV_r = Availability of r number of SVCs
- u = Total number of STATCOM.
- AV_u = Availability of u number of STATCOMs

TAFMn (in %) for HVDC System:

$$= \frac{\sum_{x=1}^s C_{xpb}(\text{act}) \times AV_{xpb} + \sum_{y=1}^t C_{ybt}(\text{act}) \times AV_{ybt}}{\sum_{x=1}^s C_{xpb} + \sum_{y=1}^t C_{ybt}} \times 100$$

Where

- C_{xpb}(act) = Total actual operated capacity of xth HVDC pole
- C_{xpb} = Total rated capacity of xth HVDC pole

AV_{xpb}	=	Availability of x^{th} HVDC pole
$Cy_{btb}(\text{act})$	=	Total actual operated capacity of y^{th} HVDC back-to-back station block
Cy_{btb}	=	Total rated capacity of y^{th} HVDC back-to-back station block
AV_{ybtb}	=	Availability of y^{th} HVDC back-to-back station block
s	=	Total no of HVDC poles
t	=	Total no of HVDC Back to Back blocks

3. The availability for each category of transmission elements shall be calculated based on the weightage factor, total hours under consideration and non-available hours for each element of that category. The formulae for calculation of Availability of each category of the transmission elements are as per **Appendix-III**. The weightage factor for each category of transmission elements shall be considered asunder:

- (a) For each circuit of AC line - Number of sub-conductors in the line multiplied by ckt-km;
- (b) For each HVDC pole- The rated MW capacity x ckt-km;
- (c) For each ICT bank - The rated MVA capacity;
- (d) For SVC- The rated MVAR capacity (inductive and capacitive);
- (e) For Bus Reactor/switchable line reactors - The rated MVAR capacity;
- (f) For HVDC back-to-back station connecting two Regional grids- Rated MW capacity of each block; and
- (g) For STATCOM - Total rated MVAR Capacity.

4. The transmission elements under outage due to following reasons shall be deemed to be available:

- i. Shut down availed for maintenance of another transmission scheme or construction of new element or renovation/upgradation/additional capitalization in existing system approved by the Commission. If the other transmission scheme belongs to the transmission licensee, the Member-

Secretary, RPC may restrict the deemed availability period to that considered reasonable by him for the work involved. In case of dispute regarding deemed availability, the matter may be referred to Chairperson, CEA within 30 days.

- ii. Switching off of a transmission line to restrict over voltage and manual tripping of switched reactors as per the directions of concerned RLDC.
5. For the following contingencies, outage period of transmission elements, as certified by the Member Secretary, RPC, shall be excluded from the total time of the element under period of consideration for the following contingencies:
- i) Outage of elements due to acts of God and force majeure events beyond the control of the transmission licensee. However, whether the same outage is due to force majeure (not design failure) will be verified by the Member Secretary, RPC. A reasonable restoration time for the element shall be considered by Member Secretary, RPC and any additional time taken by the transmission licensee for restoration of the element beyond the reasonable time shall be treated as outage time attributable to the transmission licensee. Member Secretary, RPC may consult the transmission licensee or any expert for estimation of reasonable restoration time. Circuits restored through ERS (Emergency Restoration System) shall be considered as available;
 - ii) Outage caused by grid incident/disturbance not attributable to the transmission licensee, e.g. faults in substation or bays owned by other agency causing outage of the transmission licensee's elements, and tripping of lines, ICTs, HVDC, etc. due to grid disturbance. However, if the element is not restored on receipt of direction from RLDC while normalizing the system following grid incident/disturbance within reasonable time, the element will be considered not available for the period of outage after issuance of RLDC's direction for restoration;

Provided that in case of any disagreement with the transmission licensee regarding reason for outage, same may be referred to Chairperson, CEA within

30 days. The above need to be resolved within two months:

Provided further that where there is a difficulty or delay beyond sixty days, from the incidence in finalizing the recommendation, the Member Secretary of concerned RPC shall allow the outage hours on provisional basis till the final view.

6. Time frame for certification of transmission system availability: (1) Following schedule shall be followed for certification of availability by Member Secretary of concerned RPC:

- Submission of outage data by Transmission Licensees to RLDC/ constituents
- By 5th of the following month;
- Review of the outage data by RLDC / constituents and forward the same to respective RPC - by 20th of the month;
- Issue of availability certificate by respective RPC - by 3rd of the next month.

Appendix-III

FORMULAE FOR CALCULATION OF AVAILABILITY OF EACH CATEGORY OF TRANSMISSION ELEMENTS

For AC transmission system

$$AV_o(\text{Availability of } o \text{ no. of AC lines}) = \frac{\sum_{i=1}^o W_i(T_i - T_{NAi})/T_i}{\sum_{i=1}^o W_i}$$

$$AV_q(\text{Availability of } q \text{ no. of ICTs}) = \frac{\sum_{k=1}^q W_k(T_k - T_{NAk})/T_k}{\sum_{k=1}^q W_k}$$

$$AV_r(\text{Availability of } r \text{ no. of SVCs}) = \frac{\sum_{l=1}^r W_l(T_l - T_{NAL})/T_l}{\sum_{l=1}^r W_l}$$

$$AV_p(\text{Availability of } p \text{ no. of Switched Bus reactors}) = \frac{\sum_{m=1}^p W_m(T_m - T_{NA_m})/T_m}{\sum_{m=1}^p W_m}$$

$$AV_u(\text{Availability of } u \text{ no. of STATCOMs}) = \frac{\sum_{n=1}^u W_n(T_n - T_{NAn})/T_n}{\sum_{n=1}^u W_n}$$

$$AV_{x_{bp}}(\text{Availability of an individual HVDC pole}) = \frac{(T_x - T_{N_x})}{T_x}$$

$$AV_{y_{btb}}(\text{Availability of an individual HVDC Back-to-back Blocks}) = \frac{(T_y - T_{NAy})}{T_y}$$

For HVDC transmission system

For the new HVDC commissioned but not completed twelve months;

For first 12 months: $[(AV_{x_{bp}} \text{ or } AV_{y_{btb}}) \times 95\% / 85\%]$, subject to ceiling of 95%.

Where,

- o = Total number of AC lines;
- AV_o = Availability of o number of AC lines;
- p = Total number of bus reactors/switchable line reactors;
- AV_p = Availability of p number of bus reactors/switchable line reactors;
- q = Total number of ICTs;
- AV_q = Availability of q number of ICTs;
- r = Total number of SVCs;
- AV_r = Availability of r number of SVCs;
- U = Total number of STATCOM;

AV_u	=	Availability of u number of STATCOMs;
W_i	=	Weightage factor for i th transmission line;
W_k	=	Weightage factor for k th ICT;
W_l	=	Weightage factors for inductive & capacitive operation of l th SVC;
W_m	=	Weightage factor for m th bus reactor;
W_n	=	Weightage factor for n th STATCOM.
$T_i, T_k, T_l, T_m, T_n, T_x, T_y$		The total hours of i th AC line, k th ICT, l th SVC, m th Switched Bus Reactor & n th STATCOM, x th HVDC pole, y th HVDC back-to-back blocks during the period under consideration (excluding time period for outages not attributable to transmission licensee for reasons given in Para 5 of the procedure)
$T_{NAi}, T_{NAk}, T_{NAL}, T_{NAM}, T_{NAn}, T_{NAx}, T_{NAY}$		The non-availability hours (excluding the time period for outages not attributable to transmission licensee taken as deemed availability as per Para 5 of the procedure) for i th AC line, k th ICT, l th SVC, m th Switched Bus Reactor, n th STATCOM, x th HVDC pole and y th HVDC back-to-back block.

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI****Petition No. 280/GT/2020****Coram:****Shri P. K. Pujari, Chairperson
Shri I. S. Jha, Member
Shri Pravas Kumar Singh, Member****Date of Order: 27th January, 2022****In the matter of:**

Petition for approval of tariff of Assam Gas Based Power Plant (291 MW) for the 2019-24 period.

And**In the matter of:**

North Eastern Electric Power Corporation Limited,
Corporate Office: Brookland Compound,
Lower New Colony,
Shillong 793 003

...Petitioner**Vs**

1. Assam Power Distribution Company Limited,
'Bijulee Bhawan', Paltanbazar,
Guwahati 781 001
2. Meghalaya Power Distribution Corporation Limited,
Lumjinshai, Short Round Road,
Shillong -799001
3. Tripura State Electricity Corporation Limited,
Bidyut Bhavan, North Banamalipur,
Agartala -799 001
4. Power & Electricity Department,
Government of Mizoram,
New Secretariat Complex, Kawlpetha,
Aizwal- 796001
5. Manipur State Power Distribution Company Limited,
3rd Floor, New Directorate Building,
Near 2nd M.R Gate, Imphal- Dimapur Road,
Imphal- 795001



6. Department of Power, Vidyut Bhawan,
Government of Arunachal Pradesh,
Itanagar-791111
7. Department of Power, Government of Nagaland,
Electricity House, A G Colony,
Kohima- 797001
8. North Eastern Regional Power Committee,
NERPC Complex, Dong Parmaw, Lapalang,
Shillong-793006
9. North Eastern Regional Load Despatch Centre,
Dongtieh, Lower Nongrah, Lapalang,
Shillong -793006

...Respondents

For Petitioner: Shri Devapriya Choudhury, NEEPCO
Shri Prabal Mukhopadhaya, NEEPCO
Shri Elizabeth Pyrbot, NEEPCO

For Respondent: Shri Indrajit Tahbildar, APDCL

ORDER

This petition has been filed by the Petitioner, NEEPCO for approval of tariff of Assam Gas Based Power Plant (291 MW) (in short 'the generating station') for the 2019-24 tariff period in terms of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019 (hereinafter referred to as "the 2019 Tariff Regulations").

2. Assam Gas Based Power Plant is a Combined Cycle Power generating station and comprises of six Gas Turbines each of 33.5 MW capacity and three Steam Turbine each of 30 MW capacity. The exhaust of each Gas Turbine is fed into a Waste Heat Recovery Boiler. The steam from two such boilers is used to run one Steam Turbine Generator set. Thus, there are three Combined Cycle Modules. The



generating station uses natural gas as its fuel and the natural gas from the oil fields of Assam is received at a pressure of about 5.5 kg/cm² and is fed to a Gas Booster station to increase the pressure to about 21 kg/cm² before being fed to the gas stations. The dates of commercial operation of the units of the generating station are as follows:

	Date of Commercial Operation	Capacity (MW)
GT-I	1.5.1995	33.5
GT-II	1.5.1995	33.5
GT-III	1.7.1995	33.5
GT-IV	1.8.1995	33.5
GT-V	1.4.1997	33.5
GT-VI	1.4.1997	33.5
ST-I	1.4.1999	30
ST-II	1.4.1999	30
ST-III	1.4.1999	30
Generating Station	1.4.1999	291

3. The Commission by order dated 21.12.2021 in Petition No. 298/GT/2019 had revised the tariff of the generating station for the 2014-19 tariff period, after truing-up exercise of the actual additional capital expenditure incurred in respect of the generating station. The capital cost and the annual fixed charges determined by order dated 21.12.2021 are as under:

Capital Cost allowed

(Rs. in lakh)

	2014-15	2015-16	2016-17	2017-18	2018-19
Opening capital cost	149746.94	149585.66	151200.12	154392.78	154867.66
Net additional capital expenditure	(-)161.28	1614.46	3192.66	474.88	(-)296.73
Closing capital cost	149585.66	151200.12	154392.78	154867.66	154570.93

Annual Fixed Charges allowed

(Rs. in lakh)

	2014-15	2015-16	2016-17	2017-18	2018-19
Depreciation	1634.38	1725.22	2116.15	2608.86	3039.68
Interest on Loan	8.41	10.85	103.70	182.39	89.55
Return on Equity	14360.98	15503.09	17736.39	16087.87	14898.41
Interest on Working Capital	2334.78	2416.76	2529.65	2562.33	2603.95
O&M Expenses	9728.13	10388.70	11095.83	11852.43	1658.50
Annual Fixed Charges	28066.69	30044.62	33581.72	33293.88	33290.09



4. The annual fixed charges claimed by the Petitioner for the 2019-24 tariff period are as follows:

	<i>(Rs. in lakh)</i>				
	2019-20	2020-21	2021-22	2022-23	2023-24
Depreciation	5186.54	6153.36	7496.08	8413.30	11796.35
Interest on Loan	281.20	687.47	610.13	1058.34	1031.36
Return on Equity	14805.64	14894.65	14964.02	15006.78	15077.47
Interest on Working Capital	1875.17	1832.59	1875.91	1921.04	1996.52
O&M Expenses	10537.11	10906.68	11290.80	11686.56	12096.87
Annual Fixed Charges	32685.66	34474.75	36236.94	38086.02	41998.57

5. The Commission vide Record of the Proceeding (RoP) of the hearing dated 13.4.2021, directed the Petitioner to submit certain additional information. The Respondent No.1, Assam Power Distribution Company Limited (APDCL), has filed its reply vide affidavit dated 3.5.2021. The Petitioner vide separate affidavits dated 13.5.2021 has filed the additional information and also its rejoinder to the reply of the Respondent APDCL. Thereafter, the Commission after hearing the parties on 29.6.2021 reserved its order in the matter. Taking into consideration the submissions of the parties and the documents available on record, we proceed to examine the claims of the Petitioner, on prudence check, as stated in the subsequent paragraphs.

Capital Cost

6. Regulation 19 of the 2019 Tariff Regulations provides as under:

“19. Capital Cost: (1) The Capital cost of the generating station or the transmission system, as the case may be, as determined by the Commission after prudence check in accordance with these regulations shall form the basis for determination of tariff for existing and new projects.

(2) xxxx

(3) The Capital cost of an existing project shall include the following:

- (a) Capital cost admitted by the Commission prior to 1.4.2019 duly trued up by excluding liability, if any, as on 1.4.2019;*
- (b) Additional capitalization and de-capitalization for the respective year of tariff as determined in accordance with these regulations;*
- (c) Capital expenditure on account of renovation and modernisation as admitted by this Commission in accordance with these regulations;*



- (d) Capital expenditure on account of ash disposal and utilization including handling and transportation facility;
- (e) Capital expenditure incurred towards railway infrastructure and its augmentation for transportation of coal upto the receiving end of generating station but does not include the transportation cost and any other appurtenant cost paid to the railway; and
- (f) Capital cost incurred or projected to be incurred by a thermal generating station, on account of implementation of the norms under Perform, Achieve and Trade (PAT) scheme of Government of India shall be considered by the Commission subject to sharing of benefits accrued under the PAT scheme with the beneficiaries.

xxx

(5) The following shall be excluded from the capital cost of the existing and new projects:

- (a) The assets forming part of the project, but not in use, as declared in the tariff petition;
- (b) De-capitalised Assets after the date of commercial operation on account of replacement or removal on account of obsolescence or shifting from one project to another project:

Provided that in case replacement of transmission asset is recommended by Regional Power Committee, such asset shall be de-capitalised only after its redeployment;

Provided further that unless shifting of an asset from one project to another is of permanent nature, there shall be no de-capitalization of the concerned assets.

- (c) In case of hydro generating stations, any expenditure incurred or committed to be incurred by a project developer for getting the project site allotted by the State Government by following a transparent process;
- (d) Proportionate cost of land of the existing project which is being used for generating power from generating station based on renewable energy; and
- (e) Any grant received from the Central or State Government or any statutory body or authority for the execution of the project which does not carry any liability of repayment.”

7. The Petitioner has claimed capital cost of Rs.165682.03 lakh as on 1.4.2019. The Commission vide its order dated 21.12.2021 in Petition No. 298/GT/2019 has approved the closing capital cost of Rs.154570.93 lakh as on 31.3.2019. This has been considered as the opening capital cost as on 1.4.2019 for the purpose of approval of tariff for the 2019-24 tariff period.

Additional Capital Expenditure

8. Regulation 25(2) of the 2019 Tariff Regulations provides as under:



“25(2) In case of replacement of assets deployed under the original scope of the existing project after cut-off date, the additional capitalization may be admitted by the Commission, after making necessary adjustments in the gross fixed assets and the cumulative depreciation, subject to prudence check on the following grounds:

(a) The useful life of the assets is not commensurate with the useful life of the project and such assets have been fully depreciated in accordance with the provisions of these regulations;

(b) The replacement of the asset or equipment is necessary on account of change in law or Force Majeure conditions;

(c) The replacement of such asset or equipment is necessary on account of obsolescence of technology; and

(d) The replacement of such asset or equipment has otherwise been allowed by the Commission. “

9. The Petitioner in Form-9A of the petition has claimed total projected additional capital expenditure for the 2019-24 tariff period in terms of sub-clauses (c) and (d) of clause (2) of Regulation 25 of the 2019 Tariff Regulations as under:

<i>(Rs. in lakh)</i>				
2019-20	2020-21	2021-22	2022-23	2023-24
3456.50	5780.00	1440.00	3023.00	4250.00

10. The claims for additional capitalisation under Regulation 25(2) of the 2019 Tariff Regulations, can be categorised as (i) Additional capital expenditure in respect of works already approved but are continued/ spilled over from the 2014-19 tariff period; and (ii) additional capital expenditure in respect of new items. The admissibility of the additional capital expenditure claimed by the Petitioner are examined on prudence check of the justification furnished by the Petitioner in the subsequent paragraphs.

(i) Additional capital expenditure in respect of works already approved but continued/ spilled over from the 2014-19 tariff period

11. The additional capital expenditure claimed in terms of Regulation 25(2)(c) and Regulation 25(2)(d) of the 2019 Tariff Regulations is summarised and examined below:



(Rs. in lakh)

Sl. No.	Work/items	Regulation	2019-20	2020-21	2021-22	2022-23	2023-24
1	Replacement of old Waukesha Gas Engine 12V275 GL of Unit-4 of GBS along with all auxiliaries like Air Cooled Heat Exchanger (ACHE), Fuel filter.	25(2)(d)	2010.00	-	-	-	-
2	Revamping/modification of the Compressor of GBS Unit-4.	25(2)(d)	944.00	-	-	-	-
3	Up-gradation of 7200-series, BENTELY-NEVADA make Vibration monitoring system of GT-1 and GT-2.	25(2)(c)	110.00	-	-	-	-
4	Replacement of existing UPS with battery Bank for GT controllers and Online monitoring system.	25(2)(c)	120.00	-	-	-	-
5	Comprehensive Rotor Inspection (CRI) and Compressor Rotor Refurbishment (CRR) of MHI Gas Turbine Unit-1.	25(2)(d)	-	-	-	1900.00	-
6	Comprehensive Rotor Inspection (CRI) and Compressor Rotor Refurbishment (CRR) of MHI Gas Turbine Unit-2.	25(2)(d)	-	1900.00	-	-	-
	Total additional capital expenditure claimed		3184.00	1900.00	0.00	1900.00	0.00

a) Up-gradation of 7200-series, BENTELY-NEVADA make Vibration monitoring system (VMS) of Gas Turbine-1 and Gas Turbine-2

12. The Petitioner has claimed projected additional capital expenditure of Rs.110 lakh Up-gradation of 7200-series, BENTELY-NEVADA make Vibration Monitoring System (VMS) of Gas Turbine-1 and Gas Turbine-2 in 2019-20 under Regulation 25(2)(c) of the 2019 Tariff Regulations. In justification for the same, the Petitioner has submitted that the asset has been declared as obsolete by the OEM and also spare



support is not available. The Petitioner has also submitted that the Commission in its order dated 15.2.2016 in Petition No. 41/GT/2015 had allowed an amount of Rs.50.00 lakh for GT-1 & GT-2 in 2015-16 against which only GT-4 was commissioned for Rs.27.13 lakh. Against the amount of Rs.46.53 lakh allowed in 2016-17 for up-gradation of VMS of GT-3 & GT-4, only GT-3 was commissioned for Rs.31.19 lakh and an amount of Rs.71.14 lakh in 2018-19 allowed for up-gradation work of VMS of GT-1 & GT-2 could not be executed/ completed during 2018-19. The Petitioner has submitted that order has already been placed for GT-1& GT-2 and materials have been received and work shall be executed in 2019-20.

13. The Respondent APDCL has submitted that the Petitioner has not furnished the obsolescence certificate of OEM, test results by independent agency and other supporting documents in terms of the Regulations. It has further submitted that the gross value of the old asset may be adjusted from the accrued cost. The Petitioner has clarified that the 7200-series, BENTELY-NEVADA make VMS became obsolete and spare support was also not available since 1993. It has stated that with the help of mandatory spares, the Petitioner was able to run the system till that time. The Petitioner has added that as VMS is very critical for high speed machine, up-gradation of the same may be allowed.

14. The matter has been examined. The Commission in its order dated 21.12.2021 in Petition No. 298/GT/2019 had considered the additional capitalisation claimed by the Petitioner for this asset/work for the 2014-19 tariff period and held as under:

“34. It is noticed that the additional capital expenditure claimed by the Petitioner was allowed vide order dated 15.2.2016 in Petition No. 41/GT/2015. Considering the fact that the total actual additional capital expenditure of Rs.58.32 lakh (i.e. Rs.27.13 lakh in 2016-17 for Unit 4 and Rs.31.19 lakh in 2018-19 for Unit 3) claimed in Form 9A, is claimed towards efficient operation of the generating station, in on account of existing



asset having become obsolete and does not exceed the total additional capital expenditure of Rs.167.67 lakh allowed vide order dated 15.2.2016 in Petition No. 41/GT/2015, the actual additional capital expenditure of Rs.58.32 lakh (Rs.27.13 lakh for Unit 4 in 2016-17 and Rs.31.19 lakh for Unit 3 in 2018-19) incurred by the Petitioner for up-gradation of 7200/3300 series, Bentley Nevada make Vibration Monitoring system is allowed under Regulation 14(3)(vii) of the 2014 Tariff Regulations. However, the de-capitalisation amount towards up-gradation of Order in Petition No. 298/GT/2019 Page 22 of 58 7200/3300 series, Bentley Nevada make Vibration Monitoring system, could not be traced from the information furnished in Form 9Bi of the petition. In view of this, the de-capitalisation amount of Rs.17.48 lakh in 2015-16 and Rs.19.44 lakh in 2016-17 as considered for the said asset/works, in order dated 15.2.2016 in Petition No. 41/GT/2015 has been considered for de-capitalisation in this order.”

15. It is noticed from the above that against the total additional capital expenditure of Rs.167.67 lakh allowed vide order dated 15.2.2016 in Petition No.41/GT/2015 (for 6 units), the Petitioner had incurred actual additional capital expenditure of Rs.58.32 lakh [for 2 Units (Unit-3 and Unit-4) out of 6 Units] in 2016-17 and 2018-19 and the same was allowed vide order dated 21.12.2021 in Petition No. 298/GT/2019. Accordingly, the balance amount available for this work (4 Units) of Rs.109.35 lakh (Rs.167.67 lakh – Rs.58.32 lakh). Though the Petitioner has furnished the need for this asset/ work, it has, however, not furnished any reason/ justification for the spill over of the work from the previous tariff period. Considering the fact that the materials have been received and work is to be executed in 2019-20, we allow the additional capitalisation of the balance amount of Rs.109.35 lakh (for 4 Units) in 2019-20 (as against the claim for Rs.110 lakh) in terms of Regulation 25(2)(c) of the 2019 Tariff Regulations along with the corresponding de-capitalisation of Rs.28.04 lakh, as allowed in the order dated 15.2.2016 in Petition No. 41/GT/2015. The Petitioner is, however, directed to furnish the actual audited completion cost for the said work along with reasons for the increase in cost and segregation of increased cost at the time of truing-up of tariff for this generating station for the 2019-24 tariff period.



b) Replacement of existing UPS with battery Bank for GT Controllers and Online Monitoring System

16. The Petitioner has claimed projected additional capital expenditure of Rs.120 lakh for Replacement of existing UPS with Battery Bank for GT controllers and Online Monitoring System in 2019-20 under Regulation 25(2)(c) of the 2019 Tariff Regulations. In justification for the same, the Petitioner has submitted that the existing UPS system has been in service since the commissioning of the generating station in 1995 and has been declared as obsolete by OEM. It has also stated that due to expiry of useful life, it has become necessary to replace the UPS with Battery. The Petitioner has further submitted that the Commission in its order dated 15.2.2016 in Petition No. 41/GT/2015 had allowed Rs.104 lakh for this asset/ item in 2016-17 and order for the same has already been placed and will be executed in 2019-20.

17. The Respondent APDCL has submitted that the Commission may examine and decide accordingly. The Petitioner has, however, clarified as under:

- a. The UPS system including Battery for GT controller and online monitoring system have commissioned in 1995;
- b. As per guidelines of OEM, the life period of Tubular Type (Microscopic Rubber) battery is 10-14 years and Pasted Type (Microscopic Rubber) is 5-7 years.
- c. The Commission has already admitted this item for 2016-17 for an amount of Rs. 104.00 lakh and the works has already been completed in 2019-20;
- d. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 15 years old qualify for Mid Life R&M works whereas units above 25 years (as on 31.3.2017) qualify for comprehensive R&M works for Life Extension.

18. The matter has been considered. It is noticed that the Commission vide its order dated 15.2.2016 in Petition No. 41/GT/2015 had allowed the projected additional capital expenditure of Rs.104 lakh for this asset/ item in 2016-17. However, no claim



was made by the Petitioner at the time of truing up of tariff for the 2014-19 tariff period. Though the Petitioner has furnished the need for this asset/ work, it has, however, not furnished any reason/ justification for the spill over of the work from the previous tariff period. Considering the fact that the work has been completed in 2019-20, we allow the additional capitalisation of Rs.104 lakh only, for this asset/ item in 2019-20 in terms of Regulation 25(2)(c) of the 2019 Tariff Regulations with corresponding de-capitalisation of Rs.39.71 lakh (as allowed in the order dated 15.2.2016 in Petition No. 41/GT/2015). The Petitioner is, however, directed to furnish the actual audited completion cost for the said work along with reasons for the increase in cost and segregation of increased cost at the time of truing-up of tariff for this generating station for the 2019-24 tariff period.

c) Replacement of old Waukesha Gas Engine 12V275 GL of Unit# 4 of the generating station along with all auxiliaries

19. The Petitioner has claimed projected additional capital expenditure of Rs.2010 lakh in 2019-20 for Replacement of old Waukesha Gas Engine 12V 275 GL of Unit- 4 along with all auxiliaries like Air Cooled Heat Exchanger (ACHE), Fuel filter etc., under Regulation 25(2)(d) of the 2019 Tariff Regulations. In justification for the same, the Petitioner has submitted that Gas engines have become old and obsolete and in order to get the desired output, the replacement of engine is essential. It has also submitted that the capacity of the engines has also been enhanced to meet the requirement.

20. The Respondent APDCL has submitted that the reason for the Petitioner not taking any initiative to get the work done in 2017-18 could not be understood. It has further submitted that the cost of the item/ asset has increased by Rs.362.40 lakh in 2019-20 in comparison to the cost in 2017-18 as admitted by the Petitioner, which



further increases the financial burden on the beneficiaries. The Respondent has, therefore, prayed to examine the matter and deduct the excess expenditure incurred due to delay in execution of the work by the Petitioner. In response, the Petitioner has clarified as under:

- a. There are four (4) number GBS Units. It was decided to carry out R&M of GBS in phase manner. Accordingly, order was placed in the year 2013-14 and commissioned by the year 2017-18.
- b. The R&M of 4th GBS Unit was completed by 2019-20. The reason for R&M of 4th unit in later phase in consideration of condition of 4th GBS unit, utilization of remaining inventories, process time for tendering/order placement, delivery, and commissioning etc.
- c. It cannot be presumed that due to commissioning of the 4th unit in later stage, would attract more the financial implication.

21. The matter has been examined. It is observed that the claim of the Petitioner for actual additional capitalisation of Rs.5097 lakh for this asset in 2016-17 was considered and allowed by the Commission in order dated 21.12.2021 in Petition No. 298/GT/2019 as under:

“15. We have considered the submissions. It is observed that the additional capital expenditure claimed by the Petitioner in respect of the said work was allowed by order dated 15.2.2016 in Petition No.41/GT/2015. Considering the fact that the actual additional capital expenditure of Rs.5097.00 lakh for this asset/ work is claimed towards efficient operation of the generating station and does not exceed the total additional capital expenditure of Rs.6153.36 lakh allowed vide order dated 15.2.2016, the actual additional capital expenditure of Rs.5097.00 lakh claimed by the Petitioner is allowed in terms of Regulation 14(3)(vii) of the 2014 Tariff Regulations. However, as the de-capitalisation amount could not be traced from Form 9Bi furnished by the Petitioner, the de-capitalisation amount of Rs.2151.28 lakh, as considered for said work in order dated 15.2.2016 in Petition No. 41/GT/2015, has been considered.”

22. It is observed that against the total projected additional capital expenditure of Rs.6153.36 lakh allowed for this asset/ item vide order dated 15.2.2016 in Petition No.41/GT/2015, the Petitioner had incurred actual additional capital expenditure of Rs.5097.00 lakh for this asset/ work in 2016-17. Thus, a balance amount of Rs.1056.36 lakh is only available for the said asset/item. Though the Petitioner has



furnished the need for this asset/ work, it has, however, not furnished any reason/ justification for the spill over of the work from the previous tariff period. In view of this, we allow only the balance amount of Rs.1056.36 lakh for the said asset/ item in 2019-20 under Regulation 25(2)(d) of the 2019 Tariff Regulations. The Petitioner is, however, directed to furnish the actual audited completion cost for the said work along with reasons for the increase in cost and segregation of increased cost at the time of truing-up of tariff for this generating station for the 2019-24 tariff period.

d) Revamping/modification of Compressor of GBS Unit-4

23. The Petitioner has claimed projected additional capital expenditure of Rs.944.00 lakh in 2019-20 for Revamping/Modification of compressor of GBS Unit-4 under Regulation 25(2)(d) of the 2019 Tariff Regulations. In justification for the same, the Petitioner has submitted that commensurate with the capacity enhancement of gas engine, it is proposed to revamp the Gas compressor from 27000 Nm³/hr to 28000 Nm³/hr along with replacement of two second stage compressor cylinders from 15" to 16.25" and replacement of two first stage cylinders with a new one. It has also stated that the capacity enhancement of Gas compressors will benefit in terms of the capacity of the generating station for running six GT units with three Gas compressors.

24. The Respondent APDCL has submitted that the reason for the Petitioner not taking any initiative to get the work done in 2017-18 could not be understood and this has led to increase in financial burden on the beneficiaries. The Respondent has, therefore, prayed to examine the matter and deduct the excess expenditure incurred



due to delay in execution of the work by the Petitioner. The Petitioner has submitted the same clarification as submitted in paragraph 20 above.

25. It is observed that against the total additional capital expenditure of Rs.3273.58 lakh allowed vide order dated 15.2.2016 in Petition No. 41/GT/2015, the Petitioner had claimed total actual additional capital expenditure of Rs.2735.21 lakh in 2015-16 under Regulation 14(3)(vii) of the 2014 Tariff Regulations for the said asset/ item in Petition No. 298/GT/2019. However, the Commission in its order dated 21.12.2021 decided as under:

“17. We have considered the submissions in the matter. Considering the fact that the actual additional capital expenditure amounting to Rs.2735.21 lakh for this asset/ work is claimed towards efficient operation of the generating station is on account of obsolescence of existing asset and does not exceed the total additional capital expenditure of Rs.3273.58 lakh as allowed by order dated 15.2.2016 in Petition No. 41/GT/2015 for the 2014-19 tariff period, the actual additional capital expenditure of Rs.2735.21 lakh claimed by the Petitioner is allowed under Regulation 14(3)(vii) of the 2014 Tariff Regulations. However, as the de-capitalisation amount could not be traced from Form 9Bi furnished by the Petitioner, the de-capitalisation amount of Rs.1144.48 lakh, as considered for said work in order dated 15.2.2016 in Petition No. 41/GT/2015, has been considered.”

26. It is evident from the above that the balance amount of Rs.538.37 lakh (Rs.3273.58 lakh – Rs.2735.21 lakh) is yet to be incurred by the Petitioner in respect of the said asset/ work. Though the Petitioner has furnished the need for this asset/ work, it has, however, not furnished any reason/ justification for the spill over of the work from the previous tariff period. In view of this, we allow only the balance additional capital expenditure of Rs.538.37 lakh for this asset/ item under Regulation 25(2)(d) of the 2019 Tariff Regulations. The Petitioner is, however, directed to furnish the actual audited completion cost for the said work along with reasons for the increase in cost and segregation of increased cost at the time of truing-up of tariff for this generating station for the 2019-24 tariff period.



e) Comprehensive Rotor Inspection (CRI) and Compressor Rotor Refurbishment (CRR) of MHI Gas Turbine Unit-1

27. The Petitioner has claimed projected additional capital expenditure of Rs.1900 lakh for comprehensive rotor inspection and compressor rotor refurbishment of MHI Gas Turbine Unit-1 in 2022-23 under Regulation 25(2)(d) of the 2019 Tariff Regulations. In justification for the same, the Petitioner has submitted that as per recommendation of the OEM (M/s MHI, Japan) a comprehensive inspection of Turbine rotor and refurbishment of Compressor rotor of Gas Turbine was necessary, in order to obtain the desired output of the Turbine after 1(one) lakh fired hours and this would enhance the life of the Gas Turbine. The Petitioner has further submitted that the Commission had allowed the additional capitalisation of Rs.1167.96 lakh in 2018-19 for this asset/ item in its order dated 15.2.2016 in Petition No. 41/GT/2015. It has stated that the works could not be completed within the 2014-19 tariff period due to standard schedule of the OEM. The Petitioner has, however, submitted that the refurbishment work of rotor is already in progress and shall be executed in 2022-23.

28. The Respondent APDCL has submitted that the essential works duly required by the Petitioner was allowed by the Commission in 2018-19. The Respondent has also submitted that the reason for the Petitioner not taking any initiative to get the work done in 2018-19 could not be understood and this has led to increase in financial burden on the beneficiaries. The Respondent has, therefore, prayed to examine the matter and deduct the excess expenditure incurred due to delay in execution of the work by the Petitioner. The Petitioner has clarified that the work order for CRR & CRI did not have any clause for price escalation. It has also submitted that the expenditure of Rs.1900.00 lakh is not the escalated price due to delay in work, but the price



inclusive of taxes and freight, wherein, an amount of Rs.1167.96 lakh was the 'Free On Board' amount.

29. The matter has been examined. It is observed that the Commission had allowed projected additional capitalisation of Rs.3503.88 lakh, towards the revamping and refurbishment of rotors (both Unit-1 and Unit-2) under Regulation 14(3)(7) of the 2014 Tariff Regulations but did not permit the purchase of new rotor (one in number) in order dated 15.2.2016 in Petition No 41/GT/2015. It is, however, noticed that as against allowed projected additional capitalisation of Rs.3503.88 lakh, an amount of Rs.1912.02 lakh was allowed for Comprehensive rotor inspection and compressor rotor refurbishment of MHI Gas Turbine Unit-2 in order dated 21.12.2021 in Petition No. 298/GT/2019. Hence, the balance amount of Rs.1591.86 lakh is only to be incurred against revamping and refurbishment of the rotors. The Petitioner has clarified that the works could not be completed within the 2014-19 tariff period due to standard schedule of the OEM and that the refurbishment work of rotor is already in progress and shall be executed in 2022-23. The Petitioner has also clarified that the work order for CRR & CRI did not have any clause for price escalation and that the expenditure of Rs.1900.00 lakh is not the escalated price due to delay in work, but the price inclusive of taxes and freight, wherein, an amount of Rs.1167.96 lakh was the 'Free On Board' amount. In view of this, as of now, we allow only the balance additional capital expenditure of Rs.1591.86 lakh for this asset/ item under Regulation 25(2)(d) of the 2019 Tariff Regulations. The Petitioner is directed to furnish the actual audited completion cost for the said work along with reasons for the increase in cost and segregation of increased cost at the time of truing-up of tariff for this generating station for the 2019-24 tariff period.



f) Comprehensive Rotor Inspection (CRI) and Compressor Rotor Refurbishment (CRR) of MHI Gas Turbine Unit-2

30. The Petitioner has claimed projected additional capital expenditure of Rs.1900 lakh for comprehensive rotor inspection and compressor rotor refurbishment of MHI Gas Turbine Unit-2 in 2020-21 under Regulation 25(2)(d) of the 2019 Tariff Regulations. In justification for the same, the Petitioner has submitted that as per recommendation of the OEM (M/s MHI, Japan) a comprehensive inspection of Turbine rotor and refurbishment of Compressor rotor of Gas Turbine was necessary, in order to obtain the desired output of the Turbine after 1(one) lakh fired hours and this would enhance the life of the Gas Turbine. The Petitioner has further submitted that the Commission had allowed the additional capitalisation of Rs.1167.96 lakh in 2017-18 for this asset/ item in its order dated 15.2.2016 in Petition No. 41/GT/2015. It has stated that the works could not be completed within the 2014-19 tariff period due to standard schedule of the OEM. The Petitioner has, however, submitted that the refurbishment work of rotor is already in progress and shall be executed in 2020-21.

31. The Respondent APDCL has submitted that the essential works duly required by the Petitioner was allowed by the Commission in 2017-18. The Respondent has also submitted that the reason for the Petitioner not taking any initiative to get the work done in 2017-18 could not be understood and this has led to increase in financial burden on the beneficiaries. The Respondent has, therefore, prayed to examine the matter and deduct the excess expenditure incurred due to delay in execution of the work by the Petitioner. The Petitioner has clarified that the work order for CRR & CRI did not have any clause for price escalation. It has also submitted that the expenditure of Rs.1900.00 lakh is not the escalated price due to delay in work, but the price



inclusive of taxes and freight, wherein, an amount of Rs.1167.96 lakh was the 'Free On Board' amount.

32. The matter has been examined. It is observed that the Petitioner has claimed actual additional capital expenditure of Rs.1912.02 lakh (Rs.1553.23 lakh in 2017-18 and Rs.358.80 lakh in 2018-19) for Comprehensive Rotor Inspection and Compressor Rotor Refurbishment of MHI Gas Turbine Unit-2 under Regulation 14(3)(vii) of the 2014 Tariff Regulations in Petition No. 298/GT/2019 and the Commission vide its order dated 21.12.2021 had allowed the additional capitalisation as under:

“28. It is noticed that the additional capital expenditure claimed by the Petitioner was allowed by order dated 15.2.2016 in Petition No. 41/GT/2015. Considering the fact that the actual additional capital expenditure of Rs.1912.02 lakh is claimed towards efficient operation of the generating station and does not exceed the additional capital expenditure of Rs.3503.88 lakh allowed vide order dated 15.2.2016 in Petition No. 41/GT/2015, the actual additional capital expenditure of Rs.1912.02 lakh incurred by the Petitioner for comprehensive Rotor Inspection and Compressor Rotor Refurbishment of MHI Gas Turbine Unit-2 is allowed in terms of Regulation 14(3)(vii) of the 2014 Tariff Regulations. However, the de-capitalisation amount towards comprehensive Rotor Inspection and Compressor Rotor Refurbishment of MHI Gas Turbine Unit-2 could not be traced from the information furnished in Form 9Bi of the petition. In view of this, the de-capitalisation amount of Rs.2117.12 lakh for said work, as considered in order dated 15.2.2016 in Petition No. 41/GT/2015, has been considered for de-capitalisation in this order.”

33. Considering the fact that the Petitioner has submitted that the work order for CRR & CRI did not have any clause for price escalation and that the expenditure of Rs.1900.00 lakh is not the escalated price due to delay in work, but the price inclusive of taxes and freight, wherein, an amount of Rs.1167.96 lakh was the 'Free On Board' amount and also the fact that the actual additional capital expenditure of Rs.1912.02 lakh for this asset/ item had already been allowed by order dated 21.12.2021 in Petition No. 298/GT/2019, we are not inclined to allow the additional capital expenditure of Rs.1900.00 lakh claimed by the Petitioner in respect of the said asset/ item for Unit-2 in 2020-21. For the Commission to consider any expenditure in 2019-



24 period, the Petitioner is directed to furnish the actual audited completion cost for the said work along with reasons for the increase in cost and segregation of increased cost at the time of truing-up of tariff for this generating station for the 2019-24 tariff period.

(ii) Additional capital expenditure in respect of new items

34. As stated, the Petitioner has claimed projected additional capital expenditure of the following asset/items for the 2019-24 tariff period under Regulation 25(2)(c) and Regulation 25(2)(d) of the 2019 Tariff Regulations:

<i>(Rs. in lakh)</i>							
Sl. No.	Assets/items	Regulation	2019-20	2020-21	2021-22	2022-23	2023-24
1	Up gradation of 3300-series, BENTELY-NEVADA make temperature monitoring system of STG-1 and STG-2	25(2)(c)	130.00	-	-	-	-
2	R&M/ Up gradation of Automatic Voltage Regulators of BHEL STG Unit-2	25(2)(c)	20.00	-	-	-	-
3	Replacement of 245 kV SF6 Circuit Breakers in the 220 kV Switchyard for 1(one) unit out of total 14 numbers of Breaker (2 outgoing feeders, 1 BC, 2 Stn Xmer and 9 Generating Units)	25(2)(c)	20.00	-	-	-	-
4	Up-gradation of CO2 Flooding System of GT Unit-1	25(2)(c)	40.00	-	-	-	-
5	Sulphuric Acid dosing system in water circulating system of Steam Turbine Units including civil structure	25(2)(d)	62.50	-	-	-	-
6	Up-gradation of 7200/3300 series, Bentley Nevada make	25(2)(c)	0.00	70.00	-	-	-



Sl. No.	Assets/items	Regulation	2019-20	2020-21	2021-22	2022-23	2023-24
	Vibration Monitoring system of STG-3						
7	R&M/ LE for-GT Unit-6 with uprating of turbine parts for efficiency improvement	25(2)(c)	0.00	3000.00	-	-	-
8	R&M/ up gradation of Automatic Voltage Regulators of BHEL GT Unit-5 and Unit-6	25(2)(c)	0.00	60.00	-	-	-
9	HMI up-gradation for Mark vie GT Control system of Unit # 5 and Unit # 6	25(2)(c)	0.00	120.00	-	-	-
10	Replacement of 245 kV SF6 Circuit Breakers in the 220 kV Switchyard for 7 (seven) unit out of total 14 numbers of Breaker (2 outgoing feeders, 1 BC, 2 StnXmer and 9 Generating Units)	25(2)(c)	0.00	150.00	-	-	-
11	Replacement of Electro Mechanical Relays by Numerical relays in auxiliary system of GTG, STG Unit, 6.6. kV and 415 V MCC	25(2)(c)	0.00	20.00	-	-	-
12	Spare 1 set of HV/LV Coil for BHEL make 3 ph 11/245 kV 50 MVA Transformer	25(2)(d)	0.00	100.00	-	-	-
13	Procurement of Standalone EL and DR for the Power station	25(2)(d)	0.00	40.00	-	-	-
14	Up-gradation of CO2 Flooding System of GT Unit-2, Unit-3 and Unit-4	25(2)(c)	0.00	90.00	-	-	-
15	Renovation of cooling tower	25(2)(c)	0.00	140.00	-	-	-
16	Up-gradation of Generator protection relays from solid state to Numerical relay for GTG 1~4 (for one unit)	25(2)(c)	0.00	40.00	-	-	-
17	Procurement of 1000	25(2)(c)	0.00	50.00	-	-	-



Sl. No.	Assets/items	Regulation	2019-20	2020-21	2021-22	2022-23	2023-24
	LPH Transformer Oil Filtration machine & BDV test Kit						
18	Replacement of 245 kV SF6 Circuit Breakers in the 220 kV Switchyard for 6 (six) unit out of total 14 numbers of Breaker (2 outgoing feeders, 1 BC, 2 Stn Xmer and 9 Generating Units)	25(2)(c)	0.00	0.00	150.00	-	-
19	Replacement of 220 kV Generator CT and Line Feeder CT with 0.2S accuracy as per regulation to be done in phase wise - 1st phase 12 Numbers (total 14 bay X 3 Numbers each = 42 Numbers)	25(2)(c)	0.00	0.00	40.00	-	-
20	Up-gradation of Generator protection relays from solid state to Numerical relay for GTG 1~4 (for one unit)	25(2)(c)	-	-	40.00	-	-
21	1 (one) set of HV/LV Spare Coil for Mitsubishi make 50 MVA Transformer	25(2)(c)	-	-	110.00	-	-
22	Renovation and Modernization of Governor system of STG Unit 1 along with DDC Pro Control System	25(2)(d)	-	-	850.00	-	-
23	Renovation of APRDS System of STG Units	25(2)(d)	-	-	60.00	-	-
24	Renovation of SWAS System for Module-I	25(2)(d)	-	-	40.00	-	-
25	Switch over of conventional Chlorine dosing system into Chlorine di-oxide	25(2)(d)	-	-	150.00	-	-
26	Replacement of 220 kV Generator CT and Line Feeder CT with 0.2S accuracy as per	25(2)(c)	-	-	-	40.00	-



Sl. No.	Assets/items	Regulation	2019-20	2020-21	2021-22	2022-23	2023-24
	regulation to be done in phase wise - 2nd phase 12 Numbers (total 14 bay X 3 Numbers each = 42 Numbers)						
27	Replacement of 220 kV Generator CT and Line Feeder CT with 0.2S accuracy as per regulation to be done in phase wise - 2nd phase 12 Numbers (total 14 bay X 3 Numbers each = 42 Numbers)	25(2)(c)	-	-	-	40.00	-
28	Renovation of DM Plant	25(2)(d)	-	-	-	125.00	-
29	Renovation of SWAS System for Module-II	25(2)(d)	-	-	-	40.00	-
30	Renovation and Modernization of Governor system of STG Unit-2 along with DDC Pro Control System	25(2)(d)	-	-	-	850.00	-
31	Replacement of 2 (two) number old and used 125 V battery banks of Gas Turbine Units #5 & Unit #6	25(2)(c)	-	-	-	28.00	-
32	Replacement of 220 kV Generator CT and Line Feeder CT with 0.2S accuracy as per regulation to be done in phase wise - 3rd phase 12 Numbers (total 14 bay X 3 Numbers each = 42 Numbers)	25(2)(c)	-	-	-	-	40.00
33	Up gradation of Generator protection relays from solid state to Numerical relay for GTG 1~4 (for one unit)	25(2)(c)	-	-	-	-	40.00
34	Replacement/ up Total gradation of 24 V/220	25(2)(c)	-	-	-	-	60.00



Sl. No.	Assets/items	Regulation	2019-20	2020-21	2021-22	2022-23	2023-24
	V DC Battery charger for STG Units (6 sets out of 12 sets)						
35	R&M/ LE for-GT Unit-5 with uprating of turbine parts for efficiency improvement	25(2)(d)	-	-	-	-	3,000.00
36	Renovation and Modernization of Governor system of STG Unit-3 along with DDC Pro Control System	25(2)(c)	-	-	-	-	850.00
37	Renovation of SWAS System for Module-III	25(2)(d)	-	-	-	-	40.00
38	Replacement / upgradation of 48 V DC PLCC battery bank Charger 2 Numbers	25(2)(c)	-	-	-	-	20.00
39	Asset Monitoring System for 220 kV Switchyard and Transformer Yard	25(2)(d)	-	-	-	-	200.00
	Total	10965.50	272.50	3880.00	1440.00	1123.00	4250.00

35. On scrutiny of the projected additional capital expenditure claimed towards the above assets/ items (39 numbers), it is observed that the installation of new assets/ items relates to Renovation and Modernisation/ Life extension and fall under R&M activities in terms of Regulation 27 of the 2019 Tariff Regulations. Though the Petitioner has made submissions on the life extension of some of the individual items, it has not submitted any clarification on life extension of the units/ generating station. We notice that COD of the generating station is 1.4.1999 and, therefore, the useful life of 25 years of the generating station expires on 31.3.2024. Hence, the projected additional capital expenditure of Rs.10965.50 lakh claimed by the Petitioner during the fag end of useful life of the generating station, is required to be examined in the light of



Regulation 27 of 2019 Tariff Regulations. Regulation 27 of the 2019 Tariff Regulations provides as under:

“27. Additional Capitalization on account of Renovation and Modernization

(1) The generating company or the transmission licensee, as the case may be, intending to undertake renovation and modernization (R&M) of the generating station or unit thereof or transmission system or element thereof for the purpose of extension of life beyond the originally recognized useful life for the purpose of tariff, shall file a petition before the Commission for approval of the proposal with a Detailed Project Report giving complete scope, justification, cost-benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure, schedule of completion, reference price level, estimated completion cost including foreign exchange component, if any, and any other information considered to be relevant by the generating company or the transmission licensee:

Provided that the generating company making the applications for renovation and modernization (R&M) shall not be eligible for Special Allowance under Regulation 28 of these regulations;

Provided further that the generating company or the transmission licensee intending to undertake renovation and modernization (R&M) shall be required to obtain the consent of the beneficiaries or the long-term customers, as the case may be, for such renovation and modernization (R&M) and submit the same along with the petition.

(2) Where the generating company or the transmission licensee, as the case may be, makes an application for approval of its proposal for renovation and modernisation (R&M), approval may be granted after due consideration of reasonableness of the proposed cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost-benefit analysis, expected duration of life extension, consent of the beneficiaries or long term customers, if obtained, and such other factors as may be considered relevant by the Commission.

(3) In case of gas/liquid fuel based open/ combined cycle thermal generating station after 25 years of operation from date of commercial operation, any additional capital expenditure which has become necessary for renovation of gas turbines/steam turbine or additional capital expenditure necessary due to obsolescence or non-availability of spares for efficient operation of the stations shall be allowed:

Provided that any expenditure included in the renovation and modernisation (R&M) on consumables and cost of components and spares which is generally covered in the O&M expenses during the major overhaul of gas turbine shall be suitably deducted from the expenditure to be allowed after prudence check.

(4) After completion of the renovation and modernisation (R&M), the generating company or the transmission licensee, as the case may be, shall file a petition for determination of tariff. Expenditure incurred or projected to be incurred and admitted by the Commission after prudence check, and after deducting the accumulated depreciation already recovered from the admitted project cost, shall form the basis for determination of tariff.”



36. The Petitioner has claimed total additional capital expenditure of Rs.10965.50 lakh towards Renovation & Modernisation activities for the 2019-24 tariff period, in terms of Regulation 25(2) of 2019 Tariff Regulations (i.e. additional capital expenditure within original scope and after the cut-off date) without any proposal for life extension of the generating station. Since the additional capitalisation of these assets/ items are on account of R&M, we are of the view that the matter would fall within the ambit of Regulation 27 of the 2019 Tariff Regulations (Additional Capitalisation on account of Renovation & Modernisation). We, therefore, grant liberty to the Petitioner to approach the Commission with appropriate application for Renovation & Modernisation/ Life extension of units/ generating station in terms of Regulation 27 of the 2019 Tariff Regulations. In this background, the projected additional capital expenditure of Rs.10965.50 lakh claimed towards R&M activities is not allowed. In our view, any requirement for Repairs & Maintenance for the interim period i.e. up to the end of life of the generating station during the 2019-24 tariff period, can be met by the Petitioner from the normative O&M expenses allowed for the generating station under Regulation 35(1)3) of the 2019 Tariff Regulations and any need for replacement of capital spares may be considered for reimbursement on actuals in terms of Regulation 35(6) of the 2019 Tariff Regulations.

De-capitalization

37. The Petitioner has submitted the de-capitalisation details in 'Form I' of the petition. Due to variation in the nomenclature of the items of additional capitalisation, there is difficulty in mapping the items mentioned in Form-I with the additional capitalisation claimed in 'Form 9A'. In view of this, we allow the corresponding de-capitalisation of the additional capitalisation items allowed as per order dated



15.2.2016 in Petition No. 41/GT/2015. The Petitioner is, however, directed to submit the details of de-capitalisation, properly mapped with the additional capitalisation at the time of truing-up of tariff of the generating station for the 2019-24 tariff period. Based on this, the de-capitalisation claimed and allowed for the 2019-24 tariff period is summarised below:

<i>(Rs. in lakh)</i>					
De-capitalization	2019-20	2020-21	2021-22	2022-23	2023-24
Claimed	1178.28	1992.73	499.92	1049.48	1406.02
Allowed	67.75	0.00	0.00	0.00	0.00

38. The projected additional capital expenditure and de-capitalisation allowed for the 2019-24 tariff period is summarised below:

<i>(Rs. in lakh)</i>						
Sl. No.	Work/items	2019-20	2020-21	2021-22	2022-23	2023-24
A	Allowed additional capital expenditures in respect of works already approved but continued/ spilled over from the 2014-19 tariff period					
1	Replacement of old Waukesha Gas Engine 12V275 GL of Unit# 4 of GBS along with all auxiliaries like Air Cooled Heat Exchanger (ACHE), Fuel filter					
	Claimed	2010.00	0.00	0.00	0.00	0.00
	Allowed	1056.36	0.00	0.00	0.00	0.00
2	Revamping/modification of the Compressor of GBS Unit # 4					
	Claimed	944.00	0.00	0.00	0.00	0.00
	Allowed	538.37	0.00	0.00	0.00	0.00
3	Up gradation of 7200-series, BENTELY-NEVADA- make Vibration monitoring system of Gas Turbine -1 and Turbine-2					
	Claimed	110.00	0.00	0.00	0.00	0.00
	Allowed	109.35	0.00	0.00	0.00	0.00
4	Replacement of existing UPS with battery Bank for GT controllers and Online monitoring system					
	Claimed	120.00	0.00	0.00	0.00	0.00
	Allowed	104.00	0.00	0.00	0.00	0.00
5	Comprehensive Rotor Inspection (CRI) and Compressor Rotor Refurbishment (CRR) of MHI Gas Turbine Unit-1					
	Claimed	0.00	0.00	0.00	1900.00	0.00
	Allowed	0.00	0.00	0.00	1591.86	0.00
6	Comprehensive Rotor Inspection (CRI) and Compressor Rotor Refurbishment (CRR) of MHI Gas Turbine Unit-2					
	Claimed	0.00	1900.00	0.00	0.00	0.00
	Allowed	0.00	0.00	0.00	0.00	0.00



Sl. No.	Work/items	2019-20	2020-21	2021-22	2022-23	2023-24
	Total					
	Claimed	3184.00	1900.00	0.00	1900.00	0.00
	Allowed	1808.07	0.00	0.00	1591.86	0.00
B	Additional capital expenditure in respect of new items					
	Claimed	272.50	3880.00	1440.00	1123.00	4250.00
	Allowed	0.00	0.00	0.00	0.00	0.00
	De-capitalization (C)					
	Claimed	1178.28	1992.73	499.92	1049.48	1406.02
	Allowed	67.75	0.00	0.00	0.00	0.00
	Net additional capital expenditure (A+B-C)					
	Claimed	2278.22	3787.27	940.08	1973.52	2843.98
	Allowed	1740.32	0.00	0.00	1591.86	0.00

Capital cost allowed for the 2019-24 tariff period

39. Accordingly, the capital cost allowed is as under:

	<i>(Rs. in lakh)</i>				
	2019-20	2020-21	2021-22	2022-23	2023-24
Opening Capital Cost	154570.93	156311.25	156311.25	156311.25	157903.11
Net additional capital expenditure allowed	1740.32	0.00	0.00	1591.86	0.00
Closing Capital Cost	156311.25	156311.25	156311.25	157903.11	157903.11
Average Capital cost	155441.09	156311.25	156311.25	157107.18	157903.11

Debt-Equity Ratio

40. Regulation 18 of the 2019 Tariff Regulations provides as under:

“18. Debt-Equity Ratio: (1) For new projects, the debt-equity ratio of 70:30 as on date of commercial operation shall be considered. If the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan:

Provided that:

- i. where equity actually deployed is less than 30% of the capital cost, actual equity shall be considered for determination of tariff:*
- ii. the equity invested in foreign currency shall be designated in Indian rupees on the date of each investment:*
- iii. any grant obtained for the execution of the project shall not be considered as a part of capital structure for the purpose of debt: equity ratio.*

Explanation-*The premium, if any, raised by the generating company or the transmission licensee, as the case may be, while issuing share capital and investment of internal resources created out of its free reserve, for the funding of the project, shall be*



reckoned as paid up capital for the purpose of computing return on equity, only if such premium amount and internal resources are actually utilised for meeting the capital expenditure of the generating station or the transmission system.

(2) The generating company or the transmission licensee, as the case may be, shall submit the resolution of the Board of the company or approval of the competent authority in other cases regarding infusion of funds from internal resources in support of the utilization made or proposed to be made to meet the capital expenditure of the generating station or the transmission system including communication system, as the case may be.

(3) In case of the generating station and the transmission system including communication system declared under commercial operation prior to 1.4.2019, debt: equity ratio allowed by the Commission for determination of tariff for the period ending 31.3.2019 shall be considered:

Provided that in case of a generating station or a transmission system including communication system which has completed its useful life as on or after 1.4.2019, if the equity actually deployed as on 1.4.2019 is more than 30% of the capital cost, equity in excess of 30% shall not be taken into account for tariff computation;

Provided further that in case of projects owned by Damodar Valley Corporation, the debt: equity ratio shall be governed as per sub-clause (ii) of clause (2) of Regulation 72 of these regulations.

(4) In case of the generating station and the transmission system including communication system declared under commercial operation prior to 1.4.2019, but where debt: equity ratio has not been determined by the Commission for determination of tariff for the period ending 31.3.2019, the Commission shall approve the debt: equity ratio in accordance with clause (1) of this Regulation.

(5) Any expenditure incurred or projected to be incurred on or after 1.4.2019 as may be admitted by the Commission as additional capital expenditure for determination of tariff, and renovation and modernisation expenditure for life extension shall be serviced in the manner specified in clause (1) of this Regulation.”

41. The details of debt and equity considered for the purpose of tariff are as follows:

	Capital Cost as on 1.4.2019 (Rs. in lakh)	[%]	Additional Capital Expenditure 2019-24 (Rs. in lakh)	[%]	Capital Cost as on 31.3.2024 (Rs. in lakh)	[%]
Debt	79210.97	51.25%	2332.53	70.00%	81543.50	51.64%
Equity	75359.96	48.75%	999.65	30.00%	76359.61	48.36%
Total	154570.93	100.00%	3332.18	100.00%	157903.11	100.00%

Return on Equity

42. Regulation 30 and Regulation 31 of the 2019 Tariff Regulations provide as under:



“30. Return on Equity: (1) Return on equity shall be computed in rupee terms, on the equity base determined in accordance with Regulation 18 of these regulations.

(2) Return on equity shall be computed at the base rate of 15.50% for thermal generating station, transmission system including communication system and run-of-river hydro generating station, and at the base rate of 16.50% for the storage type hydro generating stations including pumped storage hydro generating stations and run-of-river generating station with pondage:

Provided that return on equity in respect of additional capitalization after cut-off date beyond the original scope shall be computed at the weighted average rate of interest on actual loan portfolio of the generating station or the transmission system

Provided further that:

i. In case of a new project, the rate of return on equity shall be reduced by 1.00% for such period as may be decided by the Commission, if the generating station or transmission system is found to be declared under commercial operation without commissioning of any of the Restricted Governor Mode Operation (RGMO) or Free Governor Mode Operation (FGMO), data telemetry, communication system up to load dispatch centre or protection system based on the report submitted by the respective RLDC;

ii. in case of existing generating station, as and when any of the requirements under (i) above of this Regulation are found lacking based on the report submitted by the concerned RLDC, rate of return on equity shall be reduced by 1.00% for the period for which the deficiency continues;

iii. in case of a thermal generating station, with effect from 1.4.2020:

a) rate of return on equity shall be reduced by 0.25% in case of failure to achieve the ramp rate of 1% per minute;

b) an additional rate of return on equity of 0.25% shall be allowed for every incremental ramp rate of 1% per minute achieved over and above the ramp rate of 1% per minute, subject to ceiling of additional rate of return on equity of 1.00%:

Provided that the detailed guidelines in this regard shall be issued by National Load Dispatch Centre by 30.6.2019.”

“31. Tax on Return on Equity. (1) The base rate of return on equity as allowed by the Commission under Regulation 30 of these regulations shall be grossed up with the effective tax rate of the respective financial year. For this purpose, the effective tax rate shall be considered on the basis of actual tax paid in respect of the financial year in line with the provisions of the relevant Finance Acts by the concerned generating company or the transmission licensee, as the case may be. The actual tax paid on income from other businesses including deferred tax liability (i.e. income from business other than business of generation or transmission, as the case may be) shall be excluded for the calculation of effective tax rate.

(2) Rate of return on equity shall be rounded off to three decimal places and shall be computed as per the formula given below:

Rate of pre-tax return on equity = Base rate / (1-t)

Where “t” is the effective tax rate in accordance with clause (1) of this Regulation and shall be calculated at the beginning of every financial year based on the estimated profit and tax to be paid estimated in line with the provisions of the relevant Finance



Act applicable for that financial year to the company on pro-rata basis by excluding the income of non-generation or non-transmission business, as the case may be, and the corresponding tax thereon. In case of generating company or transmission licensee paying Minimum Alternate Tax (MAT), "t" shall be considered as MAT rate including surcharge and cess.

Illustration-

(i) In case of a generating company or a transmission licensee paying Minimum Alternate Tax (MAT) @ 21.55% including surcharge and cess:

Rate of return on equity = $15.50/(1-0.2155) = 19.758\%$

(ii) In case of a generating company or a transmission licensee paying normal corporate tax including surcharge and cess:

(a) Estimated Gross Income from generation or transmission business for FY 2019-20 is Rs 1,000 crore;

(b) Estimated Advance Tax for the year on above is Rs 240 crore;

(c) Effective Tax Rate for the year 2019-20 = Rs 240 Crore/Rs 1000 Crore = 24%;

(d) Rate of return on equity = $15.50/(1-0.24) = 20.395\%$.

(3) The generating company or the transmission licensee, as the case may be, shall true up the grossed up rate of return on equity at the end of every financial year based on actual tax paid together with any additional tax demand including interest thereon, duly adjusted for any refund of tax including interest received from the income tax authorities pertaining to the tariff period 2019-24 on actual gross income of any financial year. However, penalty, if any, arising on account of delay in deposit or short deposit of tax amount shall not be claimed by the generating company or the transmission licensee, as the case may be. Any under-recovery or over-recovery of grossed up rate on return on equity after truing up, shall be recovered or refunded to beneficiaries or the long term customers, as the case may be, on year to year basis."

43. For grossing up of Return on Equity (ROE) during the 2019-24 tariff period, the Petitioner has applied the MAT rate of 17.472% and the same has been allowed. This is, however, subject to revision, if any, at the time of truing up of tariff. Accordingly, ROE has been worked out and allowed based on the admitted additional capital expenditure as under:

Return on Equity on Normal rate

(Rs. in lakh)

	2019-20	2020-21	2021-22	2022-23	2023-24
Normative Equity-Opening	75359.96	75339.63	75339.63	75339.63	75339.63
Addition of Equity due to additional capital expenditure	0.00	0.00	0.00	0.00	0.00
De-capitalization	20.33	0.00	0.00	0.00	0.00
Normative Equity-Closing	75339.63	75339.63	75339.63	75339.63	75339.63
Average Normative Equity	75349.79	75339.63	75339.63	75339.63	75339.63



	2019-20	2020-21	2021-22	2022-23	2023-24
Return on Equity (Base Rate)	15.500%	15.500%	15.500%	15.500%	15.500%
Tax Rate for the year	17.472%	17.472%	17.472%	17.472%	17.472%
Rate of Return on Equity (Pre-Tax)	18.782%	18.782%	18.782%	18.782%	18.782%
Return on Equity (Pre-Tax) annualized	14152.20	14150.29	14150.29	14150.29	14150.29

Return on Equity (beyond the original scope of work excluding additional capitalization due to Change in Law) at the weighted average rate of interest on actual loan portfolio

	2019-20	2020-21	2021-22	2022-23	2023-24
Opening Notional equity	0.00	542.42	542.42	542.42	1019.98
Addition due to Additional Capitalization (after cut of date)	542.42	0.00	0.00	477.56	0.00
De-capitalization	0.00	0.00	0.00	0.00	0.00
Closing Equity	542.42	542.42	542.42	1019.98	1019.98
Average Equity	271.21	542.42	542.42	781.20	1019.98
Weighted average rate of interest on actual loan portfolio	9.783%	9.783%	9.783%	9.783%	9.783%
Return on Equity	26.53	53.07	53.07	76.42	99.78

Interest on Loan

44. Regulation 32 of the 2019 Tariff Regulations provides as under:

“32. Interest on loan capital: (1) The loans arrived at in the manner indicated in Regulation 18 of these regulations shall be considered as gross normative loan for calculation of interest on loan.

(2) The normative loan outstanding as on 1.4.2019 shall be worked out by deducting the cumulative repayment as admitted by the Commission up to 31.3.2019 from the gross normative loan.

(3) The repayment for each of the year of the tariff period 2019-24 shall be deemed to be equal to the depreciation allowed for the corresponding year/period. In case of de-capitalization of assets, the repayment shall be adjusted by taking into account cumulative repayment on a pro rata basis and the adjustment should not exceed cumulative depreciation recovered upto the date of de-capitalisation of such asset.

(4) Notwithstanding any moratorium period availed by the generating company or the transmission licensee, as the case may be, the repayment of loan shall be considered from the first year of commercial operation of the project and shall be equal to the depreciation allowed for the year or part of the year.

(5) The rate of interest shall be the weighted average rate of interest calculated on the basis of the actual loan portfolio after providing appropriate accounting adjustment for interest capitalized:

Provided that if there is no actual loan for a particular year but normative loan is still outstanding, the last available weighted average rate of interest shall be considered;

Provided further that if the generating station or the transmission system, as the



case may be, does not have actual loan, then the weighted average rate of interest of the generating company or the transmission licensee as a whole shall be considered.

(6) The interest on loan shall be calculated on the normative average loan of the year by applying the weighted average rate of interest.

(7) The changes to the terms and conditions of the loans shall be reflected from the date of such re-financing.”

45. The normative loan for the project has already been repaid. The normative loan on account of the admitted additional capital expenditure during the respective years of the tariff period has been considered as paid fully, as the admitted depreciation is more than the amount of normative loan in these years. As such, the Interest on loan during the 2019-24 tariff period is ‘nil’.

Depreciation

46. Regulation 33 of the 2019 Tariff Regulations provides as under:

“33. Depreciation: (1) Depreciation shall be computed from the date of commercial operation of a generating station or unit thereof or a transmission system or element thereof including communication system. In case of the tariff of all the units of a generating station or all elements of a transmission system including communication system for which a single tariff needs to be determined, the depreciation shall be computed from the effective date of commercial operation of the generating station or the transmission system taking into consideration the depreciation of individual units:

Provided that effective date of commercial operation shall be worked out by considering the actual date of commercial operation and installed capacity of all the units of the generating station or capital cost of all elements of the transmission system, for which single tariff needs to be determined.

(2) The value base for the purpose of depreciation shall be the capital cost of the asset admitted by the Commission. In case of multiple units of a generating station or multiple elements of a transmission system, weighted average life for the generating station of the transmission system shall be applied. Depreciation shall be chargeable from the first year of commercial operation. In case of commercial operation of the asset for part of the year, depreciation shall be charged on pro rata basis.

(3) The salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the capital cost of the asset:

Provided that the salvage value for IT equipment and software shall be considered as NIL and 100% value of the assets shall be considered depreciable;

Provided further that in case of hydro generating stations, the salvage value shall be as provided in the agreement, if any, signed by the developers with the State Government for development of the generating station:



Provided also that the capital cost of the assets of the hydro generating station for the purpose of computation of depreciated value shall correspond to the percentage of sale of electricity under long-term power purchase agreement at regulated tariff:

Provided also that any depreciation disallowed on account of lower availability of the generating station or unit or transmission system as the case may be, shall not be allowed to be recovered at a later stage during the useful life or the extended life.

(4) Land other than the land held under lease and the land for reservoir in case of hydro generating station shall not be a depreciable asset and its cost shall be excluded from the capital cost while computing depreciable value of the asset.

*(5) Depreciation shall be calculated annually based on Straight Line Method and at rates specified in **Appendix-I** to these regulations for the assets of the generating station and transmission system:*

Provided that the remaining depreciable value as on 31st March of the year closing after a period of 12 years from the effective date of commercial operation of the station shall be spread over the balance useful life of the assets.

(6) In case of the existing projects, the balance depreciable value as on 1.4.2019 shall be worked out by deducting the cumulative depreciation as admitted by the Commission up to 31.3.2019 from the gross depreciable value of the assets.

(7) The generating company or the transmission licensee, as the case may be, shall submit the details of proposed capital expenditure five years before the completion of useful life of the project along with justification and proposed life extension. The Commission based on prudence check of such submissions shall approve the depreciation on capital expenditure.

(8) In case of de-capitalization of assets in respect of generating station or unit thereof or transmission system or element thereof, the cumulative depreciation shall be adjusted by taking into account the depreciation recovered in tariff by the de-capitalized asset during its useful services.”

47. Depreciation has been worked out considering the admitted capital expenditure as on 31.3.2019 and accumulated depreciation of Rs.123736.71 lakh up to 31.3.2019. Since the generating station has completed 12 years of operation in the year 2010-11, the remaining depreciable value has been spread over the balance useful life of the assets. Depreciation calculated in terms of the above regulation is allowed as under:

	<i>(Rs. in lakh)</i>				
	2019-20	2020-21	2021-22	2022-23	2023-24
Opening Capital Cost	154570.93	156311.25	156311.25	156311.25	157903.11
Add: Additional Capital Expenditure	1740.32	0.00	0.00	1591.86	0.00
Closing Capital Cost	156311.25	156311.25	156311.25	157903.11	157903.11
Average Capital Cost	155441.09	156311.25	156311.25	157107.18	157903.11



Value of freehold land	150.17	150.17	150.17	150.17	150.17
Depreciable value (excluding land) @ 90%	139761.83	140544.97	140544.97	141261.31	141977.64
Balance useful life of the assets	4.92	3.92	2.92	1.92	0.92
Balance depreciable Value	16079.75	13594.65	10126.63	7374.94	4250.16
Rate of depreciation	2.10%	2.22%	2.22%	2.44%	2.69%
Depreciation (annualized)	3268.24	3468.02	3468.02	3841.11	4250.16
Less: Cumulative depreciation adjustment on account of de-capitalization	54.63	0.00	0.00	0.00	0.00
Cumulative depreciation (at the end of the period)	126950.32	130418.34	133886.37	137727.48	141977.64

Operation & Maintenance Expenses

48. Regulation 35(1)(3) of the 2019 Tariff Regulations provides the year-wise O&M expense norms for the generating station as follows:

<i>(in Rs. lakh/MW)</i>				
2019-20	2020-21	2021-22	2022-23	2023-24
36.21	37.48	38.8	40.16	41.57

49. The Petitioner has claimed normative O&M expenses for the 2019-24 tariff period as follows:

<i>(Rs. In lakh)</i>				
2019-20	2020-21	2021-22	2022-23	2023-24
10537.11	10906.68	11290.80	11686.56	12096.87

50. Since the normative O&M expenses claimed by the Petitioner is in terms of Regulation 35(1)(3) of the 2019 Tariff Regulations, the same is allowed.

Water Charges, Security Expenses and Capital Spares

51. As per Regulation 35(1)(6) of the 2019 Tariff Regulations, the water charges, security expenses and Capital spares for thermal generating stations are to be allowed separately. Regulation 35(1)(6) of 2019 Tariff Regulations provides as under:

“35(1)(6) The Water Charges, Security Expenses and Capital Spares for thermal generating stations shall be allowed separately after prudence check:



Provided that water charges shall be allowed based on water consumption depending upon type of plant and type of cooling water system, subject to prudence check. The details regarding the same shall be furnished along with the petition;

Provided further that the generating station shall submit the assessment of the security requirement and estimated expenses;

Provided also that the generating station shall submit the details of year-wise actual capital spares consumed at the time of truing up with appropriate justification for incurring the same and substantiating that the same is not funded through compensatory allowance as per Regulation 17 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 or Special Allowance or claimed as a part of additional capitalization or consumption of stores and spares and renovation and modernization.”

Water Charges

52. The Petitioner has claimed water charges as per revised tariff formats in terms of the first proviso to Regulation 35(1)(6) of 2019 Tariff Regulations. On perusal of the documents furnished by the Petitioner, it has been observed that the water charges of Rs.10 lakh for each year of the 2019-24 tariff period claimed are on account of ‘Consent to operate’ (air and water), which is a mandatory procedure for all power plants. Keeping in view that the expenditure towards Consent to operate form part of the normative O&M expenses allowed to the generating station, we are not inclined to allow the water charges claimed by the Petitioner, for the 2019-24 tariff period.

Security Expenses

53. As regards Security expenses, the Petitioner has submitted that it has claimed security expenses (on projection basis) based on the expenditure incurred in the preceding years, as under:

<i>(Rs. in lakh)</i>				
2019-20	2020-21	2021-22	2022-23	2023-24
455.62	478.43	502.26	527.24	553.37

54. The Petitioner has thereafter submitted that the actual security expenses incurred is Rs.408.56 lakh for 2019-20 and Rs.337.65 lakh for 2020-21. In view of this,



the actual security expenses incurred by the Petitioner for 2019-20 and 2020-21 along with the projected security expenses for Rs.502.26 lakh in 2021-22, Rs.527.24 lakh in 2022-23 and Rs.553.37 lakh in 2023-24 lakh is allowed. This is, however, subject to the Petitioner submitting the actual payments/ bills along with relevant details as per Regulation 35(1)(6) of the 2019 Tariff Regulations. Accordingly, the Security expenses allowed are summarised below:

<i>(Rs. in lakh)</i>				
2019-20	2020-21	2021-22	2022-23	2023-24
408.56	337.65	502.26	527.24	553.37

Capital Spares

55. The Petitioner has submitted that it will claim capital spares consumed at the time of truing-up of tariff, in terms of the last proviso to Regulation 35(1)(6) of the 2019 Tariff Regulations. In view of this, no capital spares have been considered in this order. The Petitioner is at liberty to claim capital spares consumed, on actual basis, in terms of the last proviso to Regulation 35(1)(6) of the 2019 Tariff Regulations.

56. Based on the above, the O&M expenses allowed as per Regulation 35(1) and Regulation 35(6) of the 2019 Tariff Regulations are summarised below:

	2019-20	2020-21	2021-22	2022-23	2023-24
Installed Capacity (MW)	291.00	291.00	291.00	291.00	291.00
O&M expense norms as per Regulation 35(1) of the 2019 Tariff Regulations (in Rs. lakh / MW)	36.21	37.48	38.80	40.16	41.57
Normative O&M expenses allowed (in Rs. lakh) (A)	10537.11	10906.68	11290.80	11686.56	12096.87
Regulation 35(1)(6) of the 2019 Tariff Regulations					
Water Charges (in Rs. lakh)	0.00	0.00	0.00	0.00	0.00
Security Expenses (in Rs. lakh)	408.56	337.65	502.26	527.24	553.37
Capital Spares consumed (in Rs. lakh)	0.00	0.00	0.00	0.00	0.00
Total O&M Expenses allowed	10945.67	11244.33	11793.06	12213.80	12650.24



Operational Norms

57. The operational norms claimed by the Petitioner is as under:

Normative Annual Plant Availability Factor (NAPAF) %	72.00
Gross Station Heat Rate (kcal/kwh)	2600.00
Auxiliary Power Consumption %	2.75

58. Since the operational norms claimed by the Petitioner as above, are in accordance with Regulation 49 of the 2019 Tariff Regulations, the same is allowed.

Interest on Working Capital

59. Regulation 34 of the 2019 Tariff Regulations specify as under:

“34. Interest on Working Capital: (1) The working capital shall cover:

(b) For Open-cycle Gas Turbine/Combined Cycle thermal generating stations:

(i) Fuel cost for 30 days corresponding to the normative annual plant availability factor, duly taking into account mode of operation of the generating station on gas fuel and liquid fuel;

(ii) Liquid fuel stock for 15 days corresponding to the normative annual plant availability factor, and in case of use of more than one liquid fuel, cost of main liquid fuel duly taking into account mode of operation of the generating stations of gas fuel and liquid fuel;

(iii) Maintenance spares @ 30% of operation and maintenance expenses including water charges and security expenses;

(iv) Receivables equivalent to 45 days of capacity charge and energy charge for sale of electricity calculated on normative plant availability factor, duly taking into account mode of operation of the generating station on gas fuel and liquid fuel; and

(v) Operation and maintenance expenses, including water charges and security expenses, for one month.”

xxx

“(3) Rate of interest on working capital shall be on normative basis and shall be considered as the bank rate as on 1.4.2019 or as on 1st April of the year during the tariff period 2019-24 in which the generating station or a unit thereof or the transmission system including communication system or element thereof, as the case may be, is declared under commercial operation, whichever is later:

Provided that in case of truing-up, the rate of interest on working capital shall be considered at bank rate as on 1st April of each of the financial year during the tariff period 2019-24.

(4) Interest on working capital shall be payable on normative basis notwithstanding that the generating company or the transmission licensee has not taken loan for working capital from any outside agency.”



(a) Fuel Cost for computation of working capital

60. The Petitioner has claimed the following fuel components for computation of working capital in Form 15, based on the price and GCV of gas for preceding three months of January 2019, February 2019 and March 2019.

<i>(Rs. in lakh)</i>				
2019-20	2020-21	2021-22	2022-23	2023-24
2903.25	2903.25	2903.25	2903.25	2903.25

61. Accordingly, the fuel cost for 30 days for computation of working capital has been allowed as under:

<i>(Rs. in lakh)</i>				
2019-20	2020-21	2021-22	2022-23	2023-24
3025.54	3025.54	3025.54	3025.54	3025.54

62. The variation in fuel components claimed by the Petitioner as against the fuel components allowed as above, is mainly due to the difference in the weighted average value of GCV and landed cost of gas considered by Petitioner and those allowed.

(b) Energy/Variable Charges for computation of working capital

63. The Petitioner has claimed Energy Charge Rate (ECR) of Rs.2.156/kWh for 2019-20 and Rs.1.385/kWh for the period 2020-24, based on the average price and GCV of gas for the preceding three months i.e., from January 2019 to March 2019. Based on the operational norms, the GCV and price of domestic gas for the preceding three months i.e., January 2019, February 2019 and March 2019, the ECR, on ex-power plant basis, has been considered for computation of working capital as under

:

	Unit	2019-20 to 2023-24
Capacity	MW	291.00
Fuel	Gas	
Normative Heat Rate	kCal/kWh	2600.00



	Unit	2019-20 to 2023-24
Auxiliary Energy Consumption	%	2.75%
Weighted Average rate of Fuel	Rs. /1000SCM	7.129
Weighted Average GCV of Fuel	kCal/SCM	9242.16
Rate of energy charge ex-bus	Rs./Unit	2.062

64. ECR in Rs./kWh on ex-power plant on month-to-month basis shall be calculated up to three decimal places in accordance with the formulae given in Regulation 42 of the 2019 Tariff Regulations.

(c) Energy Charges for 45 days for computation of working capital

65. Energy charges for 45 days on the basis of the weighted average GCV and weighted average cost for the purpose of computation of working capital has been worked out and allowed as under:

(Rs. in lakh)

2019-20	2020-21	2021-22	2022-23	2023-24
4537.61	4537.61	4537.61	4537.61	4537.61

(d) Maintenance Spares for computation of working capital

66. Regulation 34(1)(b)(ii) of the 2019 Tariff Regulations provides for Maintenance spares @ 30% of the O&M expenses. Accordingly, maintenance spares for the computation of working capital have been allowed as under:

(Rs. in lakh)

2019-20	2020-21	2021-22	2022-23	2023-24
3283.70	3373.30	3537.92	3664.14	3795.07

(e) Receivables for computation of working capital

67. Regulation 34(1)(b)(iv) of the 2019 Tariff Regulations provides for Receivables for 45 days. Accordingly, receivables for computation of working capital is allowed as under:



	<i>(Rs. in lakh)</i>				
	2019-20	2020-21	2021-22	2022-23	2023-24
Variable Charges (45 days)	4537.61	4537.61	4537.61	4537.61	4537.61
Fixed Charges (45 days)	3720.23	3782.09	3838.72	3942.91	4042.41
Total	8257.85	8319.70	8376.34	8480.52	8580.02

(f) O&M Expenses (1 month) for computation of working capital

68. Regulation 34(1)(b)(v) of the 2019 Tariff Regulations provides for O&M expenses including water charges and security expenses for one month. Accordingly, the O&M expenses for computation of working capital is allowed as follows:

<i>(Rs. in lakh)</i>				
2019-20	2020-21	2021-22	2022-23	2023-24
912.14	937.03	982.76	1017.82	1054.19

(g) Rate of Interest on working capital

69. In accordance with Regulation 34(3) of the 2019 Tariff Regulations, the rate of interest on working capital considered on projection basis, for the 2019-24 tariff period is 12.05% (i.e., 1-year SBI MCLR of 8.55% as on 1.4.2019 + 350 basis points). As the tariff of the generating station for the 2019-24 tariff period is being determined during the year 2021-22, the SBI MCLR as on 1.4.2020 (7.75%) and as on 1.4.2021(7.00%) is available, which is lower in comparison of the same, as on 1.4.2019 (8.55%). Since, the rate of interest on working capital is subject to revision at the time of truing-up of tariff, based on the bank rate as on 1st April of each financial year, we find it prudent to allow the rate of interest as on 1.4.2020 and 1.4.2021, for the subsequent financial years. Accordingly, the rate of interest for 2019-20 is 12.05%, 2020-21 is 11.25% and for the subsequent years the rate of interest of 10.50% has been considered (i.e., 1-year SBI MCLR of 7.75% as on 1.4.2020 + 350 basis points and 1-year SBI MCLR of 7.00% as on 1.4.2021 + 350 basis points).



70. Accordingly, Interest on Working Capital is allowed as under:

	<i>(Rs. in lakh)</i>				
	2019-20	2020-21	2021-22	2022-23	2023-24
Working Capital for Fuel Cost	3025.54	3025.54	3025.54	3025.54	3025.54
Working Capital for O & M expenses	912.14	937.03	982.76	1017.82	1054.19
Working Capital for Maintenance Spares	3283.70	3373.30	3537.92	3664.14	3795.07
Working Capital for Receivables	8257.85	8319.70	8376.34	8480.52	8580.02
Total Working Capital	15479.22	15655.57	15922.55	16188.01	16454.81
Rate of Interest	12.05%	11.25%	10.50%	10.50%	10.50%
Total Interest on Working capital	1865.25	1761.25	1671.87	1699.74	1727.76

Annual Fixed Charges

71. The annual fixed charges approved for the generating station for the period from 1.4.2019 to 31.3.2024 are summarised below:

	<i>(Rs. in lakh)</i>				
	2019-20	2020-21	2021-22	2022-23	2023-24
Depreciation	3268.24	3468.02	3468.02	3841.11	4250.16
Interest on Loan	0.00	0.00	0.00	0.00	0.00
Return on Equity	14178.73	14203.35	14203.35	14226.71	14250.07
O&M Expenses	10945.67	11244.33	11793.06	12213.80	12650.24
Interest on Working Capital	1865.25	1761.25	1671.87	1699.74	1727.76
Total	30257.89	30676.96	31136.31	31981.37	32878.23

72. The annual fixed charges determined as above are subject to truing-up in terms of Regulation 13 of the 2019 Tariff Regulations.

Application Filing Fees and Publication Expenses

73. The Petitioner has also sought reimbursement of fees paid by it for the 2019-24 tariff period for filing the tariff petition and the publication expenses incurred for the same. The Petitioner shall be entitled for reimbursement of the filing fees and publication expenses in connection with the present petition, directly from the beneficiaries on pro-rata basis in accordance with Regulation 70(1) of the 2019 Tariff Regulations.



74. Petition No.280/GT/2020 is disposed of in terms of the above.

Sd/-
(Pravas Kumar Singh)
Member

Sd/-
(I.S. Jha)
Member

Sd/-
(P.K. Pujari)
Chairperson





सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
तापीय परियोजना नवीनीकरण एवं आधुनिकीकरण प्रभाग
Thermal Project Renovation & Modernization Division

विषय: - Detailed project report for Renovation & Modernization/Life Extension works of 291 MW Assam gas based power station.

Reference is invited to NEEPCO letter no: NEEPCO/ED/O&M/R&M/AGBPS-23/10 dated 26.04.2023 on subject cited matter. After examining the subject matter, it is mentioned that after the enactment of the Electricity Act, 2003, Generation has become a delicensed activity. Therefore, carrying out R&M/LE activities may be decided by utility considering power supply position, feasibility of compliance of present environment norms and techno economic viability of units on the basis of Residual Life Assessment (RLA) / Condition Assessment (CA)/ Destructive test studies and Energy Audit studies after cost benefit analysis.

Therefore, it is suggested that NEEPCO may directly approach CERC for approval of DPR and further action.

This issues with the approval of Principal Chief Engineer-II, CEA.

Saurabh Parth Sarthi
14.7.23

Saurabh Parth Sarthi/(सौरभ पार्थ सार्थी)
Asst. Director (TPRM)/स. नि. (टीपीआरएम)

ED (O&M), NEEPCO Ltd.

संख्या: CEA-TH-14-24/4/2023-TRM Division / 1126

दिनांक: 14/07/2023

Engineer - Install - Maintain

Date:22.08.2023

Reference: CEIPL/NEEPCO/2023-2024/WL-103.

To,

Station Facilities Complex
AGBP, NEEPCO LTD,
Bokuloni, Dist.: Dibrugarh
Assam: 786191 (India)
Ph No, 0374-2825216 / 392

Subject: Support letter on Life Cycle of Waukesha's Engine Model 12V275GL+ Installed at AGBPS, NEEPCO LTD.

Kind Attn: Shri. Bhupendra Goswami - CGM(E/M), HOP

Reference: Your letter Neepco/AGBPS/HOP/2023-24/W-10/131 dtd 25.07.2023

Dear Sir,

We confirm that life of below listed engines will be 15 years with effect from 22.08.2023. This life is subject to –

- Adherence to Waukesha's maintenance schedule with Waukesha genuine parts and maintenance is carried out by Waukesha trained technicians.
- Consideration that upgrades due to changing part design, technology, controls, and obsolescence as suggested by Waukesha are implemented.

Unit Name	Engine type	Engine Serial Number	Approx Engine Running Hrs likely to be on 22 nd August 2023.
Unit#1	12V275GL+	5283702943	55180
Unit#2	12V275GL+	5283702964	58280
Unit#3	12V275GL+	5283702942	55349
Unit#4	12V275GL+	3233586	24452

Clarke Energy India Pvt Ltd
Shivkiran, Plot No.160,
CTS No. 632, Lane No.4
Dahanukar Colony, Kothrud,
Pune 411038, India

Tel. +9120 30241777
india@clarke-energy.com
www.clarke-energy.com


We hope the above clarification is in line with your requirement. Kindly feel free to contact us if you have any questions.

Yours sincerely

For **CLARKE ENERGY INDIA PVT. LTD.**

Atul

Herlekar

 Digitally signed by Atul
Herlekar
Date: 2023.08.22
17:40:28 +05'30'

Authorized Signatory

To,
Sri Bhupendra Goswami,
ED (T) & Head of Plant
AGBPS, NEEPCO Ltd,
PO: Bokuloni Chariali, Dibrugarh,
Assam

Date 05.09.2023

Ref: 1) Your letter NEEPCO/AGBPS/HOP/2023-24/W-8(A)/132 dated 25/07/2023.

2) Our Letter Dtd 26.08.2023

3) Your e-mail Dtd 04.09.2023

Subject: Life Extension of equipment installed at AGBPS.

Dear Sir,

This has reference to your e-mail Dtd 04.09.2023 on the subject. We would like to inform that by following the approach and carrying out the study/activities mentioned in our letter dated 26th-Aug-2023, it is possible to extend the life of the power plant equipment (gas turbine generator & its support systems) to another 15 years.

Please find below a gist of the activities that are envisaged during this assessment study:

- Physical condition of the components/ systems
- Performance of the components / systems
- Life cycle support availability / obsolesce considering next 15 years operation

Thanking you,



(Madhusudan)

మధుసూదన్ - మధుసూదన్
MADHUSUDAN

अपर महाप्रबंधक / गैस टरबाईन अभियांत्रिकी एवं प्रौद्योगिकी
Addl. General Manager / Gas Turbine Engineering & Technology
बी.एच.ई.एल.-एचपीईपी, हैदराबाद-32, BHEL- HPEP, HYD-32

CC:

- 1) Mr. Kolusu Venkatasyamkumar, BGGTS
- 2) Mr. Anshu Bhatnagar, GM, SSBG (R&M Thermal), BHEL



Bharat Heavy Electricals Limited-HPEP
(A Govt. of India Undertaking)
Ramachandrapuram - Hyderabad - 502032
Dept. : Turbine & Compressors Engineering



Date 12.09.2023

To,
Sri Bhupendra Goswami,
ED(T) & Head of Plant,
AGBPS, NEEPCO Ltd,
PO: Bokuloni Chariali, Dibrugarh,
Assam.

Ref: 1) Your letter NEEPCO/AGBPS/HOP/2023-24/W-8(A)/243 dated 25/07/2023.
2) Your e-mail Dtd 04.09.2023

Subject: Life extension of Steam Turbines installed at AGBPS (NEEPCO)

Dear Sir,

This has reference to your e-mail dated 04.09.2023 on the subject. We would like to inform that by carrying out an assessment study and retrofitting of steam turbine, it is possible to extend the life of the power plant equipments (Steam turbine generator & its support systems) to another 15 years.

Please find below a list of the activities that are envisaged during this assessment study:

- Physical condition of the components/systems
- Performance of the components/systems
- Life cycle support availability/obsolesce considering next 15 years operation.
- RLA study of steam turbine components

Thanking you,

(M Rajeswara Rao)

एम. राजेश्वर राव

M. RAJESWARA RAO

अपर महाप्रबन्धक / टर्बाइन & कंप्रेसर्स अभियंता
Addl. General Manager / Turbines & Compressors Engg
बी.एस.ई.एल. हैदराबाद, BHEL, HYD-32

Page 1/1

Date: September 5th, 2023
Ref.: TGSC23-0012

North Eastern Electric Power Corporation Ltd.
(A Government of India Enterprise)
Assam Gas Based Power Project
Bokuloni, Dist, Dibrugarh, Assam, PIN – 786-191


Kind Attn: Mr. Bhupen Goswami / ED (T) & HOP

Subject: Life Extension of Gas Turbines at NEEPCO Assam Power Station

Dear Sir,

With reference to the captioned subject, we (Mitsubishi Heavy Industries, Ltd.) recognize that Gas Turbines which installed at NEEPCO Assam Power Station as Original Equipment Manufacturer (OEM) may be able to life extension by 15 years if NEEPCO Assam Power Station follows the guidance of the OEM, perform proper maintenance, and replace parts.

Very truly yours,



Kozo Hirai / Engineering Manager
Takasago Service Engineering Department
GTCC Business Division
Energy Systems
Mitsubishi Heavy Industries, Ltd.



NEEPCO LTD

CORPORATE ACCOUNTS

Date: 24th November, 2023

Minutes of Meeting held on 24.11.2023

A meeting of finance officials from Corporate office and Statutory Auditors held at Siliguri on 24th November, 2023 for deliberation/discussion on matter related to the proposal for extension of useful life of AGBPS beyond normative life, Annual Accounts for the F.Y. 2023-24, ERP issues and other issues relating to Finance & Accounts. The meeting was chaired by Director (Finance). The following officials were present at the meeting:

Corporate Office, Shillong:

1. Baidyanath Maharana, Director (Finance)
2. Rana Bose, ED (Finance),
3. Dev Kumar Pandey, GM (Finance), Corporate Accounts and Budget & Report

Statutory Auditors, NEEPCO LTD.,

1. CA, Manish Goyal
2. CA, Badal Agarwal

At the outset, Shri Dev Kumar Pandey, GM (Finance), welcomed all the members present in the meeting and briefed the agenda to be discussed in the meeting.

Shri Rana Bose, ED(Fin) emphasized the provision under Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019 (Tariff Regulations) for proposal for extension of useful life of AGBPS for a further period of 15 years beyond its normative life. Further, the preparedness plan for Annual Accounts closing ending 31.03.2023 was also highlighted along with the preparedness of some of the reports to be generated from the ERP-SAP

The Director (Finance) welcomed and briefed the members about the significance of the extension of useful life of AGBPS for a further period of 15 years beyond its normative life and the impact of depreciation vis-à-vis the profitability in the current financial year.



NEEPCO LTD

CORPORATE ACCOUNTS

Then the following agenda were discussed in the meeting: -

Agenda no. 1: Proposal for extension of useful life of AGBPS for a further period of 15 years beyond its normative life

Agenda no. 2: ERP :: Upcoming Generation of Financial Reports in ERP-SAP

Agenda no. 3: Other issues:

Agenda no. 1:

Proposal for extension of useful life of Assam Gas Based Power Plant (AGBPS) for a further period of 15 years beyond its normative life

1. The following legislations, related rules and regulations were discussed
 - (a) Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019 (Tariff Regulations)
 - (b) Relevant provisions of Indian Accounting Standards (Ind AS) as prescribed under Section 133 of the Companies Act, 2013
2. The technical papers and certificates issued from the Original Equipment Manufacturer (OEM) and Fuel Suppliers such as Oil India Limited, Bharat Heavy Electricals Limited, Clarke Energy and Mitsubishi Corporation were also highlighted for the proposed extension of useful life of the Plant, i.e. Assam Gas Based Power Plant (AGBPS) by a further period of 15 years. It was suggested to provide the documents from the Oil India Limited/ Other Vendor(s) for the fuel supply for a further period so that the useful life of the Plant can be supported to 15 years.
3. Further, the depreciation clause as per the Sec 33 Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019 (Tariff Regulations) was also discussed along with the Ind AS 16 "Property, Plant and Equipment".
4. It was discussed that once the life extension is placed at the appropriate authority and upon the approval, NEEPCO will save the depreciation cost in the coming years including the current year,



NEEPCO LTD

CORPORATE ACCOUNTS

thereby the increasing the profitability of the Corporation in a comparatively way so that the desired estimates PBT / PAT could be achieved for the FY 2023-24.

5. After threadbare discussion, the following were resolved and agreed: -

- (a) A Management certificate in this regard will issued for approving the extension of useful life of the Plant, i.e. Assam Gas Based Power Plant (AGBPS) by a further period of 15 years
- (b) An opinion of an Advocate especially dealing with the matter related to CERC on the proposed life extension of the Plant **Or** an opinion of a Chartered Accountant especially dealing with relevant matter and has the experience of similar nature of case.
- (c) Documents from the Central Electricity Authority (CEA) duly agreeing / approving the life extension of the plant is to be arranged by the Office of the O&M, NEEPCO Ltd
- (d) Accordingly, NEEPCO will file a petition to the Central Electricity Regulatory Commission for extension of useful life of the Plant, i.e. Assam Gas Based Power Plant (AGBPS) by a further period of 15 years.
- (e) The aforesaid formalities are to be completed before the end of the financial year i.e on 31.03.2024.
- (f) Upon the submission of the petition, necessary accounting entries will be made in the current financial years, FY 2023-24, for revision in the depreciation amount for AGBPS.

Agenda no. 2:**ERP :: Upcoming Generation of Financial Reports in ERP-SAP**

1. The following points were discussed in the meeting regarding upcoming reports of the financial statements which will be generated from ERP-SAP
 - (a) The report format of Note- 2 to the Financial Statement regarding Property, Plant and Equipment will be generated through ERP-SAP from 3rd quarterly accounts onwards (FY 2023-24). This will be generated in the same format of NTPC Ltd.
 - (b) Cash Flow Statement (CFS) will be generated through ERP-SAP from 3rd quarterly accounts onwards (FY 2023-24).



NEEPCO LTD

CORPORATE ACCOUNTS

Agenda no. 3:**Other Matters**

- (a) The Statutory Auditors will visit Guwahati office after the second week of December 2023. During their visit, a detail calculation will be explained to them regarding Deferred Tax Liabilities and Regulatory Deferral Account. This will enable the Statutory Auditors to provide their valuable inputs so that the same can be incorporated in the ERP-SAP. After the end of the meeting, the Statutory Auditors will visit Kopili HPS, Umrangso. This will be a part of their annual plan visit to audit the NEEPCO books at projects / plants level.
- (b) Presently, the share of Corporate expenses is allocated only to the operational plants in the ratio of installed capacity. NEEPCO is reviewing the same and efforts are being made to allocate the Corporate Share in operation plants and construction projects on some justifiable grounds.
- (c) NEEPCO is reviewing some of its accounting policies. Before the end of the current financial year 2023-24, policy of useful life of assets related to Residential Furnitures and Fixtures and new Assets acquired and installed at New Delhi newly will be incorporated.
- (d) The Statutory Auditors will provide their itinerary and their planning to visit the NEEPCO Plants for checking the records of physical verification of assets and inventories at selected locations

The following issues were agreed upon to be taken care of as per the approved timelines to achieve the desired performance current financial year.2023-24

The meeting ended with vote of thanks



ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम) पंजीकृत कार्यालय: दुलियाजान, असम

Oil India Limited

(A Government of India Enterprise) Registered Office: Duliyan, Assam

प्लॉट. नं. 19, सेक्टर 16-ए, नोएडा-201 301 उत्तर प्रदेश

Plot No. : 19, Sector 16-A, Noida-201 301, Uttar Pradesh

दूरभाष / Telephone : 0120-2419000 फैक्स / Fax : 0120-2488310

CIN : L11101AS1959GOI001148 ई-मेल / E-mail : oilindia@oilindia.in, वेबसाइट / Website : www.oil-india

संदर्भ सं./Ref. No.:DO:OIL:02/758

दिनांक / Date: 23.02.2024

Sri Ranendra Sarma
Director (Technical), AGBPS
NEEPCO LIMITED

Sub: Comfort Letter - Natural Gas Availability for NEEPCO's Bokuloni Power Plant


Ref: NEEPCO/D(T)/AGBPP-1/2023-24/76 dtd 25.01.2024

Sir,

- 1.0 In response to your request, we hereby confirm the availability of Natural Gas in the region for supply at the rate of 1.4 MMSCMD for the next 15 years.
- 2.0 This continuation of gas supply is contingent upon:
 - 2.1 The continuation of the existing gas allocation by Ministry of Petroleum and Natural Gas (MoP&NG).
 - 2.2 Adherence to the guidelines issued by the Govt. of India/MoP&NG from time to time regarding Domestic natural gas, in terms of future gas production from blocks awarded under various regimes.
 - 2.3 The mutual agreement and execution of a new Gas Sale and Purchase Agreement (GSPA) between NEEPCO Ltd. and Oil India Limited, after expiry of the existing GSPA.

Thank you.

Yours sincerely,
FOR OIL INDIA LIMITED


(Pankaj Kumar Goswami)
Director Operations

NOOC: RCE

Life Extension of 291 MW Assam Gas Based Power Station, Dibrugarh District, Assam – consent of beneficiaries.

From : Commercial Department <commercial@neepco.co.in> Thu, Mar 28, 2024 12:00 PM
Subject : Life Extension of 291 MW Assam Gas Based Power Station, Dibrugarh District, Assam – consent of beneficiaries.

To : md apdcl <md.apdcl@apdcl.org>, Acecomt Aseb <acecomt.aseb@gmail.com>, nilmadhabdeb@gmail.com, indrajit tahbildar <indra.nits@gmail.com>, nil_aseb <nil_aseb@rediffmail.com>, eincpower <eincpower@gmail.com>, commercialpnemz <commercialpnemz@gmail.com>, managing director <managing.director@tsecl.in>, director technical <director.technical@tsecl.in>, director finance <director.finance@tsecl.in>, GM Transmission <gm-transmission@tsecl.in>, skrsujata <skrsujata@gmail.com>, d pal1966 <d_pal1966@rediffmail.com>, md mspdcl <md.mspdcl@gmail.com>, satya14may <satya14may@gmail.com>, Saratchandra Irom <iromsaratchandra@yahoo.in>, Thangjam Aton Singh <aton.sekmai@gmail.com>, MeECL Finance <revmeecl@gmail.com>, Rilang Mawlong <rilangmawlong23@gmail.com>, Robert Warjri <meecl_cao@yahoo.co.in>, Director Distribution <dd.mepdcl@gmail.com>, Sanjib Majhi <samajhi@gmail.com>, E. E. Trans Dimapur <NGL.COMML@gmail.com>, nagaland dopn <nagaland.dopn@gmail.com>, Chief Engineer (Commercial) cum Chief Electrical Inspector, Chief Engineer (Commercial) cum Chief Electrical Inspector, <cecomita@gmail.com>

Cc : CMDoffice neepco <cmdneepco@neepco.co.in>, Baidyanath Maharana <bmaharana@neepco.co.in>, BAIDYANATH MAHARANA <director.finance@neepco.co.in>, DT Office <dtooffice@neepco.co.in>, ED ONM <edonm@neepco.co.in>, neepcocommercial <neepcocommercial@gmail.com>

Sub: Life Extension of 291 MW Assam Gas Based Power Station, Dibrugarh District, Assam – consent of beneficiaries.

Sirs,

As you are already aware that NEEPCO's 291 MW Assam Gas Based Power Station, Dibrugarh district, Assam is about to complete its useful life of 25 years after having

supplied reliable power at competitive tariff to our esteemed beneficiaries. The plant is performing satisfactorily till date and serving all the beneficiaries of the North Eastern Region and it is now felt necessary to undertake measures for Life Extension through additional capitalization, to ensure seamless supply of power to the N.E. grid.

The Hon'ble Commission notified the Central Electricity Regulatory Commission (Terms and Conditions of Determination of Tariff) Regulations, 2019 (**'Tariff Regulations, 2019'**) applicable for the control period 01.04.2019 to 31.03.2024. The relevant extract from the Tariff Regulations, 2019 reads as under:

3. Definitions –

.....

(24) 'Extended Life' means the life of a generating station or unit thereof or transmission system or element thereof beyond the period of useful life, as may be determined by the Commission on case to case basis;

(73) 'Useful Life' in relation to a unit of a generating station, integrated mines, transmission system and communication system from the date of commercial operation shall mean the following:

(b) Gas/Liquid fuel based thermal generating station : 25 years
Provided that the extension of life of the projects beyond the completion of their useful life shall be decided by the Commission on case to case basis;

27.(3) In case of gas/ liquid fuel based open/ combined cycle thermal generating station after 25 years of operation from date of commercial operation, any additional capital expenditure which has become necessary for renovation of gas turbines/steam turbine or additional capital expenditure necessary due to obsolescence or non-availability of spares for efficient operation of the stations shall be allowed

On 27.01.2022, this Hon'ble Commission passed the Order in Petition No. 280/GT/2020 approving the tariff of the Project for the tariff period – 2019 to 2024, and granted a liberty to NEEPCO to approach the Hon'ble Commission with an appropriate application for Life extension of units of the Project in terms of the Regulation 27 of the Tariff Regulations, 2019. The relevant extract from the Order dated 27.01.2022 reads as under:

...We, therefore, grant liberty to the Petitioner to approach the Commission with appropriate application for Renovation & Modernisation/ Life extension of units/ generating station in terms of Regulation 27 of the 2019 Tariff Regulations.

Accordingly, a detailed Project Report has been prepared keeping in mind the Life Extension (LE) of the plant, besides the normal O&M activities, necessary for extension of its useful life which is due to expire in March 2024. The proposed life extension is for 15 years. Salient aspects of the proposal are as below:

1. Estimated expenditure of Additional capitalization for LE is Rs 455.33 crores (at Dec'23 Price Level, after decapitalization), which translates to Rs 1.56 crores/MW. Out of the Estimated expenditure of Rs. 455.33 crores an amount of Rs. 158.59 Crore has already been spent in the tariff control period 2019-24 and another Rs. 296.73 crores will be spent in phased manner during the next 5 years starting from 2024-25.
2. The First-Year (i.e 2024-25) Capacity Charge on completion of the Life Extension works based on the estimated cost as mentioned above has been worked out at Rs. 1.80 per unit with a levellised Capacity Charge over the expected 15 years extended useful life of the plant of Rs. 2.13 per unit.
3. Petition will be filed before the Hon'ble Commission for extension of the life of the power station before the completion of the useful life.
4. Further a regular Tariff Petition will be filed before the Hon'ble Commission for 2024-29 tariff period based on the year wise projected additional capitalization for the estimated additional expenditure of Rs.296.73 crores.
5. The LE of the Project would also facilitate the adoption of modern equipment and foster technical upgradation, thereby, increasing the efficiency of the Plant.

6. Further, the LE work will be undertaken in phases, depending on the availability of a particular system and unit shutdown, which will minimize the unit shutdown requirement, and thus, any avoidable loss in generation.
7. The confirmation/recommendations of the LE provided by the OEMs, and the assurance of fuel availability from M/s OIL for next 15 years is significant for the proposed LE.

Considering the attractive tariff and reliability of the station you are requested to kindly convey your consent to the above proposal for carrying out LE of the 291 MW Assam Gas Based Power Station to enable NEEPCO to obtain approval of the Hon'ble CERC on the same, as required by the relevant provisions of the Tariff Regulations, 2019. Your consent may kindly be communicated at the earliest so that the life extension activities can be commenced without delay.

Thanking you,

Debjani Dey
Executive Director (Commercial)
NEEPCO: Shillong



DETAIL PROJECT REPORT



LIFE EXTENSION OF 291 MW ASSAM GAS BASED POWER STATION (AGBPS)

MARCH 2024

(VOLUME-I)



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

TABLE OF CONTENTS:

SL. NO.	DESCRIPTION	PAGES
	COVER PAGE, TABLE OF CONTENT	1-10
PART-1	INTRODUCTION, BACKGROUND AND SALIENT FEATURES OF AGBPS	
1.0	INTRODUCTION, BACKGROUND AND SALIENT FEATURES OF AGBPS	11
1.01	INTRODUCTION AND BACKGROUND	11-13
1.02	PROJECT IMPLEMENTATION	13
1.03	COMMISSIONING DETAILS OF THE PLANT	14
1.04	INSTALLED CAPACITY AND CONFIGURATION	14-15
1.05	SALIENT FEATURES OF THE PLANT	15
1.05.01	PLANT LAYOUT OF AGBPS	15-16
1.05.02	COMBINED CYCLE MODULE SCHEMATIC	16
1.05.03	2 GTG + 1 STG MODULE OVERVIEW	17
1.05.04	DETAILS OF THE PLANT	17-18
1.05.05	FUEL SUPPLY	18-19
1.06	GENERATION AND OPERATIONAL PROFILE OF THE PLANT	19-20
1.07	UNIT'S AVERAGE PERFORMANCE PERAMETERS OVER THE LIFE	20-21
1.08	UNIT'S AVERAGE PERFORMANCE PERAMETERS DURING LAST EIGHT YEARS	21
1.09	ACHIEVEMENT DURING PAT CYCLE-II	21-23
1.10	TECHNICAL DETAILS OF GAS TURBINES OF THE PLANT	23
1.10.01	TECHNICAL PARAMETERS OF MHI MAKE GAS TURBINES	23
1.10.02	TECHNICAL PARAMETERS OF BHEL MAKE GAS TURBINES	23-24
1.11	TECHNICAL DETAILS OF STEAM TURBINES	24
1.11.01	TECHNICAL PARAMETERS OF BHEL MAKE STEAM TURBINES	24
1.11.02	BOILER SPECIFICATION	24-25
1.11.03	CONDENSER SPECIFICATION	25
1.11.04	COOLING TOWER SPECIFICATION	25



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	DESCRIPTION	PAGES
1.11.05	EJECTORS	25-26
1.11.06	CONDENSATE EXTRACTION PUMPS	26
1.11.07	GLAND STEAM COOLER	26
1.11.08	DEAERATOR	26
1.11.09	BOILER FEED PUMPS	26-27
1.11.10	STEAM TURBINE GOVERNING SYSTEM	27
1.11.11	LUBE OIL SYSTEM	27
1.11.12	STEAM TURBINE GLAND SEALING SYSTEM	27
1.11.13	RAW WATER SYSTEM	27-28
1.11.14	CW / ACW SYSTEM AND COOLING TOWERS	28
1.11.15	WATER PRE-TREATMENT PLANT	28
1.11.16	DM PLANT	28
1.11.17	WATER PATH WITH DM PLANT AND COOLING WATER CIRCUIT	28-29
1.12	PLANT ELECTRICAL SYSTEM	30
1.12.01	SCHEMATIC VIEW OF 220 KV SWITCHYARD	30
1.12.02	GENERATOR	30-31
1.12.03	STATION TRANSFORMER	31-32
1.12.04	GENERATOR TRANSFORMER	32
1.12.05	UNIT AUXILIARY TRANSFORMER	32
1.12.06	ELECTRICAL AUXILIARY POWER DISTRIBUTION SYSTEM	32-33
1.12.07	DC SYSTEM	33-36
1.13	CONTROL & INSTRUMENTATION SYSTEM OF THE PLANT	36-37
1.14	GAS BOOSTER STATION	37
1.14.01	TECHNICAL SPECIFICATIONS OF OLD DRESSER-RAND GAS COMPRESSORS	37=38
1.14.02	TECHNICAL SPECIFICATIONS OF OLD WAUKESHA GAS ENGINES	38
1.14.03	INITIAL (OLD) COMMISSIONING DATE OF GAS BOOSTER STATION	38



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	DESCRIPTION	PAGES
1.14.04	LIFE EXTENSION OF GAS BOOSTER STATION	38-41
1.15	AIR-CONDITIONING AND VENTILATION SYSTEM	41
1.16	FIRE FIGHTING SYSTEM	41-42
1.17	PLANT INSTRUMENT AIR SYSTEM	42-43
1.17.01	TECHNICAL SPECIFICATION	43-44
1.18	EMERGENCY POWER SUPPLY SYSTEM	44
1.19	PUBLIC ADDRESS SYSTEM	44
1.20	ILLUMINATION SYSTEM	44
1.21	CIVIL WORKS	44
1.21.01	MAIN POWER HOUSE BUILDING	45
1.21.02	CIVIL STRUCTURE OF GAS BOOSTER STATION	45-46
1.21.03	CIVIL STRUCTURE OF BOILER AREA	46
1.21.04	DETAILS OF CHIMNEY	46
1.21.05	CIVIL DETAILS OF COOLING TOWER	46
1.21.06	CIVIL STRUCTURE DETAILS OF TRANSFORMER YARD	46
1.21.07	MISCELLANEOUS BUILDINGS AND ASSOCIATED CIVIL STRUCTURES	46-47
1.21.08	DETAILS OF ROADS	47
1.21.09	CIVIL DETAILS OF PIPE LINE	47
1.21.10	BRIDGE	47
1.21.11	INTAKE WELL CUM PUMP HOUSE	47
1.21.12	DRAINS	47-48
1.22	STACK EMISSIONS, AMBIENT AIR QUALITY AND PROCESS EFFLUENTS	48-50
PART-2	NEED OF LIFE EXTENSION OF AGBPS	51
2.0	BACKGROUND	52
2.01	NEED OF LIFE EXTENSION	52
2.02	OBJECTIVES OF LIFE EXTENSION SOLUTION	52-53



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	DESCRIPTION	PAGES
2.03	KEY REASONS FOR LE OF AGBPS	53-54
2.04	METHODOLOGY OF IMPLEMENTATION OF LIFE EXTENSION WORKS	54
2.05	PROPOSAL FOR LIFE EXTENSION	54
2.05.01	SCOPE & JUSTIFICATION	54
2.05.02	COST BENEFIT ANALYSIS	54-55
2.05.03	ESTIMATED LIFE EXTENSION	55-56
2.05.04	SCHEDULE OF COMPLETION	56
2.05.05	FINANCIAL ANALYSIS	56
PART-3	REPORT ON RESIDUAL LIFE AND CONDITION ASSESSMENT (RLA) OF EQUIPMENTS AND COMPONENTS SUBMITTED BY M/S NTPC & REPORT FOR CHECKING OF STRUCTURAL STABILITY AND EARTHQUAKE RESISTANCE OF BUILDINGS AND OTHER STRUCTURES SUBMITTED BY JADAVPUR UNIVERSITY	57
3.01	RESIDUAL LIFE AND CONDITION ASSESSMENT (RLA) OF EQUIPMENTS AND COMPONENTS BY M/S NTPC	58
3.01.01	INTRODUCTION	58
3.01.02	MAJOR OBSERVATIONS AND RECOMMENDATIONS BY NTPC CONSULTANT TEAM	58-62
3.01.03	CONCLUSION REMARKS OF NTPC REPORT	62
3.01.04	DETAIL REPORT OF RLA CARRIED OUT BY NTPC	63
3.02	STRUCTURAL STABILITY AND EARTHQUAKE RESISTANCE OF BUILDINGS AND OTHER STRUCTURES SUBMITTED BY JADAVPUR UNIVERSITY	63
3.02.01	INTRODUCTION	63
3.02.02	RECOMMENDATIONN	63
3.02.03	DETAILED REPORT SUBMITTED BY JADAVPUR UNIVERSITY	63
PART-4	LIFE EXTENSION OF AGBPS	64
4.0	INTRODUCTION	65
4.01	DETAILS OF LE OF GAS TURBINES AND AUXILIARIES	66
4.01.01	DETAILS OF LIFE EXTENSION (LE) WORKS OF MHI & BHEL GTG	66-70



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	DESCRIPTION	PAGES
4.02	DETAILS OF LIFE EEXTENSION OF STEAM TURBINES AND ITS AUXILIARIES	71
4.02.01	NEED FOR LIFE EXTENSION	71-79
4.02.02	LIFE EXTENSION ACTIVITIES OF STEAM TURBINES AND ITS AUXILIARIES	79-86
4.03	LIFE EXTENSION OF GAS BOOSTER STATION	87
4.03.01	INTRODUCTION	87
4.03.02	TECHNICAL SPECIFICATIONS OF OLD DRESSER-RAND GAS COMPRESSORS	87
4.03.03	TECHNICAL SPECIFICATIONS OF OLD WAUKESHA GAS ENGINES	87-88
4.03.04	INITIAL (OLD) COMMISSIONING DATE OF GAS BOOSTER STATION	88
4.03.05	1 ST PHASE OF LIFE EXTENSION OF GBS	88-91
4.03.06	EXPENDITURE DETAILS OF 1 ST PHASE LE OF GBS	91
4.03.07	2 ND PHASE OF LIFE EXTENSION OF 4 TH GBS UNIT	92
4.03.08	EXPENDITURE DETAILS OF 2 ND PHASE LE OF GBS	92-93
4.03.09	KEY BENEFITS OF LE OF GBS	93
4.03.10	REFERANCES	93-94
4.04	LE OF CENTRAL AIR CONDITIONING AND VENTILATION SYSSTEM OF AGBPS	95
4.04.01	INTRODUCTION	95
4.04.02	LIST OF EQUIPMENT OF CENTRAL AC PLANT AND SPLIT PACKAGE TYPE ACS INSTALLED AT VARIOUS PLACES OF AGBPS	95-97
4.04.03	COMPLETED LE OF CENTRAL AC PLANT AND SPLIT AC DURING 2019-20 TO 2021-22	97-99
4.04.03.01	LE OF AIR CONDITIONING (AC) AND VENTILATION SYSTEM	99-101
4.04.03.02	DETAILS OF EXPENDITURE FOR LE OF CENTRAL AC PLANT AND REPLACEMENT OF SPLIT TYPE AC OF THE PLANT	101-102
4.05	DETAILS OF LIFE EXTENSION FOR PLANT ELECTRICAL SYSTEM, LIKE, CIRCUIT BREAKER, GENERATOR, EXCITER, SWITCH YARD, BATTERY BANK, CHARGER ETC. OF THE PLANT	103
4.05.01	INTRODUCTION	103-104



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	DESCRIPTION	PAGES
4.05.02	A DETAIL OF MAJOR ELECTRICAL EQUIPMENT WITH SPECIFICATIONS	104-108
4.05.03	COMPLETED LIFE EXTENSION (LE) OF PLANT ELECTRICAL EQUIPMENT DURING THE PERIOD 2019-20 TO 2023-24 (UPTO DEC 2023)	109-111
4.05.04	LE AND RETROFITTING PROGRAMME TO BE IMPLEMENTED DURING THE PERIOD 2023-24 (JAN 2024) TO 2029-30 FOR VARIOUS ELECTRICAL EQUIPMENT AND SYSTEM OF THE PLANT	111
4.05.04.01	RETROFITTING OF STATIC RELAYS BY NUMERICAL RELAYS IN MHI GENERATORS (GTG#1-4)	111
4.05.04.02	REPLACEMENT OF 24V AND 220V DC AFCOSET MAKE BATTERY CHARGER (OBSOLETE) WITH NEW UPGRADED CHARGER – 12 (TWELVE) NOS	112
4.05.04.03	MAJOR OVERHAULING/SERVICING OF M/S MITSUBISHI MAKE GENERATOR AND EXCITER (GTG # 1, 3 & 4).	112-113
4.05.04.04	PROCUREMENT OF SPARES FOR MAJOR OVERHAULING/SERVICING OF M/S BHEL MAKE GENERATOR AND EXCITER (U# 5, 6, 7, 8 & 9)	113-114
4.05.04.05	MAJOR OVERHAULING/SERVICING OF M/S BHEL MAKE GENERATOR AND EXCITER (GTG # 5, 6, 7, 8 & 9)	114-115
4.05.04.06	RETROFITTING, TESTING AND COMMISSIONING OF CAPACITIVE VOLTAGE TRANSFORMER (CVT), BUST PT	115
4.05.04.07	RETROFITTING, TESTING AND COMMISSIONING OF LIGHTENING ARRESTER (LA)	115-116
4.05.04.08	RETROFITTING, TESTING AND COMMISSIONING OF 245 KV HCB ISOLATOR	116-120
4.06	LIFE EXTENSION OF ALL CONTROL AND INSTRUMENTS EQUIPMENT, LIKE, CONTROL MODULE, AVR /DAVR, VIBRATION & TEMPERATURE MONITORING OF STG AND GTG, ETC.	121
4.06.01	DETAILED SCOPE OF LIFE EXTENSION (LE) WORKS (COMPLETED DURING 2019-20 TO DEC. 2023-24)	121
4.06.01.01	UP GRADATION OF 7200 / 3300 SERIES BENTLEY NEVADA MAKES VIBRATION MONITORING SYSTEM	121
4.06.01.02	UP GRADATION OF AVR (AUTOMATIC VOLTAGE REGULATION) SYSTEM TO DVAR FOR STEAM TURBINE GENERATOR UNIT # 2	121
4.06.01.03	UP GRADATION OF 3300 SERIES BENTLEY NEVADA MAKES VIBRATION AND TEMPERATURE MONITORING SYSTEM (STG UNIT #	122



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	DESCRIPTION	PAGES
	1, 2 & 3)	
4.06.01.04	UPGRADATION OF HMI OF GT#5 AND GT#6 (FROM WINDOWS XP/WINDOWS-7 TO WINDOWS-10)	122
4.06.01.05	UP GRADATION OF AUTOMATIC VOLTAGE REGULATORS OF BHEL GT UNIT # 5 & 6	123
4.06.01.06	UP GRADATION OF SERVER OF ABT MANAGEMENT SYSTEM AND LICENSE FOR THIRD PARTY VIEW.	123
4.06.01.07	UPGRADATION / LE OF GOVERNOR SYSTEM OF STG UNITS ALONG WITH DDC PRO CONTROL SYSTEM	123-124
4.06.01.08	UP-GRADATION OF PLC OF DM PLANT	124
4.06.01.09	UPGRADATION OF SWA-SYSTEM OF MODULE -1	124
4.06.02	DETAILED SCOPE OF LIFE EXTENSION (LE) WORKS (TO BE COMPLETED DURING THE PERIOD JANUARY 2024 TO 2029-30)	124
4.06.02.01	LE OF GOVERNOR SYSTEM OF STG UNITS ALONG WITH DDC PRO CONTROL SYSTEM	125
4.06.02.02	UPGRADATION OF SWA-SYSTEM OF MODULE -2 & 3	125
4.06.02.03	UPGRADATION OF GOVERNOR OF GTG UNIT # 1, 2, 3 & 4	126
4.06.02.04	UPGRADATION OF GOVERNOR OF GT# 5 & 6	126-127
4.06.02.05	RECONFIGURATION / MODIFICATION OF CONTROL SYSTEM OF GAS TURBINES FOR AGC (AUTOMATIC GENERATION CONTROL) FOR GTG # 1-4	127
4.06.02.06	RECONFIGURATION / MODIFICATION OF CONTROL SYSTEM OF GAS TURBINES FOR AGC (AUTOMATIC GENERATION CONTROL) FOR GTG # 5-6	127-128
4.06.02.07	IMPLEMENTATION OF AUTOMATIC GENERATION CONTROL (AGC) SYSTEM	128
4.07	LIFE EXTENSION (LE) & AUTOMATION OF FIRE FIGHTING SYSTEM OF THE PLANT	129
4.07.01	CO2 FLOODING SYSTEM OF GAS TURBINE UNITS #1, 2, 3 & 4 (COMPLETED)	129-131
4.07.02	REPLACEMENT OF EMERGENCY DIESEL ENGINE AND PUMP OF FIRE FIGHTING PUMP HOUSE (PROPOSED)	131
4.07.03	LIFE EXTENSION (LE) & AUTOMATION OF FIREFIGHTING SYSTEM (PROPOSED)	132-133



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	DESCRIPTION	PAGES
4.08	LIFE EXTENSION OF BUILDINGS, ROADS, CIVIL STRUCTURE ETC.	134
4.08.01	STRUCTURAL STABILITY CHECKING AND EARTH QUACK RESISTANCE OF BUILDINGS AND OTHER STRUCTURES OF THE PLANT	134
4.08.02	LE WORK OF CIVIL STRUCTURE AND BUILDINGS (FOR THE PERIOD 2019-20 TO 2023-24)	134-135
4.08.03	LE WORK OF CIVIL STRUCTURE AND BUILDINGS (FOR THE PERIOD JANUARY 2024 TO 2029-30)	135-136
4.09	MISCELLANEOUS WORKS	137
4.09.01	PURCHASE OF MEDIUM VOLTAGE COVERED CONDUCTOR (MVCC) FOR INTAKE WATER PUMP HOUSE 11 KV LINE (COMPLETED)	137
4.09.02	PURCHASE OF A 5 TON CAPACITY FORKLIFT (COMPLETED)	137
4.09.03	PURCHASE OF A 12 TON HYDRAULIC MOBILE CRANE (COMPLETED)	138
4.09.04	INSTALLATION AND COMMISSIONING SEWAGE TREATMENT PLANT (COMPLETED)	138-139
4.09.05	MAJOR SPARES (COMPLETED)	139
4.09.06	UPGRADATION / INSTALLATION, ERECTION & COMMISSIONING OF ADDITIONAL BLACK START 1010 / 1250 KVA EMERGENCY DIESEL GENERATOR (EDG) FOR THE PLANT (PROPOSED)	139-141
4.10	SUMMARY OF NEED OF LIFE EXTENSION OF VARIOUS PLANTS AND EQUIPMENTS OF THE PLANT AND JUSTIFICATION	142-187
PART-5	COST ESTIMATE & FINANCIAL ANALYSIS	188
5.0	GENERAL	189
5.01	HISTORICAL COST	189-190
5.02	BASIC GUIDELINES FOR COST ESTIMATION	190
5.03	CATEGORIES OF LE COST OF AGBPSS	190-191
5.04	PROJECT COST	191
5.05	PHASING OF EXPENDITURE	191-192
5.06	EQUITY & DEBT FOR TARIFF CALCULATION	192
5.07	ENERGY BENEFITS	192
5.08	SCHEDULE OF COMPLETION	192
5.09	THE ASSUMPTIONS TAKEN FOR WORKING OUT THE TARIFF ARE AS FOLLOWS	192



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	DESCRIPTION	PAGES
5.09.01	PROJECT LIFE	192-193
5.09.02	INTEREST RATE	193
5.09.03	RETURN ON EQUITY	193
5.09.04	DEPRECIATION	193
5.09.05	OPERATION AND MAINTENANCE CHARGES	193
5.09.06	INTEREST ON WORKING CAPITAL	193
5.09.07	OTHER MISCELLANEOUS ASSUMPTIONS	193-194
5.11	TARIFF COMPUTATION	194
PART-6	ANNEXURE & ENCLOSURES	195
ANNEXURE-A	DETAILS OF COMPLETED LIFE EXTENSION WORKS FOR THE FY 2019-2020 TO 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)	196-209
ANNEXURE-B	EXPENDITURE TOWARDS MAJOR CAPITAL SPARES FOR THE PERIOD OF 2019-20 TO 2023-2024 (UPTO DEC 2023)	210-215
ANNEXURE-C	REVISED ESTIMATED PROJECT COST (PRICE LEVEL DEC 2023), REF. OF BUDGETARY OFFER / PO / WO ETC. FOR PROPOSED LE OF AGBP	216-225
ANNEXURE-D	YEAR WISE PROPOSED LE WORKS OF AGBP FOR THE PERIOD 2032-24 (JAN 2024) TO 2029-30	226-231
ANNEXURE-E	YEARWISE PHASING OF COST	232
ANNEXURE-F	FUEL COST CALCULATION	233-235
ANNEXURE-G	VARIOUS PARAMETERS CONSIDERED FOR CALCULATION OF TARRIFF	236
ANNEXURE-H	COST OF GENERATION (YEAR-WISE) AND LEVELISED TARIFF CALCULATION ON CURRRENT COST	237
PART 7.0	PHOTOGRAPHS OF VARIOUS WORKS / PARTS / EQUIPMENTS OF THE PLANT	238-247

PART-1

INTRODUCTION, BACKGROUND AND SALIENT FEATURES OF AGBPS





Detailed Project report on Life Extension (LE) of AGBPS (291MW)

1.0: INTRODUCTION, BACKGROUND AND SALIENT FEATURES OF AGBPS

1.01: INTRODUCTION AND BACKGROUND:

Assam Gas Based Power Plant (AGBPS) of North Eastern Electric Power Corporation (NEEPCO), a Combined Cycle Plant, is situated at Bokuloni in Dibrugarh district of Assam. The Plant received the initial Cabinet Clearance in November, 1987. Plant activities could be started only by October, 1988 with floating of NIT for selection of Retainer Consultant as per condition set forth by the Financer, Overseas Economic Cooperation Fund (OECF, presently known as JBIC).

The total Turn-Key Contract value for supply, erection, testing & commissioning of Plant equipment & facilities was Rs 1096.65 Crores with the following break up:

S. N.	Item Description		Amount (in Rs. Crore)
1	Mitsubishi Corporation (Import Component)		545.98
	a) Equipment & Spares	534.40	
	b) Erection Services	11.58	
2.	BHEL (Indigenous Portion)		550.67
	a) Equipment Ex-works	280.24	
	b) Escalation on equipment cost account of PVC	98.09	
	c) Escalation on account of withdrawal of CCS	32.79	
	d) Escalation on account of withdrawal of exchange rate variation	57.06	
	e) Erection services	58.92	
	f) Escalation on erection cost on account of PVC	23.57	
	Total		1096.65



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

*The associated Plant Civil Works and non-plant civil works were executed by NEEPCO as separate packages. Adding cost of such works beyond the scope the turn key contract and other establishment expenses, the total completed Project Cost, as approved by the Govt. of India Project Cost worked out to **Rs 1532.32 Crores.***

The Project was executed in the debt to equity ratio of 50% : 50%. The finance covering part of Turn Key Contract, Consultancy Services was mobilized through loan from OECF, Japan (presently named as JBIC, Japan). The OECF loan was availed as per loan agreement between the OECF & the Govt. of India and routed to the Project through Govt. of India Budget. The equity component was released by the Govt. of India as net budgetary support.

The tender for turn key contract for design, manufacture, supply, erection, testing and commissioning of the plant equipment was invited in Oct., 1989. There was substantial delay in receipt of bids against the tender as the perspective bidders were reluctant to quote for the Plant in view of apprehension due to deteriorated law and order situation prevailed in NE Region at that time. However, after repeatedly extending the bid closure date, finally bids were received in August, 1990. On opening of the bids, it was found that the participating bidders quoted prices at a very high level, which resulted in jacking the Plant cost to a very exorbitant level. In view of the very high cost, prolonged negotiations by NEEPCO, CEA & MOP were held with the bidders in an attempt to bring down the cost to a reasonable level. In addition, for arriving at a decision a Standing Committee was formed by the Ministry of Power, with members from the Ministry of Heavy Industries, CEA and NEEPCO, in order to carry out negotiations with the bidders. After completion of negotiations, CEA pledged the Plant for reappraisal for fresh TEC, PIB Clearance and CCEA Clearance. Finally, on receipt of the CCEA Clearance, the Notice of Award was issued to Mitsubishi Corporation in association with BHEL on 28.05.1992.

1.02: PROJECT IMPLEMENTATION:

With award of the contract in May, 1992 and Project Zero date of Nov., 1992, the erection works of the First Gas Turbine unit commenced from August, 1994. Gas Turbine # 1 was synchronized on 16.03.1995. The gas turbines of the Plant were commissioned in 1995-96 and steam turbines were commissioned in 1998. The COD of plant was 1.04.1999



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

1.03: COMMISSIONING DETAILS OF THE PLANT:

Unit	Date of Synchronization	Date of commercial operation
GTG # 1	16.03.95	01.05.1995
GTG # 2	22.03.95	01.05.1995
GTG # 3	30.06.95	01.07.1995
GTG # 4	30.07.95	01.08.1995
GTG # 5	02.03.96	01.04.1997
GTG # 6	15.10.96	01.04.1997
STG # 1	01.03.98	01.04.1999
STG # 2	28.03.98	01.04.1999
STG # 3	05.07.98	01.04.1999
COD OF THE PLANT		01.04.1999

1.04: INSTALLED CAPACITY AND CONFIGURATION: -

The Power Station consists of three modules. Each Module comprises of 2 no. of Gas Turbine Units, 2 no. of WHRBs and 1 no. of Steam Turbine Unit. The ratings of the Units are as under:

	Generator Unit	Rating at Base Load	Make	Module Output at Base Load
Module 1	Gas Turbine# 1	33.5 MW	MHI	97.0 MW
	Gas Turbine# 2	33.5 MW	MHI	
	Steam Turbine# 1	30.00 MW	BHEL	



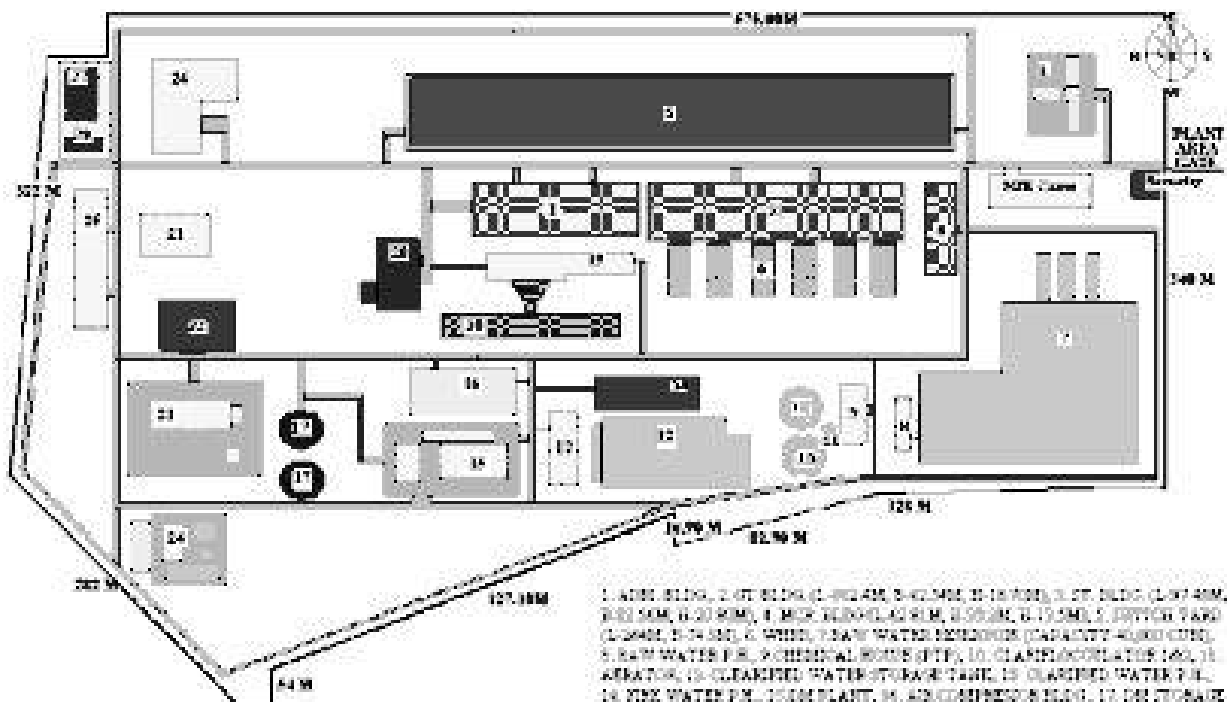
ISO 9001, 14001, 27001, 45001 & 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Module 2	Gas Turbine# 3	33.5 MW	MHI	97.0 MW
	Gas Turbine# 4	33.5 MW	MHI	
	Steam Turbine# 2	30.00 MW	BHEL	
Module 3	Gas Turbine# 5	33.5 MW	BHEL	97.0 MW
	Gas Turbine# 6	33.5 MW	BHEL	
	Steam Turbine# 3	30.00 MW	BHEL	

Total Installed Capacity at Base Load = 291.00 MW

THE PLANT WAS DECLARED AS “CENTRE OF EXCELLENCE” IN THE YEAR 2002 BY MINISTRY OF POWER, GOVERNMENT OF INDIA.

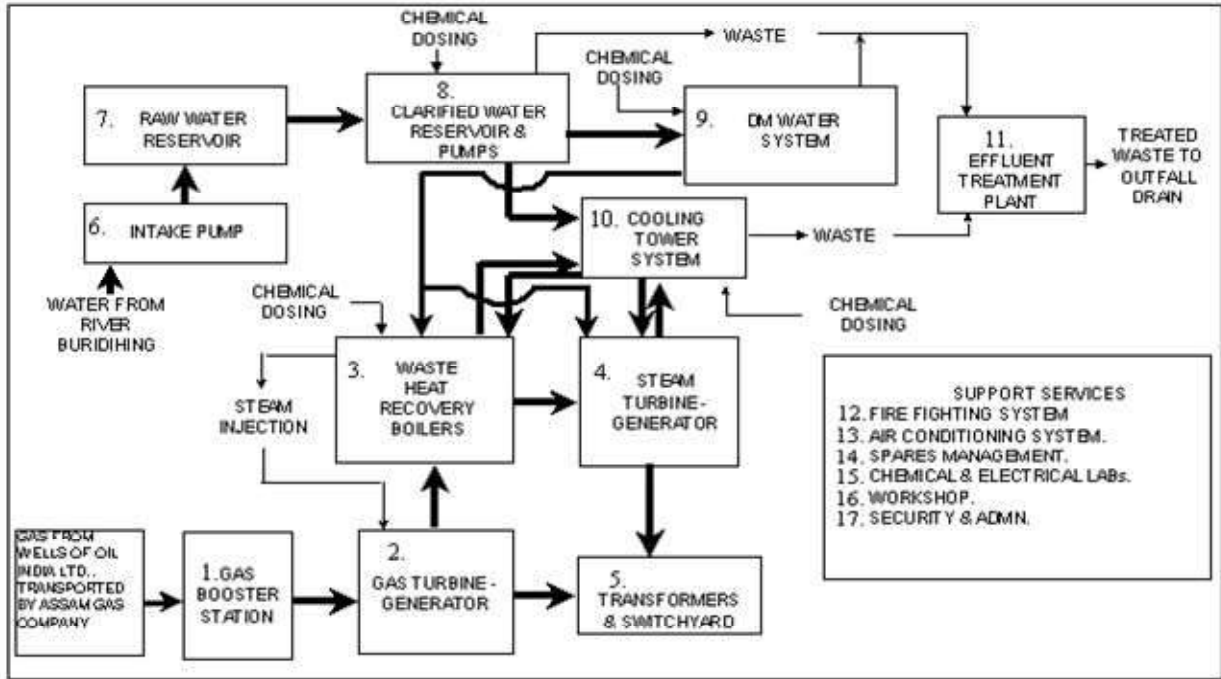
1.05: SALIENT FEATURES OF THE PLANT: -**1.05.01: PLANT LAYOUT OF AGBPS:**

**POULPLAN OF
ASSAM GAS BASED POWER PROJECT**

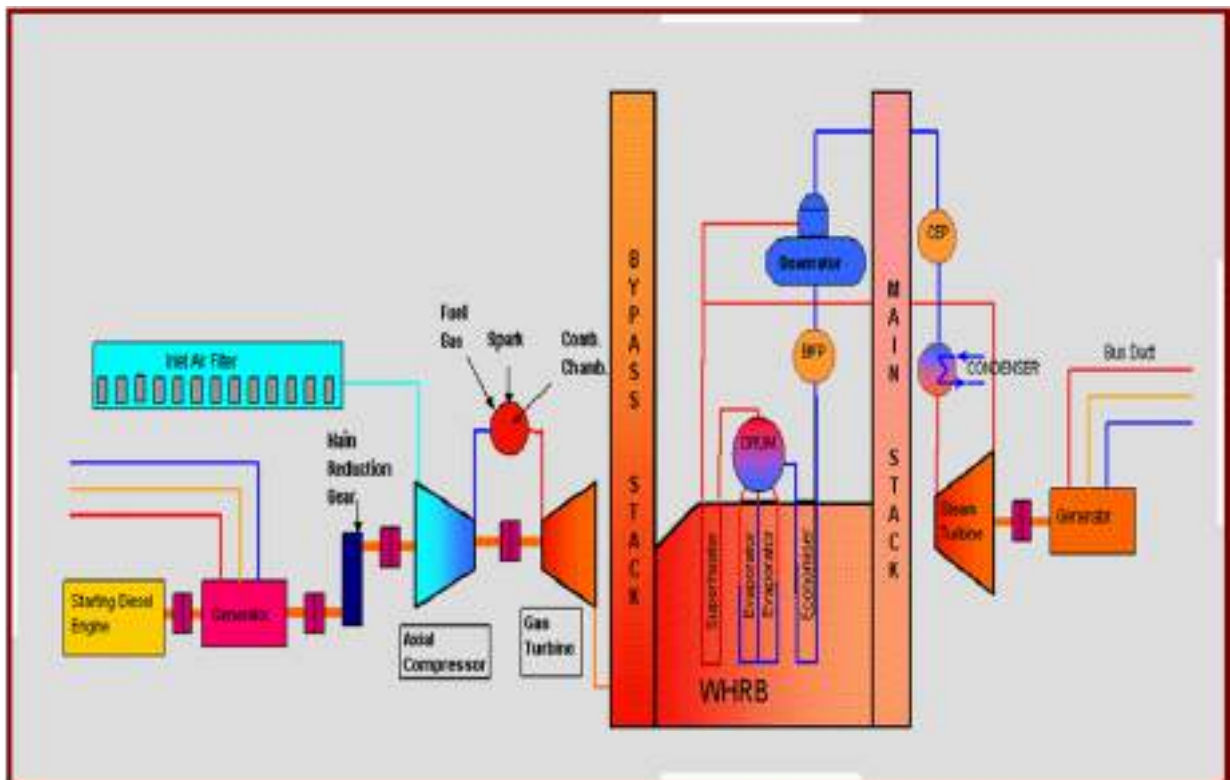


Detailed Project report on Life Extension (LE) of AGBPS (291MW)

PLANT LAYOUT

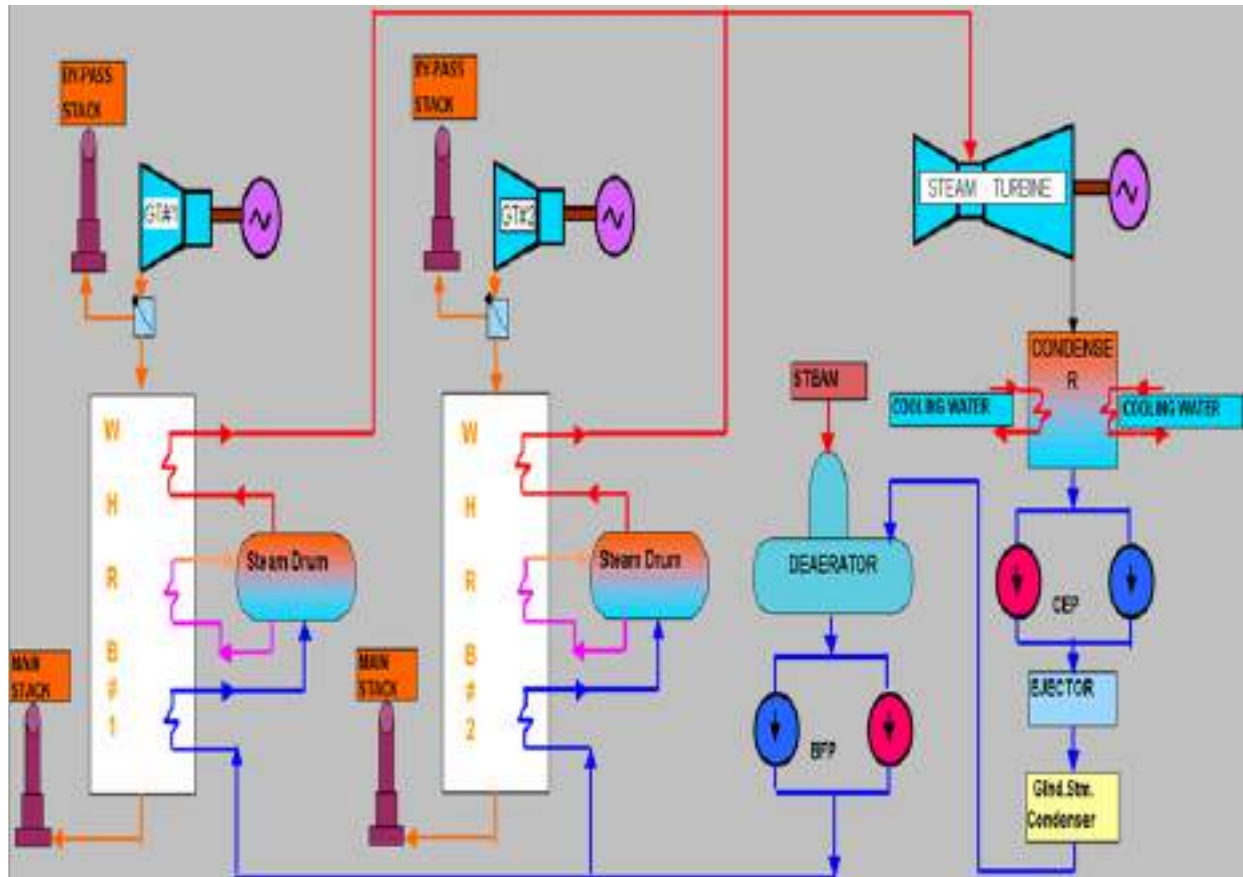


1.05.02: COMBINED CYCLE MODULE SCHEMATIC:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

1.05.03: 2 GTG + 1 STG MODULE OVERVIEW:



1.05.04: DETAILS OF THE PLANT:

Location		Longitude -- 27°—19'—59'', Latitude --- 95° - 24'—32.8''
1	District and State	Dibrugarh., Assam
2	Height above MSL	123.73 Mtrs.
Meteorological Parameters		
1	Average daily maximum temperature	27.7 Degree C.
2	Average daily minimum temperature	18.7 Degree C.
3	Annual Mean Relative Humidity	83%.
4	Total Average Rainfall	2759.4 mm.
5	Mean Wind Speed	2.3 kmph.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Project Features		
1	Source of fuel and Quantity	OIL, 1.4 MMSCMD
2	Source of water for consumptive use	River Buridihing.
3	Water Conductor length	20.86 kms (total of two pipelines)
4	Consumptive water requirement	1600 Cum/hr.
5	Unit sizes	4 No 33.66 MW (MHI) and 2 No 35.01 MW (BHEL) Gas Turbines. 3 No 30 MW (BHEL) Steam Turbines.
6	<u>Gas Turbine exhaust gas condition</u> Temperature: Flow: Pressure:	550 Degree C. 138 kg/sec. 1 Atmosphere.
7	<u>Steam Parameters</u> Pressure : Temperature: Flow/WHRB:	43.5 Ata. 473 Degree C. 60 T/hr.
8	Turbine Type	Single Cylinder.
9	Completed Cost of the Project	Rs 1532.32 Crores (incl. IDC & WCM)

1.05.05: FUEL SUPPLY: -

The Plant is fuelled by natural gas from M/S Oil India Limited, supplied at an off-take point located nearly 7 Km away from the Plant. **AGBPS has a contract with M/S Oil India Limited for supply of Natural gas. The contracted quantity of gas is 1.4 MMSCUMD and the contract is valid till 23.06. 2025. M/S OIL has also submitted their commitment letter for supply of natural gas for another 15 years.**

The gas from the OIL's off take point is transported through one number of pipelines laid, owned and maintained by Assam Gas Company Limited (AGCL). The gas received at the Plant being at low pressure (5kg/cm²) is compressed to 21kg/cm² by Gas Booster Station



ISO 9001, 14001, 27001, 45001 & 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

installed in the Plant. The Gas Booster consists of 4 no. of compressor units of Dresser Rand, USA make driven by respective Gas Engines of Waukesha, USA make.

COMPOSITION OF FUEL: -

Sl. No.	Components	Percentage by volume
1	Methane	97.11
2	Ethane	2.092
3	Propane	0.29
4	I-Butane	0.076
5	n-Butane	0.062
6	i-Pantanes	0.004
7	n-Pantanes	0.004
8	Hexane+	0.092
9	Nitrogen	0.261
10	Carbon Dioxide	Nil
11	Gas Gravity (Cal)	0.575
13	Gross Calorific Value(Kcal/SCUM)	9436.6
14	Net calorific value (Kcal/SCUM)	8503.1

1.06: GENERATION AND OPERATIONAL PROFILE OF THE PLANT:

Year	ACTUAL GEN	Aux. Con.		GAS CONSUMPTION	SP. GAS CON.	HEAT RATE		PAFY	PLFY
	Actual Gen.					on NCV	on GCV		
	MU	MU	%	SCM	SCM/KWh	Kcal/ KWh		%	%
1994-95 (W.E.F. 16.03.95)	0.1502			61,210	0.4075		3947	Not calculated	0.13
1995-96	336.3599			10,58,48,846	0.3147	2678	Not calculated		13.19
1996-97	530.0353	30.62850	5.78	21,29,93,406	0.4018	3461	Not calculated		20.79
1997-98	702.5982	21.33960	3.04	29,65,84,047	0.4221	3636	Not calculated		27.56
1998-99	743.3997	14.98090	2.02	33,17,12,939	0.4462	3841	Not calculated		29.16
1999-2000	1106.7539	28.61400	2.59	41,31,01,322	0.3733	3178	Not calculated		43.42
2000-01	1233.4334	39.66100	3.22	41,09,82,438	0.3332	2830	Not calculated		48.39
2001-02	1323.7056	40.39790	3.05	41,45,09,484	0.3131	2652	2940		51.93



ISO 9001, 14001, 27001, 45001 & 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

2002-03	1010.9551	32.61312	3.23	32,96,24,485	0.3261	2738	3037		39.66
2003-04	1591.4506	45.08916	2.83	44,24,29,926	0.2780	2328	2583		62.26
2004-05	1618.1036	47.63130	2.94	47,42,37,217	0.2931	2419	2683	77.59	63.48
2005-06	1723.6353	49.64228	2.88	49,21,49,551	0.2855	2321	2573	72.18	67.72
2006-07	1805.3608	51.69766	2.86	52,57,48,836	0.2912	2376	2637	71.80	70.44
2007-08	1727.4049	50.75037	2.94	50,07,16,751	0.2899	2400	2661	69.46	68.36
2008-09	1767.4072	43.24920	2.45	51,48,26,011	0.2913	2403	2665	70.88	70.49
2009-10	1749.5220	45.74496	2.62	48,34,64,238	0.2763	2315	2565	69.94	69.14
2010-11	1835.4186	44.7481	2.44	52,41,27,700	0.2856	2406	2666	73.94	72.73
2011-12	1765.0883	40.7149	2.31	50,58,83,698	0.2866	2469	2733	70.02	69.86
2012-13	1680.2625	45.0688	2.68	50,25,82,022	0.2991	2543	2817	66.39	65.80
2013-14	1726.3242	36.7812	2.13	51,71,48,595	0.2996	2545	2817	68.64	68.47
2014-15	1741.0803	43.0827	2.47	48,69,38,966	0.2797	2410	2666	69.26	68.15
2015-16	1759.1713	43.8825	2.49	49,18,42,787	0.2796	2415	2674	69.91	66.86
2016-17	1572.6115	39.4059	2.51	42,45,49,664	0.2700	2268	2514	62.07	57.20
2017-18	1598.4619	38.5134	2.41	43,58,86,153	0.2727	2242	2486	62.43	59.20
2018-19	1639.45544	41.9743	2.56	44,54,45,619	0.2717	2223	2467	64.2	60.74
2019-20	1704.029709	42.9360	2.52	48,12,37,499	0.2824	2358	2616	69.44	63.43
2020-21	1570.18794	39.02368	2.47	45,85,94,448	0.2921	2405	2670	64.69	58.95
2021-22	1787.0962	37.9823	2.15	51,99,70,930	0.2910	2406	2671	71.51	69.16
2022-23	1689.8261	39.9921	2.37	49,49,71,941	0.2929	2441	2708	73.29	63.13
2023-24 (UPTO DEC'23)	1612.1705	45.7115	2.84	47,13,64,214	0.3049	2501	2687	85.18	66.70

1.07: UNIT'S AVERAGE PERFORMANCE PARAMETERS OVER THE LIFE:

Year after Installation	PLF	Availability (PAF)	Output (MW)	Aux. power Con.	SP. Gas Conspn.	Unit's Gross Heat Rate	
	%	%	MW	%	SCM/KWh	on NCV (Kcal/ KWh)	on GCV (Kcal/ KWh)
Average value for last 5 years	63.08	68.63	291	2.41	0.2861	2367	2627
Average value for last 10	63.54	67.54	291	2.40	0.2833	2373	2630



ISO 9001, 14001, 27001, 45001 & 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

years							
Average value for last 15 years	65.56	68.44	291	2.44	0.2848	2391	2650
Average value for last 20 years	65.78	69.35	291	2.55	0.2855	2386	2645
Average value for last 25 years	61.13	69.35	291	2.61	0.2945	2469	2730

1.08: UNIT'S PERFORMANCE PARAMETERS DURING THE LAST EIGHT YEARS:

Period	PLF	Availability (PAF)	Output (MW)	Aux. power Con.	SP. Gas Consumption	Unit's Gross Heat Rate
	%	%	MW	%	SCM/KWh	Kcal/ KWh
2016-17	57.20	62.07	291	2.51	0.2700	2514
2017-18	59.20	62.43	291	2.41	0.2727	2486
2018-19	60.74	64.20	291	2.56	0.2717	2467
2019-20	63.43	69.44	291	2.52	0.2824	2616
2020-21	58.95	64.96	291	2.47	0.2921	2670
2021-22	69.16	71.51	291	2.13	0.2910	2671
2022-23	63.13	73.29	291	2.37	0.2929	2708
2023-24	66.70	85.18	291	2.84	0.2924	2687
Average value for last eight years	63.08	68.63	291	2.41	0.2861	2627

1.09: ACHIEVEMENT DURING PAT CYCLE-II:

Perform Achieve and Trade (PAT) scheme is a market-based compliance mechanism to accelerate improvements in energy efficiency in energy intensive industries. The energy savings



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

achieved by notified industries is converted into tradable instruments called Energy Saving Certificates (ESCCerts). The ESCCerts after issuance by Bureau of Energy Efficiency are traded at Power Exchanges.

The Energy Conservation Act 2001 has been in force since 2002 and vide their notification no. S.O. 394 (E) dated 12.03.2007, Ministry of Power in consultation with Bureau of Energy Efficiency (BEE) has identified Thermal Power Stations as Designated Consumer (DC) alongside eight other sectors. As a result, AGBPS has become a designated consumer with registration no. TPP0013AS.

As a part of the National Mission on Enhanced Energy Efficiency (NMEEE), BEE had launched a scheme viz. Perform Achieve Trade (PAT) to enhance the energy efficiency in the country under PAT scheme. All designated consumers have been given targets for reducing energy consumption. These energy reduction targets will then be required to be complied with by DCS in a time frame of 3 years. DCs which exceed their targets will receive Energy Savings Certificates (ESCCerts) equivalent to their excess savings and DCs which fail to meet their targets may either face penalties or purchase Energy Savings Certificates (ESCCerts).

During PAT-Cycle I (2012-13, 2013-14 and 2014-15), AGBPS was entitled to purchase 23040 nos of Energy Savings Certificates.

During PAT-Cycle II (2016-17, 2017-18 and 2018-19), BEE had issued 13939 nos. of Energy Savings Certificates to AGBPS.

Some energy efficiency improvement measures under taken during PAT Cycle II:

- 1. Chemical treatment of Cooling (Circulating) water to improve the water quality.*
- 2. Cleaning of 03 (three) Condensers of STGs to improve the vacuum of STGs*
- 3. Compressor Rotor Refurbishment (CRR) and Comprehensive Rotor Inspection (CRI) for GT unit # 3*
- 4. LE of GBS*
- 5. Rotor Replacement in GT # 4*
- 6. Occupancy sensor in Office Buildings*
- 7. Cleaning of CT Basin*
- 8. Servicing of Various valves of steam line to arrest leakage.*
- 9. Change over to led lamps*



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

10. Replacement of insulation of Steam Pipes of Steam turbine
11. 15 KWp on grid roof top SPV Power Plant
12. Replacement of Conventional luminaries by LED luminaries
13. Helium leak test of Condenser negative pressure parts
14. Procurement of star rating split ACs
15. Replacement of Aluminum cooling fans of GT# 5&6 by FRP fans

1.10: TECHNICAL DETAILS OF GAS TURBINES OF THE PLANT:

1.10.01: TECHNICAL PARAMETERS OF MHI MAKE GAS TURBINES: -

1	Model	MW 251 B
2	Capacity	33500 KW
3	Base Load	33660 KW
4	RPM	5100
5	Turbine Stage	3
6	Compressor Stage	18
7	Combustion Chamber	8
8	Spark Plug	2
9	Flame Detector	2
10	Turbine Rated Speed	4900 rpm
11	Compressor Inlet Pressure	1.04 Kg/cm ²
12	Compressor Discharge Pressure	9 - 10 Kg/cm ²
13	IGV Angle when stopped	34°
14	IGV Angle when at FSNL	84°
15	IGV Angle at full load	84°
16	Ambient Pressure	0.993 Bar
17	Designed Ambient temperature	23°

1.10.02: TECHNICAL PARAMETERS OF BHEL MAKE GAS TURBINES: -

1	Model	MS 6001 B
2	Capacity	33.5 Mw
3	Turbine Stage	3



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4	Compressor Stage	17
5	Combustion Chamber	10
6	Spark Plug	2
7	Flame Detector	4
8	Turbine Rated Speed	5100 rpm
9	Compressor Inlet Pressure	1.04 Kg/cm ²
10	Compressor Discharge Pressure	9 - 10 Kg/cm ²
11	IGV Angle when stopped	34°
12	IGV Angle at FSNL and upto 15 Mw	56°
13	IGV Angle after 15 Mw upto full load	84°
14	Ambient Pressure:	0.999 bar
15	Ambient temperature	23°

1.11: TECHNICAL DETAILS OF STEAM TURBINES:

1.11.01: TECHNICAL PARAMETERS OF BHEL MAKE STEAM TURBINES: -

1	Type	HNK 71/2.8/32-4
2	Capacity	30 MW
3	Turbine Stage	45
4	Steam Quantity at Rated Load	110 Tons/Hr
5	RPM	3000

1.11.02: BOILER SPECIFICATION: -

1	Type	Horizontal, natural circulation, single drum, single pressure, unfired, water tube boiler
2	Make	BHEL
3	Tube Dimension	52 mm x 3 mm for Economizer and Evaporator & and 52 mmX4 mm for Super heater
4	No. of Tubes	1260 Nos
5	Economiser	294 in four headers (7 rows X 21 X 2)
6	Evaporator	588 in four headers (14 rows X 21 X 2)
7	Super Heater	378 in four headers (9 rows X 21 X 2)



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

8	Heat Transfer Surface Area - Total	17878 m ²
9	Economiser	4666 m ²
10	Evaporator	9327 m ²
11	Super Heater	3885 m ²
12	Total Water Volume	46.5 M ³
13	Drum Volume	14 M ³
14	Normal Drum Level	7 M ³
15	Design Efficiency	59.9 % for WHRB Unit 1~4 and 62.2% for WHRB Unit 5~6

1.11.03: CONDENSER SPECIFICATION: -

1	Condenser type	Surface Condenser
2	No of tubes	8036
3	Cooling Surface Area	2597 m ²
4	Design Vacuum	0.083 kg/cm ² abs.
5	Tube material	SA249 TP 304
6	Tube Size (Dia X Thk X L)	¾" X 20 BWG X 5500 mm
7	Design CW inlet temperature	27 °C
8	Design CW outlet temperature	36 °C
9	Design Steam Inlet temperature	100 °C
10	Design Condensate Temperature	43 °C
11	Design terminal temp difference (Condensate-CW Outlet)	7 °C

1.11.04: COOLING TOWER SPECIFICATION: -

1	Make	Paharpur Cooling Towers
2	Draft	Induced
3	Flow	Cross Flow
4	No of cells	8
5	Capacity	19500 m ³ / hour

1.11.05: EJECTORS: -



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

The Condenser is provided with one starting ejector to remove large volumes of air for raising the initial vacuum during the starting of the Unit. Another Main Ejectors has been provided to remove air and non-condensable gases from the condenser to maintain the required vacuum in the condenser during the normal operation of the unit.

1.11.06: CONDENSATE EXTRACTION PUMPS: -

Condensate extraction pumps are of vertical, multistage and centrifugal pumps.

Description Units Design Parameters

1	Make and Model	KSB (Model: WKT 125/5)
2	Type	WKT 125/5
3	Capacity m ³ /h	150 m ³ /hr
4	TDH mwc	145 mwc
5	Speed rpm	1480
6	Motor Rating kW	75 kW

1.11.07: GLAND STEAM COOLER: -

A Gland Steam Cooler has been provided to condensate the leak-off steam coming out from Gland Steam of Turbine Front Gland and Turbine Rear Gland.

1.11.08: DEAERATOR: -

The deaerator is of [horizontal spray cum tray type]. It is designed to remove dissolved oxygen from the condensate in excess.

1.11.09: BOILER FEED PUMPS:

The boiler feed pumps are horizontal, multi stage centrifugal pumps of barrel type, motor driven pumps taking the suction from the deaerator. The boiler feed pumps discharge feed water through HP heaters to the economizer of the boiler.

Description Units Design Parameters

1	Make and Model	BHEL
2	Type	FRH-27
3	No of stages Nos	8
4	Capacity m ³ /h	180 M ³ /hr



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

5	Head mwc	730 mwc
6	Feed water temp ° C	110 °C
7	Gland sealing arrangement	M seal
8	Minimum flow m ³ /h	40 TPH or 40 M ³ /hr
9	NPSH required at design condition mwc	5.9 mwc
10	Method of Speed Regulation	DOL (No Regulation)
11	Type of Coupling	Flexible

1.11.10: STEAM TURBINE GOVERNING SYSTEM: -

The turbine is equipped with an electro-hydraulic (SR IV) system of automatic governing for the smooth and stable operation of turbo-set under all conditions of operation. The system is designed to sustain full load dump from the generator. The system is provided with a quick closing Emergency Stop Valve (ESV) to interrupt the supply of steam from the boiler and stop the turbine under emergency conditions. The turbine governing system includes speed governor, ESV, Governing Control Valve and Servo Motor pilot piston.

1.11.11: LUBE OIL SYSTEM: -

The lube oil system consists of Main Oil Tank, Turbine driven main oil pump, AC driven auxiliary oil pump, DC driven emergency oil pump, AC and DC driven jacking oil pump and 2 X 100 % oil coolers of, Lube oil is being purified by means of a centrifuge. Oil storage tanks consisting of Clean Oil Tank and Dirty Oil Tank have been provided.

1.11.12: STEAM TURBINE GLAND SEALING SYSTEM: -

Turbine Gland Sealing System consists of Gland Steam Pressure Controller, gland steam condenser, gland steam exhauster with associated motors, associated piping, valves & fittings, strainers / filters etc

1.11.13: RAW WATER SYSTEM: -

The consumptive water for the plant is sourced from Burhidihing river located at a distance of 12 km from the plant boundary. The intake water pump house is installed with 4 intake pumps of capacity 550 m³ /hr, out of which 2 pumps are normally working and the



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

remaining 2 pumps are standby. The raw water is pumped from the intake water pump house to the in-plant raw water reservoir, which has a storage capacity of 38,000 M³

1.11.14: CW / ACW SYSTEM AND COOLING TOWERS: -

CW system for the power plant works on re-circulating system with induced draft cooling towers. The CW system uses clarified quality of water and is working on 5 cycles of concentration. CW pump house is a common facility for all the units of the power plant. There are Four nos. of CW pumps of capacity 6600 m³/hr provided for each unit. The cold water from the cooling water flows to the fore bay of CW Pump House for recirculation into the system. The cooling tower cools the water from 37 deg C to 27 deg C. The cooling tower has been designed for an ambient wet bulb temperature of 21.9 deg C. The cooling towers are of counter flow design. The Cooling Tower fills are made of PVC

1.11.15: WATER PRE-TREATMENT PLANT: -

Water Pre-Treatment Plant is a common facility for all the units of the power plant. Pre-treatment plant supplies clarified water to DM plant, cooling water to the auxiliaries of BOP system, Hydrants and to the drinking water system. There are two numbers of clari-flocculator each having 451 m³ /hr capacity to meet all the clarified water requirements of the whole plant.

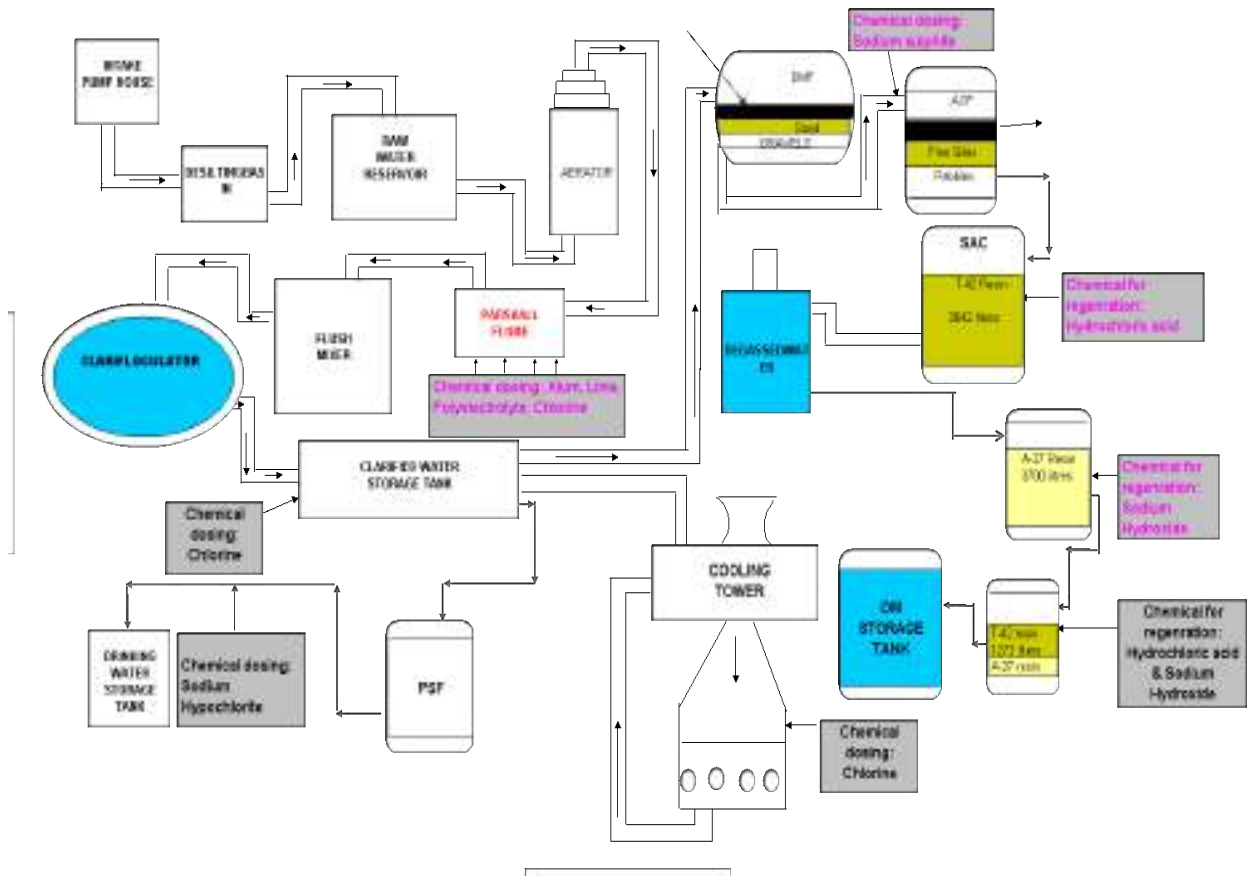
1.11.16: DM PLANT: -

DM plant consists of two streams, each of 70 m³ /hr capacity. There are two DM water tanks of 1985 m³ capacity each. A common regeneration system has been provided for all the three streams. DM plant operates on semi-automatic system with PLC controls.

1.11.17: WATER PATH WITH DM PLANT AND COOLING WATER CIRCUIT



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

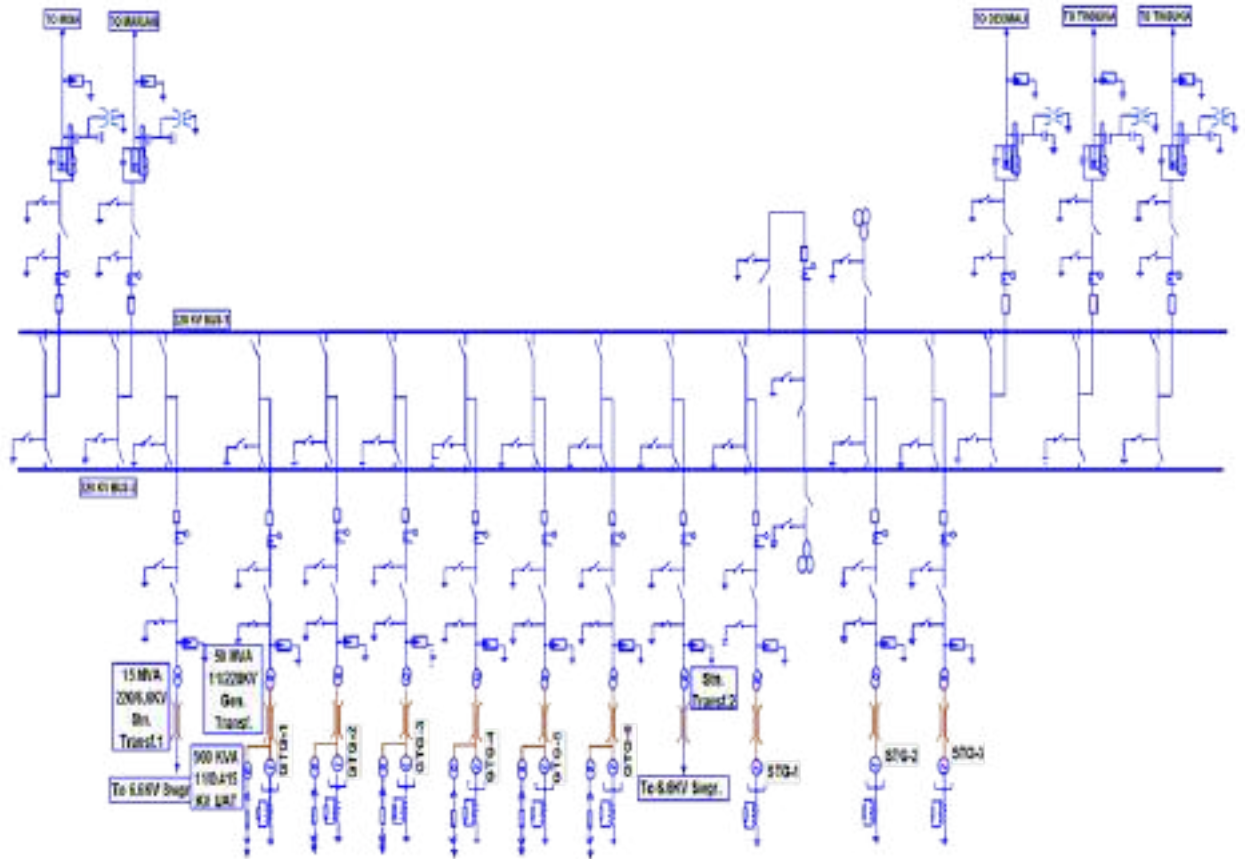




Detailed Project report on Life Extension (LE) of AGBPS (291MW)

1.12: PLANT ELECTRICAL SYSTEM: -

1.12.01: SCHEMATIC VIEW OF 220 KV SWITCHYARD:



1.12.02: GENERATOR: -

The Generator is a 11 kV, 50 Hz, 0.80 power factor machine, directly coupled with Gas Turbine and Steam turbine operating at 5000 rpm and 3000 rpm respectively, with Brushless type of excitation system and digital programmable voltage regulator. The Generator has water cooled stator winding and Air-cooled rotor winding. The stator winding cooling water is cooled in a closed cycle cooling system using DM water. The Parameters of the Generator are briefly mentioned below:

sl	Description	GTG 1~4	GTG 5~6	STG 1~3
1	Rated MW Capacity	35.68 MW	35.68 MW	30 MW
2	Rated MVA Capacity	44600 KVA	44600 KVA	44600 KVA



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

3	Rated Terminal Voltage	11 kV	11 kV	11 kV
4	Rated Power Factor	0.80 (Lag)	0.80 (Lag)	0.80 (Lag)
5	Rated Stator Current	2341 A	2341 A	2341 A
6	Rated Speed	3000 rpm	3000 rpm	3000 rpm
7	Rated Frequency	50 Hz	50 Hz	50 Hz
8	Efficiency at Rated Power Output and Rated Power Factor	%	%	%
9	Excitation Current	kA	kA	kA
10	Excitation Voltage at Rated Power Output and Rated Power Factor	kV	kV	kV
11	Short Circuit Ratio			
12	Negative Sequence Current	Amp	Amp	Amp
13	Phase Connection	Ynd11	Ynd11	Ynd11
14	Type of Excitation	Brushless	Brushless	Brushless
15	Method of Cooling the Rotor	Forced Air (Rotor shaft mounted cooling Fan)	Forced Air (Rotor shaft mounted cooling Fan)	Forced Air (Rotor shaft mounted cooling Fan)
16	Method of Cooling the Stator	Air cooled	Water Cooled	Water Cooled

1.12.03: STATION TRANSFORMER: -

Two Station Transformers have been provided to meet the station [common] auxiliary loads of the power plant. The Station Transformers have been provided with On-Load tap changers to keep the station 6.6 kV voltage constant. Cooling of this transformer is ONAF with mounted radiators. The Parameters of the Station Transformers are briefly mentioned below

1	Capacity / Rating	15 MVA
---	-------------------	--------



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

2	Voltage Ratio	220/6.9 kV
3	Type of Cooling	ONAF
4	Quantity	2 Nos.

1.12.04: GENERATOR TRANSFORMER: -

The power output from each Generator is being stepped up to 11/245 kV through a 50 MVA step up Generator Transformer. The Parameters of the Generator Transformer are briefly mentioned below:

1	Make	Mitsubishi	BHEL
2	Capacity / Rating	50 MVA	50 MVA
3	Voltage Ratio	11/245 kV	11/234 kV
4	Type of Cooling	ONAF	ONAF
5	Quantity	4 Nos.	5 Nos

1.12.05: UNIT AUXILIARY TRANSFORMER: -

Six auxiliary transformers have been provided for Six Gas Turbine units for meeting all unit auxiliary loads. The Parameters of unit auxiliary transformers are briefly mentioned below:

1	Make	Mitsubishi	BHEL
2	Capacity / Rating	500KVA	500KVA
3	Voltage Ratio	11 kV/433 V	11 kV/433 V
4	Type of Cooling	ONAN	ONAN
5	Quantity	4 Nos.	2 Nos.

1.12.06: ELECTRICAL AUXILIARY POWER DISTRIBUTION SYSTEM: -

Unit auxiliaries receive their normal power supplies at 6.6 kV through two (2) nos. of 220/6.9 kV Transformer. For lower rating drives, 6.6 kV is further stepped down to 415 V through ten (10) nos. of unit service transformers. The 415 V distribution system feeds a number of Motor Control Canters (MCCs) for running 415 V drives. 6.6 kV unit switchgears are



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

connected to station switchgear for start-up and emergency power supply. The details are mentioned below:

1	Voltage Level	6.6 kV
2	Type of Breaker	VCB
3	Type of Grounding	
4	Type of Protection	Numerical Relay

1.12.07: DC SYSTEM: -

Each GTG unit have its own 125 V DC system and STG Units have its own 220 V DC system. A Separate 220 V DC systems (2 sets) have been provided for switchyard control system, 6 (six) sets of 24 V DC system for DCS and 2 sets of 48 V DC system for PLCC and 380 V DC System for UPS system. Each DC system comprises of the Storage Battery, the Battery charger and the distribution boards. The details are mentioned below:

1. SCB300- 220V-35A/90A FLOAT CUM BOOST CHARGER (HBL NIFE): 2 SET

1	Make	HBL NIFE
2	Capacity /Rating	220V-35A/90A
3	Voltage	220 V
4	Type of Charger	FCBC
5	Area of Application	Station DC supply (for Switchyard)
6	BATTERY	EXIDE, TI600H

2. 48 V DC, 500 AH FLOAT CUM BOOST CHARGER (CALDYNE): 2 SET

1	Make	CALDYNE
2	Capacity /Rating	48V-100A
3	Voltage	48V
4	Type of Charger	FCBC



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

5	Area of Application	FOR PLCC
6	BATTERY	EXIDE, STBS500, 500AH

3. 125V-100 A FLOAT AND FLOAT CUM BOOST CHARGER (CHHABI): 2 SET

1	Make	CHHABI ELECTRICALS PRIVATE LIMITED
2	Capacity /Rating	125V-100A
3	Voltage	125 V
4	Type of Charger	FC & FCBC
5	Area of Application	GTG# 1 &2
6	BATTERY	EXIDE, STBS500, 500AH

4. 125V-100 A FLOAT CUM BOOST CHARGER (SAFT NIFE: MITSUBISHI): 3 SET

1	Make	Saft Nife: Mitsubishi
2	Capacity /Rating	125V-100A
3	Voltage	125 V
4	Type of Charger	FCBC
5	Area of Application	GTG# 3, 4 & 6
6	BATTERY	GTG# 3&4: EXIDE, YHP11, 535AH, GTG# 6: EXIDETM 400H, 400AH

5. SCB300- 125V-50A DUAL FLOAT CUM BOOST CHARGER (HBL NIFE): 1 SET

1	Make	HBL NIFE
2	Capacity /Rating	125V-50A
3	Voltage	125 V
4	Type of Charger	DUAL FCBC
5	Area of Application	GTG# 5
6	BATTERY	EXIDETM 400H, 400AH



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

6. 220V/ 100 AH FLOAT CUM BOOST CHARGER (AFCO): 6 SET

1	Make	AFCO
2	Capacity /Rating	220 V DC, 100 A
3	Voltage	220 V
4	Type of Charger	FCBC
5	Area of Application	DC supply for STG#1,2,3 and 6.6 KV, 415 V PANEL
6	BATTERY	EXIDE TL 700H, 700AH

7. 220V-40 A FLOAT AND FLOAT CUM BOOST CHARGER (CHHABI): 1 SET

1	Make	CHHABI ELECTRICALS PRIVATE LIMITED
2	Capacity /Rating	220 V-40A
3	Voltage	220 V
4	Type of Charger	FC & FCBC
5	Area of Application	GBS
6	BATTERY	EXIDE YKP15 175AH

8. 24V/ 1900 AH FLOAT CUM BOOST CHARGER (AFCO): 6 SET

1	Make	AFCO
2	Capacity /Rating	24 V DC, 650 A,
3	Voltage	24 V
4	Type of Charger	FCBC
5	Area of Application	DC supply for DCS (STG)
6	BATTERY	EXIDE TH1900H

9. UPS (CONSUL NEOWATT): 1 SET

1	Make	Consul Neowatt Power solutions Pvt. Limited,
2	Capacity /Rating	2X100 KVA (MODEL: FALCON 1000)



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

3	Voltage	360 V DC
4	Type	12 PULSE FULLY CONTROLLED
5	Area of Application	COOMON/CENTRAL UPS SUPPLY FOR THE PLANT
5	BATTERY	EXIDE, YHP11, 535AH

1.13: CONTROL & INSTRUMENTATION SYSTEM OF THE PLANT: -

The Control and Instrumentation System of Assam Gas Based Power Plant for combine cycle operation is based on Microprocessor based Distributed Digital Control with monitoring & information System to provide centralized, fully automated and efficient operation of the total plant under various modes of operation such as start-up, shut down and emergency operation of the plant along with safety, reliability and availability of the plant.

The GTG controls in AGBPS is implemented in a separate hardware with upgraded DCS controller having suitable communication links to the DDCMIS control hardware of STG as well as WHRBs along with all mechanical auxiliaries for achieving a total integrated control system for run up, synchronization, loading, unloading, and normal & emergency shutdown.

At CCR, DDCMIS (Pro-control P-10) system establishes load set signal for the Gas turbine. ALR receives the signals and adjusts the Governor reference or load control reference.

The DDCMIS system of AGBPS is a PROCONTROL-P13 microprocessor based distributed digital control system specially designed and developed to suit power plant for open loop and closed loops controls as well as signal acquisition/conditioning functions of the monitoring system. M/S BHEL has stopped supplying spares and services after changed over to MAX DNA automation system fifteen years back.

The control requirements of the steam turbine are realized through a local station with minimum infrastructure of redundant / hot standby traffic directors. Microprocessor based controller (70PRO5) with a hot standby is provided for each automation unit except protection. The automation unit /local station receives the composite requirement of measurement, signal conditioning, algorithm execution and final elements control of each process subsystem. Drive control modules are the final control elements of this control system.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

The MMI/DAS is a redundant 800XA 32-bit process computer environment. The MMI connected with data bus system and performs as a pool for collection of process and processed data for control purposes. HMI is integrated with the data highway (IPB or P42 bus) of downstream control system.

The existing EHC (Electro-Hydraulic Controller) based governing system consists of (a) Speed Controller (b) Valve lift Controller (c) Pressure Controller. The operating logic for these controllers is user defined set of programs in the processor (70PR05) of the PROCONTROL module housing the EHC. The minimum output signal from these controllers limited by the TSE margin is the ultimate EHC command being issued to the Electro-hydraulic transducer which is the interface between the actuators of the main steam control valve and the electronic control circuitry. The control modules consist of old and obsolete SCAMATIC type of electronic modules.

1.14: GAS BOOSTER STATION:

The Assam Gas Based Power project (291 MW) is a combined cycle Gas Based Power Plant. The Fuel for this Plant is Natural Gas supplied by M/s Oil India Ltd. from an Off-take point located nearly 7 km. away from this plant. M/s Assam Gas Company is entrusted to transport the gas from this Off-take point through a single line pipeline laid, owned and maintained by M/s Assam Gas Company. The Gas received at Project being at low pressure (3.5 – 6 kg/cm²) is compressed to 20-21 kg/cm² by a Gas Booster Station installed in the Project premises. The GBS is installed, owned and maintained by NEEPCO and consists of 4 nos. of compressor units of Dresser Rand, USA make driven by respective gas engines of Waukesha, USA make.

1.14.01: TECHNICAL SPECIFICATIONS OF OLD DRESSER-RAND GAS COMPRESSORS:

MANUFACTURER	DRESSER-RAND, USA
MODEL	6HOS4-2
STAGES	2
CAPACITY	27,000 M ³ /HOUR @ 1000rpm
COMPRESSOR FRAME Oil LUBRICATION SYSTEM	Internal Gear Type pump
COMPRESSOR CYLINDER LUBRICATION SYSTEM	Cylinder/packing pump point to point lubrication



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

COMPRESSOR SYSTEM	COOLING	Water Cooling (Forced circulation) through auxiliary jacket water pump mounted on engine
-------------------	---------	--

1.14.02: TECHNICAL SPECIFICATIONS OF OLD WAUKESHA GAS ENGINES:

MANUFACTURER	Waukesha Engine Division, USA
MODEL	12V, AT25GL
RATED SPEED	750-1000 RPM
CONTINUOUS HP RATING	2587 HP @ 1000 RPM
COOLING SYSTEM	Jacket Water Pump & Auxiliary water pump, gear driven mounted at the end of crankshaft
LUBRICATION SYSTEM	Lube oil pump, gear driven, mounted at the end of crankshaft.
STARTING SYSTEM	Air starter motor (2 Nos. at the flywheel)

1.14.03: INITIAL (OLD) COMMISSIONING DATE OF GAS BOOSTER STATION:

GBS UNITS	INITIAL COMMISSIONING DATE
UNIT#I	11 th July 1995
UNIT#II	03 rd March 1995
UNIT#III	10 th March 1995
UNIT#IV	13 th March 1995

1.14.04 LIFE EXTENSION WORKS OF GAS BOOSTER STATION:

During the initial years of operation, all units of GBS had experienced not only erratic behaviour due to inherited problem and grid instability, but also encountered huge number of tripping.

Despite modifications of various systems, like, new ignition system, incorporation of TCMS system, replacement of thermostats, etc., there was no much improvement of behavior and characteristics. Frequent tripping of GBS compounded the breakdown maintenance of Gas Engines as well as enhanced the outages of GBS Units.

To overcome unreliability situation of GBS and to enhance stability, it was decided to carry out Life Extension of GBS in phase manner.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Considering the facts and to eliminate various flaws, there was no other option but to Renovate and Modernized the Gas Booster Units. Under LE of GBS, following works were carried out:

- **Replacement of three numbers of old Waukesha Gas Engines** with new Waukesha gas Engines, Model **12V-AT275GL+** with enhanced capacity and margin of power above 15% with respect to compressor requirement.
- **Replacement of old under efficient ACHE (Air Cooled Heat Exchanger)** with new higher capacity ACHEs.
- **Enhancement of flow capacity of three numbers of Dresser-Rand Gas compressors** to 32,000 m³/Hr @900 RPM with respect to old capacity of 27,000 m³/Hr @ 1000 RPM. This capacity enhancement of Dresser-Rand Gas Compressor increases the redundancy of the GBS Units and utilization of the system to its maximum.
- **Installation of additional higher capacity Main Inlet Scrubber** to eliminate liquid flow and other contaminants coming along-with the Natural Gas supplied by OIL.
- **Installation of Additional fuel filters system for Gas Engines** to barring liquid and other contaminants to enter Gas Engines. The Gas Engines are intended to run with dry natural gas and any liquid carry over along-with natural gas may detrimental to Gas Engines. Keeping in view of the circumstances, **individual fuel filter** to each Gas Engines are also incorporated to the system in addition to **fuel filter system**.
- **Installation of new LCPS (Local Control Panel) & MCP (Master Control Panel)** as per the new system requirement and installation of **SCADA System** for monitoring.
- Installation of **Gas Flow Totalizer** and **individual fuel gas flow meters** to each Waukesha Gas Engines.

Accordingly, a petition was filed to CERC for LE of GBS Unit # 1, 2 & 3. Based on the approval for additional capitalization vide petition order ref. no. 295/2009 & date of order 06/09/201, the 1ST Phase LE of GBS was entrusted to **M/S CEIPL** for replacement of Gas Engines, ACHEs, installation of Inlet scrubber, fuel gas filter, LCP & MCP etc. and to **M/S Dresser-Rand** for capacity enhancement of Dresser-Rand Gas Compressors of GBS Unit # 1, 2 & 3.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

The capacity enhancement of gas compressors of GBS Unit # 1, 2 & 3 was awarded to OEM, i.e. **M/S Dresser Rand India private Limited.**

The erection and commissioning of all 3 (three) units were successfully completed and commissioning date of GBS Unit # 1, 2 & 3 are as follows:

UNIT NO.	ENGINE SL. NO.	GAS COMPRESSOR SL. NO.	COMMISSIONING DATE
GBS UNIT # 1	5283702942	YRH423R	16/09/2015
GBS UNIT # 2	5283702943	YRH424R	12/06/2015
GBS UNIT # 3	5283702964	YRH425R	02/01/2016

Final commissioning of all the three units in all respect is considered as 02/01/2016.

In the 1st phase, only 3 GBS units were considered with a view that the remaining balance inventories against old units are to be utilized in the 4th GBS Unit till revamping of the 4th Unit.

After completion of 1st phase, a petition was filed to CERC for LE of the 4th GBS Unit vide Petition no. 41/GT/2015 for the period from 01/04/2014 to 31/03/2019. The projected additional capital expenditure allowed for the followings:

1. **Rs. 1,647.60 Lakh** for replacement of Gas Engine along-with associated auxiliaries FOR Unit # 4.
2. **Rs. 939.18 Lakh** for LE of Gas Compressor of GBS Unit # 4.

Considering the condition of the 4th GBS unit and to make the system at par with the revamped GBS units, LE of 4th GBS unit was carried out in line with the LE of other three units. Moreover, CERC had allowed for additional capitalization based on the petition submitted to CERC.

Based on the 1st Phase, the details of equipment, specification and quantity required for replacement of Gas Engine along-with associated auxiliaries and Erection & commissioning, the orders were awarded to **M/S CEIPL**. Similarly, for capacity enhancement of Dresser-Rand Gas Compressor of GBS Unit # 4, the orders were awarded to M/S Dresser Rand India Private Limited.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

The erection and commissioning of 4th GBS unit was successfully completed and commissioning date of GBS Unit # 4 is as follows:

UNIT NO.	ENGINE SL. NO.	GAS COMPRESSOR DETAILS	COMMISSIONING DATE
GBS UNIT # 4	3233586	YRH426R	01/02/2020

1.15: AIR-CONDITIONING AND VENTILATION SYSTEM: -

The central control room, switchyard control room and selected areas of service building have been provided with centralized air-conditioning system. The central air-conditioning system of chilled water type has been provided for various control rooms and switchyard control room and other areas in the service building. Evaporative ventilation system has been provided for TG building along with roof extractors. Other areas are ventilated by a combination of exhaust and supply air fans.

1.16: FIRE FIGHTING SYSTEM: -

Firefighting system at AGBPS comprises of the following system:

- Fire Water Pump House
- Fire water hydrant network system
- Emulsifier system
- Fire detection & alarm system
- CO2 flooding system

a) FIRE WATER PUMP HOUSE:

1. Electrically operated motor/pump (415 V AC/132 Kw/177 HP) -3 nos
2. Diesel operated Fire pump---2 nos
3. Jockey Pump---2 nos
4. Air Receiver----2 nos
5. Hydro pneumatic Tank---1 no

b) FIRE WATER HYDRANT NETWORK SYSTEM:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

The system has the ring header running throughout the plant with pipe diameter between 150 mm & 250 mm. Total running length of network is approximately 2.20 km. Water for the hydrant system is drawn from clarified water tank of 5500 CuM capacity of which 2800 CuM of water is kept for firefighting (dead storage capacity). Hydrant water is fed through main feeder lines of 14" diameter connected with Fire water pump house. Line size has been designed to get a residual pressure of 7kg/cm² at the remotest point of network.

c) EMULSIFIER SYSTEM:

- High Velocity Water Spray System for Generator Transformer and Station Transformers.
- Medium Velocity Water Spray System for cable galleries/cable vaults.

d) FIRE DETECTION & ALARM SYSTEM OF AGBPS

Almost all the vital and unmanned area of Assam Gas Based Power plant is covered with fire detection & alarm system so that early warning can be given in case of fire emergency.

e) CO₂ FIRE SUPPRESSION SYSTEM FOR GAS TURBINES UNITS:

All the six gas turbine units have in built CO₂ Fire suppression system (CO₂ Flooding system) designed as per NFPA12 code covering all chambers including load gear box, turbine area, generator that get activated automatically/manually.

f) CO₂ Fire Suppression System for Steam Turbines Generators:

All the three steam turbine generator units also have in built CO₂ Fire suppression system (CO₂ Flooding system) designed as per NFPA12 code that get activated automatically/manually through electrically/mechanically operated solenoid valve.

g) PORTABLE FIRE EXTINGUISHERS:

Presently 347 numbers of different type (CO₂, Mechanical Foam & DCP type) capacity of portable Fire Extinguishers are available in this plant which are placed different location of the plant.

1.17: PLANT INSTRUMENT AIR SYSTEM: -

Plant and instrument Air System is a common facility for all the units of the plant. For meeting the instrument air requirement, **04 (four)** numbers of Two stage Balanced Opposed Piston Type compressors (Model No. T-BTD-JM), **02 (two)** working and **02 (two)** standby, each



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

of **9.57 NM³/min** capacity and discharge pressure of **8.50 Kg/cm²** have been provided along with dryers. Equal number of air compressors of similar rating has been provided to meet the requirement of the plant air system. The air-drying plant for the instrument air has been provided to achieve a dew point (-) 40° C at atmospheric pressure. Details are given below:

1.17.01: TECHNICAL SPECIFICATION: -

AIR COMPRESSOR

- | | |
|-----------------------|---|
| 1. No. of Compressor | : 04 Nos. |
| 2. Make, Model & Type | : Make- M/S Kirloskar Pneumatic Co. Ltd., Pune. Model- T-BTD-JM |
| | : Type- Two Stage Balanced Opposed Piston Type. |
| 3. Free Air Delivery | : 9.57 NM ³ /Min |
| 4. Discharge Pressure | : 8.5 Kg/cm ² |
| 5. R.P.M. | : 530 r.p.m. |

INDUCTION MOTOR

- | | |
|-------------------|---|
| 1. Make | : M/S Kirloskar Electric Co. Ltd., Bangalore. |
| 2. Motor Capacity | : 75 Kw, 415 V, 3 PH, 50 Hz, 127 Amps |

AIR DRYER

- | | |
|---------------------------------|----------------------------|
| 1. No. of Air Dryer | : 04 Nos. |
| 2. Make | : M/S Del Air, New Delhi. |
| 3. Capacity (Inlet) | : 40 NM ³ /Hr. |
| 4. Air Quantity (outlet) | : 432 NM ³ /Hr. |
| 5. Working pressure | : 8.5 KG/CM ² . |
| 6. Inlet Temperature | : 35°C. |
| 7. Outlet due point | : (-) 20°C. |
| 8. Outlet Atmospheric due point | : (-) 40°C. |
| 9. Drying Time | : 05 Min. |



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

10. Regeneration Time	: 05 Min.
11. Purge Air Qty. (FAD)	: 48 NM ³ /Hr.
12. Max. Working pressure	: 10 Kg/cm ² .
13. Desiccant	: Activated Alumina.
14. Desiccant Qty.	: 110 Kgs.
15. Input Electric supply	: 220 V, 50 Hz AC.
16. Control supply	: 110 V AC, 50 Hz.
17. Load	: 10 Watt.

1.18: EMERGENCY POWER SUPPLY SYSTEM: -

Diesel generating sets are installed for meeting the power requirements of essential auxiliaries (viz. jacking oil pumps, AC lube oil pump, hydrogen seal oil pump, float charger for DC battery, emergency lighting, scanner air fan and stator cooling water pump) during total failure of AC Power Supply in the power station. Diesel generating sets are located in the CD bay at the ground floor. The details are mentioned below

1	Make of DG Sets	Cummins	Cummins
2	Rating of DG Sets	950 KVA (Black Start)	250 KVA (For GBS)
3	Quantity	1 (one) Nos	1 (one) No.

1.19: PUBLIC ADDRESS SYSTEM: -

The unit is provided with paging and party channels comprising handset stations with amplifiers, transmitters, receivers and loud speakers. The system facilitates paging, communication and also private conversation as on conventional telephone.

1.20: ILLUMINATION SYSTEM: -

For all indoor and Outdoor application, energy saving LED lamp fixtures have been provided. Aviation type fixtures have been installed at the Chimney

1.21: CIVIL WORKS: -

Major Civil facilities consist of the following:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

1.21.01: MAIN POWER HOUSE BUILDING:

The main Power House Building Complex consists of G.T. Building, S.T. Building and the M.C.R. buildings located very close to each other. The Generator Turbine building accommodates the 6 nos. of Gas Turbines each having the generating power of 33.50MW. The 6 nos. of Gas Turbine Units are placed one by one in a single row and each unit consists of Turbine Generator, G/T Generator Neutral Grounding Transformer Cubicle, G/T Generator Neutral Grounding Resistor Cubicle and Instrument Air Compressor etc. Centre to centre distance between Unit # I & II is 15.00m, Unit # II & III is 19.00m, Unit # III & IV is 15.00m Unit # IV & V is 17.00m and Unit # V & VI is 15.00m. The access for equipment entry has been made from the rear side of Power House Building. The TG bay, also houses the Boiler Feed Pumps, Lube Oil System and other TG accessories. The total length of TG bay for 6x33.5 MW and 3x 30.00 MW units is [200 m] and width [30 m]. The centre to centre spacing of the columns varies from 7.00m to 8.00m [Av.7.5 m]. TG bay is provided with 2 Nos. of overhead EOT Cranes. In order to make the handling facilities of the cranes available to the boiler feed pumps and other equipment, removable chequered plates have been provided at appropriate locations. The Steam Turbine building accommodates 3 nos. of Steam turbines having capacity of 30.00 MW each at turbine floor at an elevation of 9.00m. Each Turbine unit consists of Turbine, Generator and Exciter. The De-aerator Tank is provided at De-aeration floor at an elevation of 14.00m. The Jack Oil Pump, and Main Oil Tank are situated at an elevation of 4.50m. The Lube oil Cooler, Oil Centrifuge Pump and C.W. Condensate unit is placed at ground floor. The MCR building provides Control Room floor for all the nine units which is located at an elevation of 8.00 M. The cable tray floor is provided at an elevation of 4.50m. The Staircase and Lift facility is provided up to top floor for easy access of the employees during operation and maintenance of the plant. The storage provision for equipment's for chemical dosing, air handling and MCC for soot blowers etc. have been arranged at an elevation of [16 m] in BC Bay.

1.21.02: CIVIL STRUCTURE OF GAS BOOSTER STATION: –

The Gas Booster Station is located in the North West corner of the Plant Area. The Gas received from OIL's offtake point is transported through a pipe line laid, owned and maintained by M/s. Assam gas Company Ltd. The Gas received at the Plant being at low pressure (5kg/cm²) is compressed to (21 Kg/cm²) by the Gas Booster Station installed in the Plant.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Subsequently, the Gas Booster Station provides the compressed gas to the Power House area for generation of power.

1.21.03: CIVIL STRUCTURE OF BOILER AREA: -

In Boiler area, there are 6 numbers of Boilers are placed in position and the boilers are associated with its auxiliaries like PA fan, ID fan etc.

1.21.04: DETAILS OF CHIMNEY: -

The Chimneys having a height of 30.00 meters comprising of Concrete wind shield has been provided for 6 units. The total 2x6 nos. (2 Nos. for each GT unit) of 30 m height have been constructed for Bye pass stack and Main stack. The Chimneys are erected in two parallel rows on either side of the Boilers. The flue gases from each unit are allowed to pass through these Chimneys for ultimate disposal in to the atmosphere. The Chimneys are provided with a Steel ladder fixed on its body up to the top for maintenance purpose.

1.21.05: CIVIL DETAILS OF COOLING TOWER: -

There is a provision for 8 Nos. of Cooling Towers located one by one in a row and placed in a single rigid mammoth RCC structure for cooling operation of the D.M. Water of the plant. The dimensions of each Cooling Tower are [12.90m (L) x 16.86m (B)]. One Cooling Tower is of (Induced draft / Natural Draft) and the cooling towers are of cross flow/ counter flow design. The Cooling Tower fills are made of (RCC/PVC/ Polypropylene).

1.21.06: CIVIL STRUCTURE DETAILS OF TRANSFORMER YARD: -

There is a provision for Transformer yard with a dimension of [232.00m (L) x 20.00m (B)] in front of G.T. Building, S.T. Building and a part of MCR Building. The transformer yard accommodates Station transformer, Unit auxiliary transformers and Generator transformers along with oil pits etc. To facilitate erection and maintenance of transformers, the area has been provided with rail tracks. The rail tracks are placed in a direction both parallel and perpendicular to the Power House Buildings as per requirement for erection and maintenance work of the Transformers. The rail tracks further connected through cross tracks. In addition, space has been provided for laying the CW pipelines and locating the butterfly valve chambers.

1.21.07: MISCELLANEOUS BUILDINGS AND ASSOCIATED CIVIL STRUCTURES: -



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Besides the above, there are some other **miscellaneous buildings and associated civil structures** within the Plant premises.

The miscellaneous buildings are- Administrative building, D.M. Plant Building, clarified water pump House, Raw Water pump house, Fire Fighting Water Pump House, Air Compressor building, Civil Store Building, Workshop, D.G. Room, Fire Station Building, CW Pump House, Diesel oil unloading Pump House, Electrical Maintenance Store Building, Chemical House Building, Security Office Building., and other Maintenance Office buildings have been provided within the plant area.

The associated Civil Structures are- D.M. Storage Tank, Clarified Water Storage Tank, Clariflocculator, Raw Water Reservoir, Fuel Gas Station, Aerator, Chlorination Plant, Diesel Oil Handling Area, Effluent Treatment plant, and Weigh Bridge.

1.21.08: DETAILS OF ROADS: -

The Plant area is facilitated with a well-connected road networking system for a total length of about 3.70 Km. The road network comprises of Periphery road, Ring road and other internal roads connecting all the buildings and structures of the plant.

1.21.09: CIVIL DETAILS OF PIPE LINE: -

There is a double line Pipeline of 500mm diameter for a length of 10.43 Km running from the Intake Well at Buridihing River, Fakial Ghat, Joypur for supplying the required water for operation of the Plant. The total pipe line length for both the lines is 20.86 Km.

1.21.10: BRIDGE: -

A 8 span pre-stressed bridge of length 425.00m and width 5.50m is constructed over the River Burhidihing, at Intake Well, Fakial Ghat, Joypur to connect the two banks of the river for crossing of our raw water pipe lines and maintenance work of Intake well as well as Intake Pump House.

1.21.11: INTAKE WELL CUM PUMP HOUSE:

A double-D shape Intake well with a Pump House on its top is located at the Intake Point Fakialghat, Jaypur for uninterrupted supply of water to the Plant.

1.21.12: DRAINS: -



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

There is a provision for Storm water drain in the Plant Area for a length of 3.60 KM. Moreover, the Main Outfall Drain is constructed from Plant area to Tipling Nallah to discharge waste water after necessary treatment which is 3.60 KM long. There are 24 numbers of Culverts are provisioned for free flow of the water ways along the roads.

1.22: STACK EMISSIONS, AMBIENT AIR QUALITY AND PROCESS EFFLUENTS

The Project has been regularly monitoring the environmental parameters such as stack emission, ambient air quality (AAQ), noise pollution and liquid waste pollution in accordance with applicable norms by both in-house monitoring and employing [M/S Green Tech Environmental Engineer and Consultants, which is an agency approved by State Pollution Control Board. In addition to that on-line monitoring of stack emission (CEMS) & discharged effluent of ETP are also in place which is linked with CPCB & Assam PCB Server to monitor the real time data from their end. The existing environmental data and the limits specified for different pollutants, the locations of their measurements and the frequency of monitoring are given in the table below:

3rd party Monitoring data TABLE

Sl No	Details of monitoring	Parameter	Limit	Result	Frequency of monitoring
01	Effluent of ETP	BOD	30 mg/l	18	Quarterly Limit are as per EP Rule'1989
		COD	250 mg/l	42	
		pH	6.5-8.5	7.61	
		TSS	100 mg/l	36	
		Fe	1 mg/l	0.3	
		Cu	1 mg/l	0.05	
		Zn	1 mg/l	0.8	
		Cr	0.2 mg/l	0.06	
	Oil & Grease	20 mg/l	4		
02	ETP Sludge	pH		7.02	Quarterly



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		Pb	5000 mg/kg	24	
		Cu	50 mg/kg	15	
	ETP Sludge	Cr	50 mg/kg	12	Limit are as per HW rule
		Ni	50 mg/kg	9	
		Zn	20,000 mg/kg	110	
		Fe		2.4	
		Cd	50 mg/kg	0.01	
		Fluoride	20,000 mg/kg	0.01	
		Phosphate	20,000 mg/kg	30	
		Oil & Grease		4.8	
03	Effluent of AGBPS Health Centre	BOD	30 mg/l	12	Once in a year
		COD	250 mg/l	34	
		TSS	100 mg/l	42	Limit are as per BIS
		pH	5.5-9.0	6.53	
		Oil & Grease	10 mg/l	4	
04	Ambient Air Quality	PM 2.5	60 $\mu\text{g}/\text{m}^3$	37	Twice in a year
		PM10	100 $\mu\text{g}/\text{m}^3$	65	
		SO ₂	80 $\mu\text{g}/\text{m}^3$	4.8	Limit are as per CPCB norms
		NO ₂	80 $\mu\text{g}/\text{m}^3$	9	
		O ₃	180 $\mu\text{g}/\text{m}^3$	40	
		CO	2 mg/m ³	< 1.5	
		Pb	1 $\mu\text{g}/\text{m}^3$	< 0.01	
		Benzene	5 $\mu\text{g}/\text{m}^3$	< 1	
		Benzo pyrene	1 ng/m ³	<1	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		As	6 ng/m ³	<1	
		Ni	20 ng/m ³	<1	
		NH ₃	400 µg/m ³	<5	
05	Stack Emission monitoring of Gas Turbine	Velocity	-----	15-16 m/sec	Annually
		Flow rate	-----	242 m ³ /sec	
		SO ₂	0.6	-----	
		NO _x	57	150 ppm	
		CO	210		
		CO ₂	4.7		
		O ₂	15.6		

PART-2

***NEED OF LIFE EXTENSION (LE) OF ASSAM
GAS BASED POWER STATION (AGBPS)***





Detailed Project report on Life Extension (LE) of AGBPS (291MW)

2.0: BACKGROUND:

Keeping in mind the demand of power scenario in India and on the verge of completion of 25 years of useful life of the plant, the need for Life extension of AGBPS is very much essential, so as to have normative operative life extension for at least next 15 years as par the prevailing policy of GOI and trend in the country for extended utilization of existing assets.

The Gas Turbines Unit # 1-4 were commissioned in the year 1995 and has almost completed 26 years of operation, the Gas Turbines Unit # 5-6 were commissioned in the year 1997 and has completed 24 years of operation and STG Unit # 1-3 were commissioned in the year 1999 and has completed 22 years of operations. The COD of the plant is 01/04/1999. Considering the life span of a Gas Based power plant, it is thereby necessitating Life Extension (LE) of the plant in phase manners basis.

The beneficiaries of the power station are seven North Eastern States as per the share allocation of Ministry of Power. Tariff of the Power Station is very attractive and economical for the consumers and is being fixed by CERC as per the prevailing CERC Tariff Regulations for each tariff period. Considering the contract agreement signed with OIL for **1.4 MMSCMD** natural gas for attaining normative PAF 72% as fixed by CERC to recover 100 % AFC, being well connected to the grid, the Project plays a major role in the Power Scenario of North Eastern region, especially for the North Eastern Regional Load Despatch Centre (NERLDC) being source of reliable power.

2.01: NEED FOR LIFE EXTENSION:

Keeping in mind the demand of power, need for Life extension is very much essential, so as to have normative operative life extension for at least next 15 years, which would be consistent with the prevailing policy of GOI and trend in the country for extended utilization of existing assets. The 291 MW Assam Gas Based Power Plant under NEEPCO was generating since 1995 (GTG Unit # 1-4), 1997 (GTG # 5 & 6) and 1998 (STG Unit # 1, 2 & 3). The date of commercial operation (COD) was 01.04.1999. The project has already completed more than 24 years of operation and has almost completed the useful life of 25 years in 2023-24. After that, Life Extension (LE) has to be carried out for keeping the station under commercial operation.

2.02: OBJECTIVES OF LIFE EXTENSION (LE) SOLUTION: -



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Based on the condition and age of the plant, recommendation of OEM, upgradation of technologies, inherent problems of the plant, **contracted Gas of 1.4 MMSCM with OIL**, etc. it is necessary to study the following activities for life extension (LE) possibilities of the plant.

❖ Restoring / up-rating of Generation Capacity on a continuous, safe and reliable basis to suit the present Gas Availability (**Contracted 1.4 MMSCM / day basis with OIL**). M/S OIL has agreed for supply of natural gas for another 15 years (Letter of M/S OIL is enclosed at Vol-II (Annexure-IV)).

❖ Increasing unit availability and reliability on a sustainable basis to meet the current requirements like availability-based tariff.

❖ Achieving rated or better efficiency of the unit so that the Cost of Generation (COG) remains competitive.

❖ Achieving an extended plant life by minimum 15 (fifteen) years.

❖ Meeting current statutory environmental norms.

❖ Improving safety of plant and personnel.

❖ Reduction of Auxiliary Power Consumption.

❖ Replacing the existing obsolete technology.

2.03: KEY REASONS FOR LIFE EXTENSION (LE) OF AGBPS:

Generalized justification for proposed Life Extension (LE) are as follows:

- The GTG Unit # 1, 2, 3 & 4 were commissioned in the year 1995 and has almost completed the useful life, thereby necessitating Life Extension (LE) works.
- The GTG Unit # 5 & 6 were commissioned in the year 1997 and has completed 24 years i.e. almost completed its useful life.
- The GBS Unit#1, 2, 3 & 4 were commissioned in the year 1995 and has already completed its useful life.
- The STG Unit # 1, 2 & 3 were commissioned in the year 1999 and has already completed 22 years of operation i.e. almost completed its useful life.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

- *Life Extension (LE) of the power plant would be economical. This would also give a new lease of life to the Power plant/ equipment.*
- *Life Extension (LE) of the Power Station would enable to incorporate new technologies, thereby increase in efficiency and availability. This would also enable to incorporate technologies to comply with the regulations of CEA, CERC, grid code etc.*
- *Modern instruments / upgraded control system / upgraded machines and equipment etc. would improving reliability as well-as quality of generation.*

From the above, the need for Life Extension (LE) of AGBPS can be summarised as below:

- a) Deterioration of plant components due to ageing*
- b) Loss of performance/ Efficiency*
- c) Life Extension*
- d) Adoption of modern Technology / equipment*
- e) Upgraded version of control system*
- f) OEM's recommendation.*
- g) Commitment of M/S OIL for supply of natural gas for another 15 years.*

2.04: METHODOLOGY OF IMPLEMENTATION OF LIFE EXTENSION (LE) WORKS:

*The methodology of implementation of Life Extension (LE) shall be adopted as par the clause no. 6.1 (i) of "Guidelines for LE for thermal power plant" by CEA, 2020 (Enclosed at **Annexure-I, Vol-II**). Since, AGBPS is a running plant, the various activities / schemes are identified based on the plant operation data, feedback from O&M engineers / OEM / consultant recommendations, etc. and it is planned to execute the LE works in phases depending on the availability of particular system / unit shutdown. Such approach results in minimizing unit shutdown requirement and thereby loss in generation.*

2.05: PROPOSAL FOR LIFE EXTENSION (LE):

2.05.01: SCOPE & JUSTIFICATION

*The complete scope of LE work has been deliberated under **Part-4 of this DPR.***

2.05.02: COST BENIFIT ANALYSIS



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

On detailed analysis, it is seen that LE work is extremely beneficial in comparison to construction of a new project of a similar size. The key parameters are mentioned below: -

- *The average generation by power plant in last 15 years is 1,709.45 MU / year*
- *The estimated project cost is **Rs.2,034.36 Cr.***
- *The cost / MW for the proposed LE works is about **Rs. 6.99 Cr.** Per megawatt, as against of about Rs. 10.00 Cr. Per megawatt for new Thermal (Gas / Coal) power plant of similar size.*
- *Post LE works, the 1st year tariff of Power Station is expected to be **Rs. 1.80/KWH** and the levelized tariff is likely expected to be **Rs. 2.13/KWH** considering a debt-equity ratio of 70:30.*

Considering the above, it may be concluded that, it is highly economical to go for an extensive Life Extension (LE) for 291 MW AGBPS, which will not only provide reliable, environment friendly electric power to the country, but also, the cost of production, after completion of the project will remain much lower than the average price of power in the present circumstances.

2.05.03: ESTIMATED LIFE EXTENSION

It is to be highlighted that following major works are already completed:

1. *New rotor installed at MHI GTG Unit # 4*
2. *CRI & CRR of MHI GTG Unit # 2 & 3 are already completed.*
3. *4 numbers of Gas Engines of Gas booster station are replaced with upgraded 12VAT275GL+ Waukesha Gas Engines along with capacity enhancement of Dresser Rand Gas Compressors.*
4. *Rotor refurbishment of BHEL make steam turbine STG Unit # 2 has already completed.*
5. *20 MVAR line reactor installed.*
6. *14 numbers of 245 KV SF6 hydraulic operated Circuit breaker upgraded to 245 KV spring operated Circuit Breaker.*
7. *Installation and commissioning of 50 MVA BHEL make Generator transformer at GT Unit # 5.*
8. *Upgradation of AVR to DAVR of GTG Unit # 5 & 6.*



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

9. Upgradation of Governor DDC pro control system of Module 1.
10. Upgradation of CO2 flooding system of MHI GTGs.
11. Repairing of civil works for Clarifloculator, Aerator, Intake well pump house.

Since, some of the Life extension works of major equipment's, buildings etc are already completed and proposed to carry out Life Extension works as mentioned in **Annexure-C** enclosed herewith, the life of the power plant shall be extended further for another 15 years from the date of commissioning after completion of all Life Extension (LE) activities in phase manner. This programme is as per the CEA guidelines for LE works of thermal power stations described under subclause 6.1 (i).

2.05.04: SCHEDULE OF COMPLETION

As par CEA guidelines for LE of a running power plant, the LE works shall be done in phases depending on the availability of particular system / unit shutdown. Such approach will be minimizing unit shutdown requirement and thereby loss in generation.

Keeping in view of above, some job has already been taken up and completed for the period 2014-19. The jobs completed during that period was already capitalised and trued up through revised petition to CERC. However, LE jobs during the period 2019-20 to 2023-24 (upto Dec 2023) are recorded at **Annexure-A (Vol-I)**, which are capitalised but not trued up.

Since, AGBPS is a running plant, the various activities / schemes are identified based on the plant operation data, feedback from O&M engineers / OEM / consultant recommendations, etc. and it is planned to execute the LE works in phases depending on the availability of particular system / unit shutdown. Such approach results in minimizing unit shutdown requirement and thereby loss in generation. The proposed job for the FY 2023-24 (Jan 2024) to 2029-30 are identified and phase wise / year wise schedule of completion has been detailed under **Annexure-D (Vol-I)**

2.05.05: COST ESTIMATE AND FINANCIAL ANALYSIS

The cost estimate and financial analysis of the plant has been detailed under "Cost estimate of Life extension" part and "Economic & Financial Evaluation" part of this DPR deliberated at **PART-6**

PART-3

**REPORT ON RESIDUAL LIFE AND CONDITION
ASSESSMENT (RLA) OF EQUIPMENTS AND
COMPONENTS SUBMITTED BY M/S NTPC**

&

**REPORT FOR CHECKING OF STRUCTURAL STABILITY
AND EARTHQUAKE RESISTANCE OF BUILDINGS
AND OTHER STRUCTURES SUBMITTED BY
JADAVPUR UNIVERSITY**





Detailed Project report on Life Extension (LE) of AGBPS (291MW)

3.01: RESIDUAL LIFE AND CONDITION ASSESSMENT (RLA) OF EQUIPMENTS AND COMPONENTS BY M/S NTPC:

3.01.01: INTRODUCTION:

Since the plant is completing its life of 25 years in 2023-24, the life extension has to be carried out for keeping the station under commercial operation. In this line as preparatory for Life Extension, the contract for assessment of equipment to identify the problematic area / equipment for RLA of Gas turbine / Steam turbine and WHRS has been awarded to NTPC.

The operating data collected during the Walk Down Survey and the results and findings of various Residual Life Assessment and Condition Assessment Studies conducted on the equipment and components of the Boiler & Auxiliaries, Turbo Generator & Auxiliaries and all the systems of the Balance of Plant.

Before going for LE, NEEPCO has felt the need of assessment of equipment for RLA study at these stations. Hence, a contract has been awarded to NTPC "Consultancy services for assessment of equipment for RLA study of 291MW AGBPS, Kathalguri, Assam and 135MW AGTCCPP, Agartala, Tripura", vide PO no: NEEPCO/ED(O&M)/AGBPS-25/2018-19/3798 dated 28/02/2019.

NTPC team has visited the AGBPS from 22/05/19 to 24/05/19 and studied the systems, condition of the equipment, running parameters and efficiency. The equipment which require RLA and the equipment which does not require RLA are indicated in the report with reasons. The report on RLA of the plant is enclosed at **Vol-II, ANNEXURE-II.**

3.01.02 MAJOR OBSERVATIONS AND RECOMMENDATIONS BY NTPC CONSULTANT TEAM:

Sl. No	Area	Observation by NTPC	Recommendations by NTPC
1a	GT 1-4	<ul style="list-style-type: none"> - GT 3&4 CRR is done in 2015 and 2017 respectively. - For GT 1&2 CRR is under process. 	- RLA is not required. To be reviewed after five years.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Sl. No	Area	Observation by NTPC	Recommendations by NTPC
		- HGP components are being replaced from time to time.	- To be replaced as per OEM recommended schedule.
1b	GT 5-6	- HGP components are being replaced from time to time.	- To be replaced as per OEM recommended schedule. - As the running hours are reaching 1.5 lakh EOH, comprehensive rotor refurbishment may be planned in line with OEM recommendation. - All stages of compressor blades coating is suggested for better performance - No separate RLA is required
1c	All GTs	The compressor efficiency found to be low (normal 89%): 1 - 82.76% 2 - 83.47% 3 - 83.56% 4 - 82.36% 5 - Stopped condition 6 - 75.8%	- Offline washing is suggested in every 2000 EOH or at the earliest possible opportunity.
1d	Fin fan Coolers	- Healthiness found OK	
2	STs	- There is no problem observed in ST parameters	- Spare rotor to be refurbished and kept ready for future use. - No RLA is required
3a	WHRBs	- WHRB	- Deposits observed over the fins of SH and economizer tube fins which can be removed by dry ice cleaning



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Sl. No	Area	Observation by NTPC	Recommendations by NTPC
3b		- Boiler body temperature are more for all the boilers. Many hot spots with temperature upto 170-180 deg C are seen. WHRB 3&4 are having more hot spots. Insulation are either deteriorated or displaced	- Regular thermography to be carried out and necessary repair to be done to prevent further damages.
3c		- Boiler structure painting	- Recommended once in 2-3 years
3d		Boiler effectiveness are (design 63%): 1 - 62.9% 2 - 62.06% 3 - 68.85 4 - 69.16 5 – Not available 6 – Not available	- As per section 391A of IBR 1950, RLA is to be carried out at 1 lakh running hours and at every five years interval thereafter. - RLA to be carried out at the earliest.
4a	Condensers	- Condenser back pressure is higher (0.27,0.25, 0.19KSc) than design value(0.088KSc) in all machines. - The vac. is low due to high CW inlet temp 40degC against design 27degC and high heat around 11% high than design value, the reasons are follows: -PRDS drain kept open to	- PRDS drain may be diverted to open tank and then pump it to D/A with 5-10HP pump.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Sl. No	Area	Observation by NTPC	Recommendations by NTPC
		<p>condenser in all the units,</p> <ul style="list-style-type: none"> - MS drains found passing in U#4, and - Turbine bypass valve passing in U#4 - Low vac. leads to higher heat rejection in condenser 	
4b		<ul style="list-style-type: none"> - When starting ejector was taken in service in ST#1 the vac. found improved by 0.015KSC and load by 0.3MW indicating the main ejector performance is not upto the mark(both main ejectors in service always). Reason may be: <ul style="list-style-type: none"> - PRDS parameters are not maintained - Ejector orifice may be worn out 	<ul style="list-style-type: none"> - Thorough inspection of ejector system to be carried out to improve the performance. - Alternately, possibility of its replacement with Vacuum pump may be explored. - In next major overhauling of ST, RLA of condenser may be planned. - Epoxy coating of water box may be carried out.
5a	Cooling tower	<ul style="list-style-type: none"> - Continuous Cl₂ dosing not taking place, lot of algae formation observed - Each CT is taking 45-57KW (current 70-88A) power against rating 75KW - CW temperature more CW pumps 	<ul style="list-style-type: none"> - Latest technology is dosing of ClO₂ in place of Cl₂. It is more effective and safe. - CT capability test to be carried out to identify the gaps. Meanwhile, blade angle of the fans taking less load may be increased by 1-2deg for better performance. - FRP blades are recommended in place of GRP blades for reducing APC.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Sl. No	Area	Observation by NTPC	Recommendations by NTPC
			<p>- All the available CT fans may be run as it increases better vacuum and generation (on experimental basis standby fan was taken into service and found there was gain of 0.5MW in station)</p> <p>- Internal coating of CW pumps may be carried out for better efficiency</p>
6a	General	- Civil	- As the units are more than twenty years old Structural and civil foundation inspection may be carried out
6b		- BFP discharge pressure 80KSc, Drum pressure 38KSc	- BFP DE-staging may be considered to reduce APC
6c		- Flue gas temperature at chimney is 210degC	- The excess heat can be utilized by installing vapor absorption system for air conditioning of the plant.
7	ST control system	<p>- Many critical parameters are not available</p> <p>- Control</p>	- Up gradation of the control system and governing system of combined cycle area for safe control, data capturing and efficient operation

3.01.03: CONCLUSION REMARKS OF NTPC REPORT:

- Regular parts replacement from time to time as per OEM recommendation is required to keep Gas Turbines in good health
- RLA of boilers must be carried out at 1 lakh running hours and then after every five years in line with IBR act.
- **The civil structure and foundations RLA to be carried out as they have already crossed twenty years.**



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

3.01.04: DETAIL REPORT OF RLA CARRIED OUT BY NTPC:

The detail report is enclosed at **Volume-II (ANNEXURE-II)**.

3.02: STRUCTURAL STABILITY AND EARTHQUAKE RESISTANCE OF BUILDINGS AND OTHER STRUCTURES SUBMITTED BY JADAVPUR UNIVERSITY:

3.02.01 INTRODUCTION:

The Non-Destructive, Partially Destructive Test and visual inspection of various structural compounds of Assam Gas Based Power Plant at Bokuloni, Assam. North Eastern Electric Power Corporation Limited had allotted to this job to Dr. Partha Ghosh, Professor of Construction Engineering Department, Jadavpur University, Salt Lake Campus, Plot-8, Block-LB, Sector-III, Kolkata-700106 vide Work Order No. NEEPCO/AGBF/CWC/2021-22/T-99/549, Dated on 10.09.2021

The Scope of the work consists of Quality assessment & Health monitoring of above mentioned structure through Non-Destructive and Partially Destructive Test.

The team has visited on site on site during Sept-Dec. 2021 and conducted various test as per their procedure. Based on the test carried out, Jadavpur University has submitted a detail report and recommendations. The detail report is enclosed at **Vol-II (Annexure-III)**.

3.02.02: RECOMMENDATION:

The detail recommendations are enclosed at Vol-II (Annexure-III)

3.02.03: DETAILED REPORT SUBMITTED BY JADAVPUR UNIVERSITY:

The detail report is enclosed at **Volume-II (ANNEXURE-III)**.

PART-4
LIFE EXTENSION (LE) OF AGBPS





Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.0: INTRODUCTION:

In view of Obsolescence & upgradation of the items / systems / equipment, schedule recommendation of OEM, RLA report of NTPC consultant, Civil structure stability report of Jadavpur University, problems encountered during operation, aging of the equipment, etc. major replacements / maintenance / modification etc have been done and planned to be done for the main component of the plant i.e. MHI & BHEL make GTGs, BHEL make STG and its auxiliaries, Waukesha Gas Engines, Dresser-Rand Gas Compressors, Switch yard, Transformers, CB, CT & PT, Generators, exciters, various MCC panels, Control & Instrumentation, etc. The scope of Life extension (LE) of AGBPS (291 MW), NEEPCO, are broadly categorized into the following:

- A. LE of MHI and BHEL GTG and its auxiliaries.*
- B. LE of BHEL make STG and its auxiliaries.*
- C. LE of Gas booster station,*
- D. LE of Central AC system etc.*
- E. LE of all electrical equipment of the plant, like, Generator, Transformer, Switch yard, battery bank and chargers, CT, PT, Circuit breakers, relays, etc.*
- F. LE of all control and instruments equipment, like, control module, AVR /DAVR, vibration & temperature monitoring of STG and GTG, etc.*
- G. LE of Fire Fighting system of the plant.*
- H. LE of buildings, roads, civil structure etc.*
- I. Miscellaneous Works*



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.01: DETAILS OF LIFE EXTENSION (LE) OF GAS TURBINES AND AUXILIARIES:

4.01.01: DETAILS OF LIFE EXTENSION (LE) WORKS OF MHI & BHEL GTG:

As per recommendation OEM Mitsubishi Corporation, Japan, in MHI (Mitsubishi Heavy Industries) make Gas turbines, Compressor Rotor Refurbishment (CRR) of Compressor Rotor along with Disc replacement & Comprehensive Rotor Inspection (CRI) of Gas Turbine Rotor should be carried out at around 1,00,000 EOH operation to clean & verify each part of the rotor. As our MHPS/MHI supplied Gas Turbines had crossed more than 1,40,000 Actual Operating Hours and as we were experiencing vibration in all these units due to Compressor Rotor Disc migration, we planned CRR & CRI of all MHPS / MHI supplied Gas Turbines one by one.

Accordingly, an order was placed to M/S MHI, Japan for CRR & CRI of three MHPS/MHI supplied Gas Turbines along with procurement of a new GT Rotor in 2013. The new rotor of MHI GTG Unit # 4 was replaced and CRR & CRIs of MHI GTG Unit # 2 & 3 has already completed and CRR & CRI of MHI GTG Unit # 1 shall be completed as per table shown below.

Due to aging, the cracks and abrasion were observed in Turbine Blade Ring, Torque Tube covers and Turbine Exhaust Casing of all the MHPS/MHI supplied Gas Turbines. Wall reduction was also observed in many places of the Turbine Blade Ring and Torque Tube cover due to high temperature oxidation. Some cracks were repaired by welding but some could not be repaired due to wall reduction. Moreover, due to long and sustained operation of the Gas Turbines at varied load, permanent deformation has occurred in the Turbine Blade Ring of the unit. Due to this, loss occurs owing to uneven clearance between moving blades and baffle segments. Due to cracks in Turbine Exhaust Casing, leakage of hot burnt gas occurs, which increases the temperature in Turbine compartment. If the leakage increases, it will affect the performance of the HRSGs resulting in decrease in STG generation. These cracks have been repaired by welding several times during overhauling but now the OEM has suggested to replace the Exhaust Casings with new ones. To rectify these, we planned to replace the Blade Ring, Torque Tube covers and Turbine Exhaust Casing of all the units one by one and we have already placed an order with Mitsubishi Corporation, Japan for supply of Parts for replacement of Turbine Blade Ring and Torque Tube cover of MHPS supplied Gas Turbine Unit # 1. The



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

estimated FOB amount for replacement of Blade Ring, Torque Tube covers and Turbine Exhaust Casing unit wise are as shown on table below.

BHEL make Gas Turbine Unit # 5 & 6 completed more than 1,50,000 and 1,40,000 run hours respectively. As per the recommendation of GE, at 5,000 factored starts or 2,00,000 factored hours, compressor and turbine rotors should be disassembled and thoroughly inspected to detect possible wheel forging discontinuities or other service related damage. Such discontinuities or damage may develop into cracks of a critical size as a result of repeated cyclic loading. Under continued operation such critical flaws could lead to a turbine wheel failure, which, in addition to resulting in extensive damage to the turbine, may also result in substantial damage to adjacent equipment and in serious injury to any nearby personnel. M/s. BGGTS, the authorized spares and services agency for Gas Turbine Units supplied by BHEL in India, submitted their offers for new un bucketed Gas Turbine Rotor as well as for repair of the existing Gas Turbine Rotor at BHEL/BGGTS workshop. Their estimated quoted price for the new bucketed Rotor is 32 Cr and the quoted price for the repair is 13 Cr. In case of repair, we will have to procure 3 (three) sets of new buckets and that will cost additional 12 Cr. So, in case of repair we will have to incur an expense of 25 Cr. After repair, the life of the Gas Turbine Rotor will be extended by 1,00,000 hrs, whereas, with the new Rotor, we will get 2,00,000 hrs. Moreover, the repair of the Rotor will take 12 months after receipt of the Rotor at BHEL/BGGTS workshop. So, the Gas Turbine will be under shutdown for more than a year. We cannot afford such long shutdown of a Gas Turbine at a stretch, because other Gas Turbines will also have their scheduled inspections within that period. As the price difference is only 7 Cr and the repair period are more than 1 year, we propose to procure 2 new Gas Turbine Rotors for Gas Turbine Unit # 5 & 6. The schedule for Rotor replacement in Gas Turbine Unit # 5 & 6 is as indicated in below table.

Cummins make Starting Diesel Engine (Model: KTA-1150C) of BHEL supplied Gas Turbine Units have already completed more than 20 years. Both the Engines are showing wear and tear due to ageing, particularly the Engine of Gas Turbine Unit # 5. Recently, the Engine broke down. As we did not have any spare Engine and we needed to restore the engine at the earliest, we placed orders to M/s Garuda Power, Tinsukia, the authorized Dealer of Cummins Diesel Sales & Service (India) Ltd., Pune for a new Starting Diesel Engine and its auxiliaries for an amount of `



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

54,00,906.00 (Rupees Fifty-Five Lac Nine Hundred Six) only. It will enhance the life of the Starting Diesel Engine and will solve the starting problem of Gas Turbine Unit # 5.

The existing Starting Diesel Engine of Gas Turbine Unit # 5 will be sent to repair shop of M/s Garuda Power at Asansol, West Bengal for overhauling and it will be installed in Gas Turbine # 6. It will cost around ` 25,00,000.00 (Rupees Twenty-Five Lac) only

The details of works which were already completed (till Dec 2023) and to be completed within next 5 years (2023-24 to 2029-30) are summarised as follows:

Table: A

Sl. No.	Item	Date of Commissioning	Expenditure (Lakhs)	Expected Life Extension	Remarks
1	GT Rotor of Unit # 4 (replaced with New Rotor)	25.07.2015	2,886.74	15 Years	Completed
2	Technical Advisory Services for Turbine inspection of MHI GT unit # 4	10.02.2019	74.38	-----	Completed
3	Technical Advisory services for Major inspection of BHEL GTG # 5	13.05.2020	82.41	-----	Completed
4	CRR & CRI of rotor of MHI GT Unit # 3 (After CRR / CRI of GT rotor Unit # 3 at MHI Works at Japan, the rotor was installed at GT unit # 2)	2022-23 (Completed on April 2022)	2,606.76	15 Years	Completed
5	Technical Advisory Services for Turbine Inspection of GT-2	2022-23 (Completed on April 2022)	136.30	-----	Completed
6	New starting Diesel Engine for Gas Turbine Unit # 5	28.02.2022	85.90	15 Years	Completed
7	CRR & CRI of GT Rotor of Unit # 2 (To be installed at GT Unit # 1)	2024-25	2,527.42	15 Years	Order placed. Refer Annex-C



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

8	Turbine Blade Ring & Torque Tube cover of MHI GT# 1	2024-25	1,198.00	15 years	Order placed. Refer Annex-C
9	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 4	2024-25	867.00	15 years	Order placed. Refer Annex-C
10	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 3	2026-27	864.15	15 years	To be processed
11	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 2	2027-28	864.15	15 years	To be processed
12	Exhaust cylinder & exhaust manifold of MHI GTG Unit # 3	2026-27	2,524.60	15 years	To be processed
13	Exhaust cylinder & exhaust manifold of MHI GTG Unit # 2	2027-28	2,524.60	15 years	To be processed
14	Exhaust cylinder & exhaust manifold of MHI GTG Unit # 1	2029-30	2,524.60	15 years	To be processed
15	Exhaust cylinder & exhaust manifold of MHI GTG Unit # 2	2029-30	2,524.60	15 years	To be processed
16	New unbucketed GT Rotor of BHEL GTG Unit # 5	2028-29	2,760.70	15 years	To be processed
17	New unbucketed GT Rotor of BHEL GTG Unit # 6	2029-30	2,760.70	15 years	To be processed
18	New Starting Diesel Engine for BHEL Gas Turbine Unit # 6	2025-26	95.82	15 years	To be processed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

REFERENCES:

Orders for CRR & CRI, new GT Rotor and additional spares for CRR & CRI are as follows:

1. *P.O. No. NEEPCO/AGBPS/ HOP/13-14/W-8(A)/205 dated 28.05.13 supply of new GT Rotor and work order for CRR & CRI of MHI make Gas Turbine Unit # 1 to 4.*
2. *P.O. No. NEEPCO/AGBPS/HOP/2016-17/W-8(A)/376 dated 27.09.16 for additional spares and consumables for CRR & CRI of original Rotor of MHPS make MW 251 Gas Turbine Unit # 4.*
3. *P.O. No. NEEPCO/AGBPS/HOP/2018-19/ W-8(A)/528 dated 17.12.18 for additional spares and consumables for CRR & CRI of the original rotor of MHPS make MW 251 Gas Turbine Unit # 3.*
4. *P.O. No. NEEPCO/AGBPS/HOP/2018-19/ W-23/03 dated 05.04.19 for compressor blades required for CRR & CRI of the original rotor of MHPS make MW 251 Gas Turbine Unit # 3.*
5. *P.O. No. NEEPCO/AGBPS/HOP/2019-20/W-8(A)/575 dated 28.02.2020 additional spares and consumables for CRR & CRI of the original rotor of MHPS make MW 251 Gas Turbine Unit # 2.*

Order for Turbine Blade Ring & Torque Tube cover:

1. *P.O. No. NEEPCO/AGBP/ HOP/13-14/W-8(A)/205 dated 28.05.13. (Enclosed at Vol-IV, DOCUMENT/02).*
2. *P.O No. NEEPCO/AGBPS/HOP/2021-22/W-8(A)/154 dated 02.08.2021 for supply of Parts for replacement of Turbine Blade Ring and Torque Tube cover of MHPS supplied Gas Turbine Unit # 1.*

Orders for new Starting Diesel Engine and its auxiliaries for BHEL Gas Turbine Unit # 5:

1. *P.O No. NEEPCO/AGBPS/GT & Aux./W-38/2021-22/95 dated 23.08.2021 for supply of Cummins make Starting Diesel Engine, Model: KTA-1150C.*
2. *P.O No. NEEPCO/AGBPS/GT & Aux./W-38/2021-22/100 dated 23.08.2021 for supply of Spares for Air intake system, Cooling system and Exhaust system for new Cummins makes Starting Diesel Engine, Model: KTA-1150C.*



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.02: DETAILS OF LIFE EXTENSION (LE) OF STEAM TURBINES AND ITS AUXILIARIES:

4.02.01: NEED FOR LIFE EXTENSION (LE):

The first machine i.e. GTG-1 was commissioned on 16.03.1995 and PG test of combine cycle operation for all three modules were completed by Dec 2020 and since then, units are being operated in accordance to demand in the grid. However, due to ageing, earlier design criteria as well as present technical up gradation thereafter, it is the call of time to upgrade few existing old systems for overall performance improvement.

The major key area as identified is the less output from all three of STG units.

Root cause of underperformance of STG units is key marked as low condenser vacuum.

To find out the root cause of low vacuum, the following points are noted:

- Fouling of condenser: deposition of hard scale in condenser tubes attributing to poor heat transfer efficiency.
- Fast scale formation even after cleaning of condenser tubes in periodical manner.
- High cooling water inlet temperature: Cooling tower is under performing due to fouling of PVC fill packs.
- Ejector responsible for evacuation of non-condensing steam air mixture from condenser was under performing.
- Poor quality of auxiliary steam parameter.
- Quality of circulating cooling water.
- Design constrain as system was designed in ISO condition considering ambient temperature of 23^o C.

The aforesaid condition/causes are inter-related to each other and failure of any one of above have cascading effect and ultimate result is system low vacuum i.e less thermal efficiency of steam turbine.

To control the fouling to some extent at present, CW treatment is being continued for last few years but not full proof at all as recorded though all parameters of treatment program are being maintained.

To overcome all the issues, it is the time to go for Life Extension (LE) as the plant is about to complete 25 years of service in combine cycle operation.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

As Life Extension (LE) is concerned, the following specific area are need to be addressed, modernized and renovated.

Sl. No.	Area of LE	Impact on system performance:
1.	REPLACEMENT PVC FILL PACK AND WATER DISTRIBUTION SYSTEM OF COOLING TOWER	Present condition of cooling tower is not satisfactory for fouling of fill packs in particular. By replacing PVC fill packs performance of cooling tower shall improve i.e. approach temperature shall come down which in turn improve the efficiency of condenser.
2.	RLA STUDY OF CONDENSERS AND IF SUGGESTED REPLACEMENT CONDENSER TUBES.	<p>Fast formation of hard scale in condenser tubes (fouling) has been observed during past few years. It is apprehended that surface of condenser tubes get rough for which rate of deposition of scale is increasing day by day. The condition of the tube could be ascertained by RLA study of the condensing system which shall invariably cover the following:</p> <ul style="list-style-type: none"> ➤ Tube bundle- 100% testing for life assessment. ➤ Condenser Shell ➤ Support plate ➤ Hot well ➤ Water boxes ➤ Foundation and connection to turbine ➤ Condenser auxiliary system ➤ Condenser vacuum system. <p>Base on the report of RLA, corrective action such as replacement of tube bundles, improvement of vacuum system shall be initiated. For RLA study of condenser, open e tender has already been floated and scheduled to be carried out in the month of December 2021.</p>
3.	Purchase of -01 set of 6.6	Circulating cooling water system of steam turbine



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

	<i>KV pump motor set for replacement.</i>	<p><i>unit is comprises of 04 numbers of CW pumps driven by 6.6 KV HT motors. In the year 2020, motor of CW pump no.1 was failed which was repaired at the works of BHEL and installed back. As all the pump motor set have crossed approx. 23 years of service life and may fail due to ageing. For redundant operation, it is intended and proposed to purchase 01 no of complete pump motor set to keep in ready stock for one to one replacement in case failure of existing one.</i></p> <p><i>Expected cost involvement shall be of Rs. 1.5 crore (basic) and the expenditure shall be incurred in the financial year 2022-23.</i></p>
4 (a)	<i>Purchase of two numbers Boiler feed pump with partial design modification (7 stage instead of existing 08 stage pump)</i>	<p><i>Each steam turbine units are comprising of 2 numbers of Boiler Feed Pumps in which one shall be in service and another shall be in standby condition. There was a failure instance of boiler feed pump in which complete pump was replaced with a new one. Boiler feed pumps are considered one of a very critical auxiliaries and tendered 23 years of service counted from the year of commissioning. For redundant operation, it is also intended to purchase 02 no of Boiler feed pump to keep in ready stock for replacement if required.</i></p>
4(b)	<i>De staging of existing Boiler feed pump:</i>	<p><i>Design specification of existing boiler feed pumps may be noted as follows:</i></p> <p><i>Nos of pump in each unit: 02 nos. Make BHEL</i></p> <p><i>Pump type: FRH-27.</i></p> <p><i>Make: BHEL.</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		<p><i>Pump input: 473 KW.</i></p> <p><i>Motor rating: 550 KW, 6.6 KV.</i></p> <p><i>Total head: 730 MWC.</i></p> <p><i>Discharge:180M³/hr.</i></p> <p><i>Nos. of stage: 8 nos.</i></p> <p><i>Shut of head:870 MWC.</i></p> <p><i>Boiler efficiency: 65.2%</i></p> <p><i>However, designed maximum operating pressure of our steam turbine unit is 43 Kg/cm². It was pointed out by NTPC during the RLA study for de staging of boiler feed pump to reduce average power consumption as the designed operated head of BFP is much more than the required one base on operation parameters of our boilers.</i></p> <p><i>For de staging of existing boiler feed pump, several correspondences had been made with BHEL but BHEL did not respond to our enquiry even after several reminders issued from our end. We shall have to explore private renowned parties in this connection.</i></p>
5.	<p><i>Insulation LE for module-1 & 2</i></p>	<p><i>In thermal power plant heat energy is converted into electrical energy. As such, losses of heat energy in any form is the loss of efficiency. A properly designed and installed insulation system immediately reduces the need for energy and results in significant savings. Insulation act as a barrier for heat transfer from a object to surrounding.</i></p> <p><i>The benefit of insulation may be noted as follows:</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		<ol style="list-style-type: none"> 1. Reduces energy costs 2. Prevents moisture condensation 3. Reduces capacity and size of new mechanical equipment 4. Enhances process performance 5. Reduces emissions of pollutants 6. Safety and protection of personnel 7. Acoustical performance: reduces noise levels 8. Maximizes return on investment (ROI) 9. Improves Appearance 10. Fire Protection <p><i>Insulation of module-III was renovated in the year 2016. With the LE, significant improvement has been noted. With time, insulation of module-1 and 2 is recorded degraded due to ageing for which skin temperature is rising. To prevent untoward heat losses, it is planned to renovate insulation of power cycle piping of module-1 and -2. To do it so, complete unit shutdown shall be required. Accordingly, it is planned to club the LE work of insulation with major inspection of steam turbines. Major overhauling of steam turbine 1 and 2 have been scheduled to carry out in the year 2022 and 2024 respectively:</i></p>
6.	<p><i>Major overhauling of steam turbine units and refurbishment of turbine internal.</i></p>	<p><i>First Major inspection of steam turbine units were carried out on the following dates:</i></p> <p><i>STG-1: 2012</i></p> <p><i>STG-2: 2014</i></p> <p><i>STG-3: 2016</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		<p>Next major overhauling shall be due on the following dates:</p> <p>STG-1: 2022</p> <p>STG-2: 2024</p> <p>STG-3: 2026</p> <p>During major overhauling of steam turbine units, turbine internals both guide blade carriers and turbine rotor are refurbished for efficiency improvements as well residual life enhancement. Refurbishment of turbine internals are carried out at the works at BHEL, Hyderabad. As the time gap between two major overhauling is 10 years, we may say that the refurbishment enhances life of a steam turbine for additional 10 years.</p> <p>Refurbishment process covers the following:</p> <ul style="list-style-type: none"> ➤ Inspection of turbine rotor and the static parts. ➤ Carried out NDT ➤ Replacement of defective parts as found ➤ Dynamic balancing of the rotor.
7.	<p>Internal lining DM water storage tank and ion exchange vessels.</p>	<p>DM Plant of Assam Gas Based Power Plant is comprising of following system:</p> <p>DM Water Generating system: Clarified water is passed through following system for final de mineralization process:</p> <ul style="list-style-type: none"> ➤ DMF – Dual media filter to remove turbidity ➤ ACF- Activated carbon filter to remove residual chlorine & Arrest organic matter ➤ SAC: - Strong acid cation to remove positively



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		<p>charged ions form minerals with resin. Resin type: T-42</p> <ul style="list-style-type: none"> ➤ SBA: - Strong Base Anion to remove negatively charged ions using resin. Resin type: A-27. ➤ MB- Mixed bed with both anion and cation resins to arrest the ions escaping SAC/ SBA ➤ In between SAC and SBA, there is a degasser water tower where dissolved CO₂ is removed by air blowing. <p>Regeneration Process:</p> <p>The resins get exhausted after exchanging ions from water. Then they need to be chemically regenerated.</p> <ul style="list-style-type: none"> ➤ SAC is regenerated with HCl solution ➤ SBA is regenerated with Na OH solution ➤ The regenerated solution is allowed to pass through the resin by ejection process. The chemical takes up the ions and make the resin ready for ion exchange. <p>DMF and ACF tanks are epoxy coated and SAC, SBA and MBs are rubber lined inside.</p> <p>To store generated DM water, there are two numbers DM water storage tank each having storage capacity of 1985 KL of DM water as required for our boilers.</p> <p>One tank is rubber lined and another one is epoxy coated.</p> <p>After tendering long services since commission, bulging of rubber lining both in vessels and storages tanks is being noticed. The same is applicable to</p>
--	--	--



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		<p>epoxy coated tank/vessels. To avoid contamination of DM water coming into contact with metal surface as well to avoid chemical corrosion of vessels, linings are to be renovated.</p>
8.	Main Lube oil Cooler.	<p>Each steam turbine unit is equipped with 02 numbers of main lube oil cooler for cooling of lube oil circulated through force oil lubrication system i.e there are overall 06 numbers of coolers.</p> <p>The cooler bundles are made of copper and the cooling water as used for cooling media is clarified water. As seen in our condenser tubes, scale is also formed in the tube bundles which is being cleaned in periodical manner. However, due to ageing, copper tube may get puncture and for better and reliable operation, cooler bundle may be replaced for better cooling effect as well as for life enhancement.</p>
9.	Generator cooler.	<p>Generator of steam turbine units are air cooled and the air is being cooled at cooler. Cooler tubes are made of SS and seen heavy fouling by scale formation and is being cleaned in periodical manner. As ID of the cooler tube is small and satisfactory cleaning is not possible.</p> <p>For effective cooling of generator, the coolers of all three generators are required to be replaced.</p>
10.	Replacement of Auxiliary Cooling Water Pump:	<p>There are 04 numbers of ACW pumps for circulation of cooling water into auxiliary system. During operation of all three-steam turbine unit, 3 (three) numbers of ACW pumps are to be kept into service round the clock.</p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		Due to ageing, frequency of break down/trouble shooting is being noted in rising trend. Recently we have replaced 02 numbers of ACW pumps with new pumps for satisfactory performance.
11.	Expansion bellows of Boiler duct. (Drum, Inlet Duct and exhaust duct.)	To take the thermal expansion, expansion joints are placed in inlet duct, boiler drum and exhaust duct. Except duct of Boiler drum, duct of inlet duct and exhaust ducts are metallic. Due to ageing, all the ducts of all 06 numbers of Boilers are in in order and multiple puncture/cracks have been noted. During recent RLA study of boilers, it was recommended for replacement with new ones.

4.02.02: LIFE EXTENSION ACTIVITIES OF STEAM TURBINES AND ITS AUXILIARIES:

Considering on above, following activities are identifies for Life Extension of Steam Turbines and its auxiliaries.

A. Cooling tower of AGBPS NEEPCO is induced draught counter flow cooling tower designed/ engineered supplied and erected by M/S Paharpur Cooling Tower Ltd.

The designed data of cooling tower may be noted as follows:

- Manufacturer: M/S Paharpur Cooling Tower Ltd.
- Designed ambient temperature: 230C.
- No. of cells: 08 nos.
- CT Model: 85442-3.0-8,
- Capacity: 19500 M3/hr.
- HWT: 370C
- WBT: 21.90C

COMPARISON OF PERFORMANCE COOLING TOWER AT PRESENT AND DESIGNED CONDITION:

Designed parameter at 23 Deg C		Present scenario
HWT	37 DegC	44 DegC
CWT	27 DegC	34 DegC



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Range	10 DegC	10 DegC
Dry bulb temp	23 DegC	21 DegC
Wet bulb temperature	21.9 DegC	17 DegC
Approach.	5.1 DegC	17 DegC

From above, it is clear that our cooling tower is grossly underperforming as approach temperature is much higher side i.e. 17 DegC.

To address the problem as associated with our cooling tower because of its underperformance, OEM i.e. M/S Paharpur was called for in situ study and they submitted their report along with their offer for LE and performances improvement of Cooling tower. The report as submitted by the OEM which is submitted herewith.

OEM recommended for the following:

- Complete replacement of PVC fill packs.
- Replacement of Asbestos drift eliminator with PVC eliminator.
- Replacement of defective nozzles and diffusers.

The work of replacement of PVC fill pack was awarded to M/S Cooldeck Industries Private Limited vide our purchase order reference No. NEEPCO/AGBPS/ST & AUX/W-33(A)-09/2020-21/240 dated 03.08.2020 with total basic cost involvement of **Rs. 87,19,152.00 only** and total expenditure inclusive of all taxes and duties was **Rs.91.54 Lakhs**.

The PO for replacement of Drive mechanism of cooling tower (2 numbers) had been placed to M/S Paharpur Cooling Towers Limited vide ref. no. GEMC-511687723180318 dtd. 10/03/2023 and the total financial involvement was Rs. 22.90 Lakhs. The job has already completed during 2023-24.

Following proposed works are to be done during 2024-25 to 2029-30 for LE of Cooling Tower:

Sl. No.	Item	Year	Approx. Expenditure (Lakhs)	Expected Life Extension	Remarks
1	Drive mechanism of Cooling tower (04 set of drive mechanism)	2025-26 2028-29	46.01	15 years	To be processed

The cost benefit analysis by doing LE of cooling tower as per recommendation of OEM:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

It may be noted that in the year 2012, the replacement PVC fill packs and the work was executed through the OEM i.e. M/S Paharpur Cooling Tower. After replacement of fill pack of cooling tower, approach temperature comes down to design one which implies significant improvement in cooling tower performance.

B. The replacement of few critical drives having high lean time of delivery also have direct impact on availability of generating units.

The following critical major drives are considered to purchase with anticipated break down that may occur due to ageing factor in near future. Though all the critical drives have back up standby unit, subsequent failure of standby unit too may lead to outage of a generating unit. To ensure un interrupted operation as well as to reduce untoward down time of generating unit in the situation as mentioned above, few critical major drives shall have to purchase either for replacement or shall have to keep in ready stock for replacement.

Considering the factor of ageing, the following drives are proposed to purchase.

1. One complete set of 6.6 KV CW pump motor set of following specification directly from BHEL for one to one replacement of existing pump as per requirement (Completed).

- Make BHEL: Type: CW-10
- Flow: 6600M³/Hr.
- Head: 22.5 MWC.
- Speed: 590 RPM.
- Pump eff: 87%.
- Pump input power: 489.4 KW.
- Motor rating: 6.6KV, 550 KW.
- No of stage: 1.

2. Purchase 02 numbers of Boiler feed pump with partial design modification and de staging of existing Boiler feed pumps as suggested.

Technical specification:

- Nos of pump in each unit: 02 nos. Make BHEL
- Pump type: FRH-27.
- Make: BHEL.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

- Pump input: 473 KW.
 - Motor rating: 550 KW, 6.6 KV.
 - Total head: 730 MWC.
 - Discharge: 180M³/hr.
 - Proposed Nos. of stage with modification: 7 nos.
 - Shut of head: 870 MWC.
- 3. ACW pumps are also considered as critical auxiliaries for cooling of auxiliary supporting system of steam turbine operation. With auxiliary cooling, operation of steam turbine is not possible.**

Till date we have replaced 02 numbers of ACW pumps for performance improvement and life enhancement and another 02 numbers have been left out for replacement.

Technical details of ACW pumps may be noted as follows:

- Nos of pump: 04 (four nos).
- Make: Kirloskar Brothers.
- Model: BHR 35, double stage.
- Flow: 44 M³/hr.
- Head: 440 MWC.
- Motor rating: 75 KW.

The details of the LE works are enlisted are follows:

Sl. No	Description	Estimated amount (Lakhs)	Proposed year of Execution	Life enhancement
1	Replacement of 6.6 KV CW pump motor set. (Completed)	2022-23 & 2023-24	535.58	15 years
2	Replacement of 2 numbers of ACW pumps for replacement for life enhancement	2024-25	57.90	15 years
3	Replacement of Boiler feed pump FRH 27	2024-25	602.94	15 years



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

C. Major overhauling steam turbine units were carried out as per OEM guideline in following dates:

Sl. No.	Unit.	Carried out	Due on.
1.	STG-1	2012	2022
2.	STG-2	2014	2024
3.	STG-3	216	2026

At the time of major overhauling, turbine internals are inspected and defective turbine internals such as turbine rotor, guide blade carriers, glands are replaced/repared or refurbished. After major overhauling and defect rectification, further life of steam turbine unit is predicated operational performance of units improves.

The PO ref. no. NEEPCO/AGBP/HOP/W-15/2022-23/50 dtd. 09/05/2022 has been placed to M/S BHEL for Rotor refurbishment Steam turbine-1. The estimation for other 2 units is based on the PO placed to M/S BHEL. The document is enclosed at Vol-IV, Document No.: DOCUMENT/19.

Sl. No	Description	Estimated amount (Lakhs)	Proposed year of Execution	Life enhancement
1	Rotor refurbishment Steam turbine-1	478.26 (Order placed)	Completed on 25-10-2022	15 years
2	Rotor refurbishment of Steam Turbine-2	470.81	2026-27	15 years
3	Rotor refurbishment of Steam Turbine-3	470.81	2028-29	15 years

The above works will enhance life of the Steam Turbines as well as enhance in output by reducing in maintenance requirement.

D. MAIN LUBE OIL COOLER REPLACEMENT FOR LIFE EXTENSION:

A large amount of heat is generated at the bearings of rotating machinery. To remove this excess heat, lubricating oil is circulated through the bearing.

In the closed cycle operation of the oil circuit, twin coolers are placed on the discharge side of the oil pump. The cooler which receive oil i.e. in service absorbed the heat, cool it to the



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

temperature as required at the bearings of steam turbines. The coolers are provided with 100% capacity each.

Based on the offer received from M/S BHEL vide offer ref. no. PS/SSBG-KOL/HYU/SB22K0383/GKD/0109 dtd. 10/10/2022, the estimate calculated at Dec 2023 PL is as follows:

Sl. No	Description	Estimated amount (Lakhs)	Proposed year of Execution	Life enhancement
1	Replacement main lube oil cooler (6 numbers)	304.99	2024-25	15 years

The benefit shall be Life enhancement, reliability and better heat transfer efficiency.

E. GENERATOR COOLER REPLACEMENT:

Generator of steam turbine units are air cooled and the air is cooled in coolers of shell and tube arrangement and the cooling media of the cooler is clarified water.

Because of water quality, tubes are fouled with scale deposition for which coolers are cleaned in a periodical interval. However, satisfactory cleanliness is not achievable due to less ID of the tubes. As full proof water treatment with PH control is being adopted now a days, it is proposed to replace all the coolers with new tube bundle for effective cooling as well as additional life enhancement.

Technical specification may be noted as follows:

Drawing No.		2-16501-00231
Type:		Shell & Tube.
Number of coolers		2X100% in each unit.
Quantity of Oil.	M ³ /Hr.	30
Inlet temperature of OIL	Degree C.	59.9
Outlet temperature of Oil.	Degree C.	45
Pressure drop on oil side.	Kg/cm ²	0.81
Qty of cooling water.	M ³ /Hr.	70
Inlet temperature of water	Degree C.	37
Outlet temperature of water.	Degree C.	39.6



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Cooling surface area	AsM	50
Size of tubes.	MM (ODxThkXL)	15x1x2700
Total numbers of tubes.	420	420 nos.
Tube material:		Admiralty Brass (SB 111 Alloy 443)

Based on the offer received from M/S BHEL vide offer ref. no. PS/SSBG-KOL/HYU/SB22K0383/GKD/0109 dtd. 10/10/2022, the estimate calculated at Dec 2023 PL is as follows:

Sl. No	Description	Estimated amount (Lakhs)	Proposed year of Execution	Life enhancement
1	Replacement of Generator coolers (1 unit)	190.03	2026-27	15 years

Based on the above, the LE works which were already completed (2019 to Dec 2024) and LE works to be completed (Jan 2024 to 2029-30) are summarized as below:

Table: B

Sl. No.	Item	Date of Commissioning	Expenditure (Lakhs)	Expected Life Extension	Remarks
1	LE of Cooling Tower (PVC fill pack replacement of Cooling Towers)	23.12.2020	91.54	4-5 Years	Completed
2	Installation of bulk acid tank & fume absorbed acid tank for makeup water system of STG	23-12-2021	15.44	15 Years	Completed
3	LE of Cooling Tower- Replacement of Drive mechanism of Cooling tower (2 Set of Drive mechanism)	16-08-2021	22.36	15 Years	Completed
4	Replacement of 6.6 KV CW pump motor set.	2022-23 & 2023-24	535.58	15 Years	Completed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

5	Rotor refurbishment of Steam Turbine-2	25-10-2022	478.26	-----	Completed
6	LE of Cooling Tower- Replacement of Drive mechanism of Cooling tower (2 Set of Drive mechanism)	2023-24	22.90	15 Years	Completed
7	LE of Cooling Tower- Replacement of Drive mechanism of Cooling tower (4 Set of Drive mechanism)	2025-26 2028-29	45.80	15 Years	To be processed
8	Replacement of 2 numbers of ACW pumps for replacement for life enhancement	2024-25	54.39	15 years	To be processed
9	Replacement of Boiler feed pump FRH 27	2024-25	606.52	15 years	To be processed
10	Rotor refurbishment of Steam Turbine-2	2026-27	478.26	15 years	To be processed
11	Rotor refurbishment of Steam Turbine-3	2028-29	478.26	15 years	To be processed
12	Replacement of Main lube oil cooler (2 numbers)	2024-25	306.80	15 years	To be processed
13	Replacement of generator coolers (1 unit)	2026-27	191.16	15 years	To be processed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.03: LIFE EXTENSION (LE) OF GAS BOOSTER STATION:

4.03.01: INTRODUCTION

The Assam Gas Based Power project (291 MW) is a combined cycle Gas Based Power Plant. The Fuel for this Plant is Natural Gas supplied by M/s Oil India Ltd. from an OFF-take point located nearly 7 km. away from this plant. M/s Assam Gas Company is entrusted to transport the gas from this OFF-take point through a single line pipeline laid, owned and maintained by M/s Assam Gas Company. The Gas received at Project being at low pressure (3.5 – 6 kg/cm²) is compressed to 20-21 kg/cm² by a Gas Booster Station installed in the Project premises. The GBS is installed, owned and maintained by NEEPCO and consists of 4 nos. of compressor units of Dresser Rand, USA make driven by respective gas engines of Waukesha, USA make.

Although the Gas Booster Station is an integral part of the generating plant of AGBPS, which pressurizes and provide fuel gas to the Gas Turbines at a pressure of 20-21 kg/cm², it is however, not a general convention to include such gas installation under the purview of a power station.

4.03.02: TECHNICAL SPECIFICATIONS OF OLD DRESSER-RAND GAS COMPRESSORS:

MANUFACTURER	DRESSER-RAND, USA
MODEL	6HOS4-2
STAGES	2
CAPACITY	27,000 M ³ /HOUR @ 1000rpm
COMPRESSOR FRAME Oil LUBRICATION SYSTEM	Internal Gear Type pump
COMPRESSOR CYLINDER LUBRICATION SYSTEM	Cylinder/packing pump point to point lubrication
COMPRESSOR COOLING SYSTEM	Water Cooling (Forced circulation) through auxiliary jacket water pump mounted on engine

4.03.03: TECHNICAL SPECIFICATIONS OF OLD WAUKESHA GAS ENGINES:

MANUFACTURER	Waukesha Engine Division, USA
MODEL	12V, AT25GL



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

RATED SPEED	750-1000 RPM
CONTINUOUS HP RATING	2587 HP @ 1000 RPM
COOLING SYSTEM	Jacket Water Pump & Auxiliary water pump, gear driven mounted at the end of crankshaft
LUBRICATION SYSTEM	Lube oil pump, gear driven, mounted at the end of crankshaft.
STARTING SYSTEM	Air starter motor (2 Nos. at the flywheel)

4.03.04: INITIAL (OLD) COMMISSIONING DATE OF GAS BOOSTER STATION:

GBS UNITS	INITIAL COMMISSIONING DATE
UNIT#I	11 th July 1995
UNIT#II	03 rd March 1995
UNIT#III	10 th March 1995
UNIT#IV	13 th March 1995

During the initial years of operation, all units of GBS had experienced with erratic behaviour due to inherited problem and grid instability and encountered huge number of tripping.

Despite modifications of various systems, like, new ignition system, incorporation of TCMS system, replacement of thermostats, etc., of Waukesha Gas Engines, there was no much improvement of behaviour and characteristics. Frequent tripping of GBS compounded the breakdown maintenance of Gas Engines as well as enhanced the outages of GBS Units.

To overcome unreliability situation of GBS and to enhance stability, it was decided to carry out Life Extension (LE) GBS in phase manner.

4.03.05: 1st PHASE OF LIFE EXTENSION (LE) OF GBS:

Considering the facts and to eliminate various flaws, there was no other option but to carry out LE works of the Gas Booster Units. Under LE of GBS, following works were carried out:

- **Replacement of three numbers of old Waukesha Gas Engines with new Waukesha gas Engines, Model 12V-AT275GL+ with enhanced capacity and margin of power above 15% with**



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

respect to compressor requirement: Three new Waukesha Gas Engines are installed in GBS Unit # 1, 2 and 3.

- **Replacement of three numbers of old under efficient ACHE (Air Cooled Heat Exchanger) with new higher capacity ACHEs:** Three nos. of new ACHEs are installed in GBS Unit # 1, 2 & 3.
- **Enhancement of flow capacity of three numbers of Dresser-Rand Gas compressors to 32,000 m³/Hr @900 RPM with respect to old capacity of 27,000 m³/Hr @ 1000 RPM.** This capacity enhancement of Dresser-Rand Gas Compressor increases the redundancy of the GBS Units and utilization of the system to its maximum: Compressor flow capacity is enhanced in GBS Unit # 1, 2 & 3.
- **Installation of additional higher capacity Main Inlet Scrubber to eliminate liquid flow and other contaminants coming along-with the Natural Gas supplied by OIL.**
- **Installation of Additional fuel filters system for Gas Engines to barring liquid and other contaminants to enter Gas Engines.** The Gas Engines are intended to run with dry natural gas and any liquid carry over along-with natural gas may detrimental to Gas Engines. Keeping in view of the circumstances, **individual fuel filter** to each Gas Engines are also incorporated to the system in addition to **fuel filter system**.
- **Installation of new LCPs (Local Control Panel) & MCP (Master Control Panel) as per the new system requirement and installation of SCADA System for monitoring.** New LCPs (Local Control Panels) are installed in GBS Unit # 1, 2 & 3.
- **Installation of Gas Flow Totalizer and individual fuel gas flow meters to each Waukesha Gas Engines.** The individual gas flow meters are installed in GBS Unit # 1, 2 & 3.

Accordingly, a petition was filed to CERC for LE of GBS Unit # 1, 2 & 3. Based on the approval for additional capitalization vide petition order ref. no. 295/2009 & date of order 06/09/201, the 1ST Phase LE of GBS was entrusted to **M/S CEIPL** for replacement of Gas Engines, ACHEs, installation of Inlet scrubber, fuel gas filter, LCP & MCP etc. and to **M/S Dresser-Rand** for capacity enhancement of Dresser-Rand Gas Compressors of GBS Unit # 1, 2 & 3.

The details supply order as well as work order to M/S CEIPL are mentioned under reference sl. No. 2 & 3. The details of works carried out by M/S CEIPL were as follows:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	EQUIPMENT	MAKE / MANUFACTURER	QTY. SUPPLIED FOR LE OF UNIT # 1, 2 & 3
1	GAS ENGINES WITH MANDATORY SPARES	GE-WAUKESHA, USA	3 NOS.
2	FLEXIBLE DISC COUPLING FOR CONNECTION TO EXISTING GAS COMPRESSOR	REXNORD	3 NOS.
3	AIR COOLED HEAT EXCHANGERS	PATELS AIRTEMP (INDIA), LIMITED, AHMEDABAD, GUJRAT	3 NOS.
4	INLET SCRUBBER	PETROMER	1 NO.
5	GAS ENGINE COMMON FUEL GAS FILTER	PETROMER	1 NO.
6	FLOW METER FOR FLOW RATE AND FLOW TOTALIZER		1 NO.
7	LOCAL & MASTER CONTROL PANELS WITH NECESSARY INSTRUMENTATION & CONTROL INCLUDING HMI SYSTEM	CUBIX	4 NOS. OF LCP & 1 MASTER PANEL
8	PIPINGS	---	3 LOT
9	FIRST FILL LUBE OIL, LUBRICANTS, COOLANTS AND OTHER CONSUMABLES	LUBE OIL: SHELL MYSELLA S5N, COOLANT: NALCOOL 2000 ETC.	1 LOT

The capacity enhancement of gas compressors of GBS Unit # 1, 2 & 3 was awarded to OEM, i.e. **M/S Dresser Rand India private Limited**. The details of orders are mentioned under reference at sl. No. 4 & 5. The details of works were as follows:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	EQUIPMENT	MAKE / MANUFACTURER	SPECIFICATIO N / MODEL	QTY. SUPPLIED FOR LE OF UNIT # 1, 2 & 3
1	COMPLETE GAS ENDS 16.25"	DRESSER RAND	AS DETAILED IN THE PO	6 NOS.
2	SUCTION SEPERATORS & SUCTION AND DISCHARGE PULSATION SUPPRESSORS, PIPING, INSTRUMENTATION	DRESSER-RAND		6 NOS.
3	DIGITAL PULSATION STUDY	DRESSER-RAND		1

In the 1st phase of LE, only 3 GBS units were considered with a view that the remaining balance inventories against old units are to be utilized in the 4th GBS Unit till LE of the 4th Unit.

4.03.06: EXPENDITURE DETAILS OF 1ST PHASE LE OF GBS

The details of cost involvement for 1st Phase of LE was as follows:

SL. NO.	PO / WO REFERANCES	EXPD. IN (LAKHS)	COMPLETED ON
1	Installation of individual Gas Engine Fuel filter assy. Complete with accessories (For all units)	35.65	Sept-Oct 2014
2	LE of Dresser-Rand Gas Compressors Unit # 1, 2 & 3 (Capacity enhancement)	2,735.21	2015-16
3	Replacement of Gas Engines and its auxiliaries of GBS Unit # 1, 2 & 3	5,097.00	2015-16

DATE OF COMPLETION:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

The erection and commissioning of all 3 (three) units were successfully completed and commissioning date of GBS Unit # 1, 2 & 3 are as follows:

UNIT NO.	ENGINE SL. NO.	GAS COMPRESSOR SL. NO.	COMMISSIONING DATE
GBS UNIT # 1	5283702942	YRH423R	16/09/2015
GBS UNIT # 2	5283702943	YRH424R	12/06/2015
GBS UNIT # 3	5283702964	YRH425R	02/01/2016

Final commissioning of all the three units in all respect is considered as 02/01/2016.

4.03.07: 2ND PHASE OF LIFEEXTENSION (LE) OF 4TH GBS UNIT:

A petition was filed to CERC for Life Extension (LE) of the 4th GBS Unit vide Petition no. 41/GT/2015 for the period from 01/04/2014 to 31/03/2019. The projected additional capital expenditure allowed for the followings:

1. **Rs. 1,647.60 Lakh** for replacement of Gas Engine along-with associated auxiliaries FOR Unit # 4.
2. **Rs. 939.18 Lakh** for LE of Gas Compressor of GBS Unit # 4.

Considering the condition of the 4th GBS unit and to make the system at par with the revamped GBS units, LE of 4th GBS unit was carried out in line with the LE of other three units. Moreover, CERC had allowed for additional capitalization based on the petition submitted to CERC.

Based on the 1st Phase, the details of equipment, specification and quantity required for replacement of Gas Engine along-with associated auxiliaries and Erection & commissioning, the orders were awarded to **M/S CEIPL** vide order references at sl. No. 7 & 8.

Similarly, for capacity enhancement of Dresser-Rand Gas Compressor of GBS Unit # 4, the orders were awarded to M/S Dresser Rand India Private Limited vide order references at sl. No. 9 & 10.

4.03.08: EXPENDITURE DETAILS OF 2ND PHASE LE OF GBS:

The details of cost involvement for 2nd Phase of LE was as follows:

SL.	PO / WO REFERANCES	EXPD. IN	COMPLETED
-----	--------------------	----------	-----------



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

NO.		(LAKHS)	ON
1	Replacement of Gas Engines and its auxiliaries of GBS Unit # 4	1,961.29	01/02/2020
2	Procurement of piston and rod assy. Of 23" HOS cylinder of Dresser-Rand Gas Compressors	29.19	-----
3	LE of Dresser-Rand Gas Compressors Unit # 4 (Capacity enhancement)	884.07	01/02/2020

DATE OF COMPLETION:

The erection and commissioning of 4th GBS unit was successfully completed and commissioning date of GBS Unit # 4 is as follows:

UNIT NO.	ENGINE SL. NO.	GAS COMPRESSOR DETAILS	COMMISSIONING DATE
GBS UNIT # 4	3233586	YRH426R	01/02/2020

4.03.09: KEY BENEFITS OF LE OF GBS

1. Reduce the number of tripping of GBS units subsequently GT and STG.
2. Increase the reliability of the plant.
3. Reduce the consequential losses of the plant due to elimination of frequent tripping of GBS units.
4. Enhance the life of the GT, STG and other equipment of the plant.
5. Reliable power generation.

4.03.10: REFERENCES

1. CERC approval for additional capitalization vide petition order ref. no. 295/2009 & date of order 06/09/201.
2. 1st Phase LE of GBS: Supply order to M/S CEIPL, ref. no. NEEPCO/ED(C&P)/AGBPS/R&M/484 dtd.10/06/13.
3. 1st Phase LE of GBS: Work order to M/S CEIPL, ref. no. NEEPCO/ED(C&P)/AGBPS/R&M/497 dtd.10/06/13.
4. 1st Phase LE of GBS: Supply order to M/S Dresser Rand, ref. no. NEEPCO/AGBPS/HOP/2013-14/W-10(A)/781 dtd. 27/09/2013.

**Detailed Project report on Life Extension (LE) of AGBPS (291MW)**

5. 1st Phase LE of GBS: Work order to M/S Dresser Rand, ref. no. NEEPCO/AGBPS/HOP/2013-14/W-10(A)/856 dtd. 10/10/2013.
6. CERC approval for LE of the 4th GBS Unit vide Petition no. 41/GT/2015 for the period from 01/04/2014 to 31/03/2019.
7. 2nd Phase LE of GBS: Supply order to M/S CEIPL, ref. no. NEEPCO/AGBPS/HOP/2018-19/W-10(A)/635 dtd. 24/01/2019.
8. 2nd Phase LE of GBS: Work order to M/S CEIPL, ref. no. NEEPCO/AGBPS/HOP/2018-19/W-10(A)/642 dtd. 24/01/2019.
9. 2nd Phase LE of GBS: Supply order to M/S Dresser Rand, ref. no. NEEPCO/AGBPS/HOP/2018-19/W-10(A)/332 dtd. 21/08/2018.
10. 2nd Phase LE of GBS: Work order to M/S Dresser Rand, ref. no. NEEPCO/AGBPS/HOP/2018-19/W-10(A)/451 dtd. 03/11/2018.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.04: LIFE EXTENSION (LE) OF CENTRAL AIR CONDITIONING AND VENTILATION SYSTEM OF AGBPS:

4.04.01: INTRODUCTION

3 x 70 TR chiller units have been installed at Central A/C Room at the ground floor of CCR Building along with 2 x 50% Air Handling Units to cater the Air Conditioning requirements of the Central Control Room in the year 1995. The Central AC Plant also caters requirement in the following area through Fan Coil Units:

C & I Office Room	4 nos. of Fan Coil Units.
PEM Office Room	2 nos. of Fan Coil Units.
PLCC & EPABX Room	2 nos. of Fan Coil Units.
C & I Laboratory	2 nos. of Fan Coil Units.
Electrical Laboratory	2 nos. of Fan Coil Units.
Library & Information Centre	4nos. of Fan Coil Units.

The other important areas which are air conditioned by means of Split Air Conditioners are as below:

Local Control Room # 1	3 Nos. 5 TR Split ACs.
Local Control Room # 2	3 Nos. 5 TR Split ACs.
Local Control Room # 3	3 Nos. 7 TR Split ACs.
Local Control Room DM Plant	3 Nos. 3 TR Split ACs.
Chemical Lab of DM Plant	2 Nos. 3 TR Split ACs.
Local Control Room PT Plant	2 Nos. 3 TR Split ACs.
DAS & Computer Room	3 Nos. 3 TR Split ACs.

4.04.02: LIST OF EQUIPMENT OF CENTRAL AC PLANT AND SPLIT PACKAGE TYPE ACs INSTALLED AT VARIOUS PLACES OF AGBPS:

A. CENTRAL AC PLANT



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	EQUIPMENTS	MAKE & DETAILS OF EQUIPMENTS (MODEL/ETC.)	QTY. (NOS.)	LOCATION INSTALLED
1	Chilling unit	Water cooled Reciprocating Chilling Unit, Capacity = 70 TR, Power 415 Volts AC, 3 Ph, 50 Hz. Compressor Model No. JS 64 F-Q50B, Make/Type: Blue Star Limited/Semi-hermetic Condenser: Shell tube type Model: YCD Chiller model: LCH 45 W	3	Central AC plant
2	Sheet Metal Air Handling Units, comprising of Chilling coil, centrifugal forward curved blower, Face bypass damper and Filters.	Blue Star Model No. of AHU: CS 402	2	Air Conditioning Plant.
3	FRP Cooling Tower	Tower Model: 3853, Tower Type: Induced Draft cross flow.	3	Air Conditioning Plant.
4	Fan coil Units	Model: SFC-0800 Serial no. 96A110	16	4 nos. at C & I Office Room. 2 nos. at PEM Office Room. 2 nos. at PLCC & EPABX Room. 2 nos. at C & I Laboratory. 2 nos. at Electrical Laboratory. 4 nos. at Library & Information Centre.

B. SPLIT TYPE PACKAGE AC:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	EQUIPMENTS	MAKE & DETAILS OF EQUIPMENTS (MODEL/ETC.)	QTY. (NOS.)	LOCATION INSTALLED
1	Split type Package Air conditioner:	7.5 TR capacity	3	LCR # 3
		5.0 TR capacity	6	3 nos. at LCR #1
				3nos. at LCR # 2
		3.0 TR capacity	10	3 nos. at LCR DM Plant
				2 nos. at Chemical Lab of DM Plant
				2 nos. at LCR PT Plant.
				3 nos. at DAS & Computer Room.

4.04.03: COMPLETED LIFE EXTENSION (LE) WORKS OF CENTRAL AC PLANT AND SPLIT AC DURING 2019-20 TO 2021-22:

The Central Air Conditioning system, split package AC and all other ventilation system of the plant was commissioned in the year 1995 by M/S Blue Star Limited. The life of the plant has already completed 25 years and due to aging frequent breakdown of some equipment occurred.

The existing Chillers are water cooled reciprocation type of capacity 70 Ton each. The **Reciprocating type compressors** are used in chiller plants in comfort applications of cooling capacities between 15 TR to 240 TR but are rarely sold these days as this technology has become almost obsolete because there are newer and more energy efficient technologies available. Reciprocating compressors operate with single or multiple piston heads to modulate the capacity. Capacity control happens in stepped manner unlike screw compressors which operate on stepless capacity control mode. Although the reciprocating compressor-based chillers irrespective of application are very robust, but due to technical advantages of new generation Scroll and Screw type compressor over reciprocating compressors, this technology has taken a backseat.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Scroll compressors are one of the most used chillers in small to medium capacities (11 TR to 120 TR) allowed companies to develop multiple circuit chillers. It is economical to purchase a scroll compressor based for these capacities. Full load and part load performance was a little better than reciprocating compressors. A water-cooled scroll compressor can operate at a specific power consumption of 0.8 to 0.84 at full load if properly designed, selected, installed and commissioned. Scroll compressors work with a stationary scroll and a revolving scroll within which compresses refrigerant during the scrolling action. Reciprocating compressors cannot compress the remnant compressor left in the clearance volume between the piston and cylinder head but scroll compressors overcome this shortcoming of reciprocating compressors. Scroll compressors cannot be overhauled at site while reciprocating compressors can be overhauled and spares are replaceable. Capacity control in scroll compressors is done by switching on and off compressors one by one depending the leaving water temperature set point. Scroll compressors have to be replaced with new scroll compressors when there is a failure. If the system is poorly designed/ maintained or the power quality is not up to the mark the maintenance cost of scroll compressors can be very high. Scroll type compressors are generally not used in low temperature refrigeration (secondary refrigerant leaving temperature less than 4 deg C) application and would not like to comment on the same.

Screw compressors: Among the small (80 TR) to medium sized (up to 900 TR) capacity chiller packages, screw chillers which operate with either vertical hermetic screw compressors or horizontal semi-hermetic screw compressors, are arguably the most energy efficient chillers. The compressors use single to two screw lobes-based screw compressors which rotate to produce suction and delivery effect between two ends. Capacity control is generally done using a slide valve mechanism in case if the starter is not VSD based (with star delta/ double delta/ soft starter based starting mechanism). In case of VSD based screw compressor, the speed drive itself varies the RPM of the compressor motor. In all cases, capacity control happens based on the leaving chilled water/ brine temperature. Most of the screw chillers operate with flooded evaporator (refrigerant on the shell side and water/ brine in the tube side) allowing faster and more efficient heat exchange due to higher mass flow rate of refrigerant than that compared with DX evaporators. The screw chillers are preferred by most users who have medium capacity loads because they are economical for those capacities as mentioned above (can get faster



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

payback). Specific power consumption of water-cooled screw chillers could be around 0.55 (for higher capacities) to 0.72 (for medium capacities) at full load. Stepless operation of these chillers have helped innovate variable primary chilled water flow kind of innovations which are much more energy efficient than standard constant flow primary pumping set up.

Centrifugal compressors: Centrifugal force is used as the means to compress refrigerant. The refrigerant circuitry is similar to screw chillers. Centrifugal compressor-based chiller packages are the most energy efficient chillers for larger capacities (400 TR to 1500 TR). Specific power consumption of standard centrifugal compressor-based chillers at peak load could be as low as 0.45 to 0.65. Centrifugal compressors are available in oil free type also wherein bearings operate on the concept of magnetic levitation. Suppliers even promise a specific power consumption as low as 0.3 kW/TR for this type. Centrifugal chillers have a great demand in district cooling systems, large office premises and large malls especially for comfort air conditioning applications.

Keeping in view of above, Life Extension (LE) of Central AC plant is considered in phase manners by replacement of Reciprocating Type Chillers with Screw Type Chillers of 80 Tr capacity, replacement of Split ACs. Fan Coil units, cooling towers, etc. installed at our plant.

4.04.03.01: LE OF AIR CONDITIONING (AC) AND VENTILATION SYSTEM:

For effective cooling of DDC (Distributed Digital Control) rooms (where all the control panels for combined cycle operation, GTG operations, Diverter Damper operations, etc are installed), 5 numbers of 8 Ton capacity Floor Standing AC are installed and commissioned. The order was placed to M/S Ankit Appliances, vide order ref. no. NEEPCO/AGBPS/SFC/O&M-13/2020-21/500 dtd. 29/10/2020 for supply, installation and commissioning of 5 numbers of 8 Ton capacity floor standing AC. The date of commissioning was 29/01/2021.

In addition to above, two orders were placed to M/S Blue Star Limited vide order ref. no. NEEPCO/AGBPS/SFC/O&M-13/2021-22/197 dtd. 28/06/2021 & NEEPCO/AGBP/SFC/O&M-13/2021-22/526 DTD. 21/12/2021, for replacement of 3 numbers of 70 TR reciprocating chiller units with 2 numbers of 80 TR Screw Chiller along with 3 numbers of cooling towers and other accessories.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

For efficient cooling at DM plant laboratory, DM plant PLC room, C&I office and laboratory, PEM laboratory, a order was placed to M/S R. B. Electronics for replacement of old Split AC by new 10 numbers of Split AC (2 Ton capacity each).

The 1st phase of replacement has considered following equipment:

SL. NO.	EQUIPMENTS	EXISTING EQUIPMENTS (MODEL/ETC.)	EQUIPMENT INSTALLED / TO BE INSTALLED IN 1ST PHASE
1	Floor Standing AC for DDC room	-	5 numbers of 8 Ton capacity Floor Standing AC are installed at commissioned on 29/01/2021
2	Chilling unit	Water cooled Reciprocating Chilling Unit, Capacity = 2 X 70 TR, Power 415 Volts AC, 3 Ph, 50 Hz. Compressor Model No. JS 64 F-Q50B, Make/Type: Blue Star Limited/Semi- hermetic Condenser: Shell tube type Model: YCD Chiller model: LCH 45 W Along with other condenser and chiller pumps.	3 numbers of 80 Tr capacity Water Cooled Screw Type Chiller units are installed.
3	FRP Cooling Tower	Tower Model: 3853, Tower Type: Induced Draft cross flow. Qty.: 2 nos.	3 nos. of FRP cooling Towers minimum heat rejection capacity 80 TR are installed.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4	Split AC	10 X 3.0 TR capacity at DM Plant (3 nos.), Chemical Lab (2 nos.) & DAS & Computer Room (3 nos.)	1. 2 numbers of 2 Ton capacity Split AC for DM Laboratory are installed. 2. 4 nos. of 2 Ton capacity Split AC for DM PLC room are installed. 3. 2 numbers of C&I office room are installed. 4. 2 number each is C&I and PEM Lab are installed.
---	----------	---	---

4.04.03.02: DETAILS OF EXPENDITURE FOR LIFE EXTENSION (LE) OF CENTRAL AC PLANT AND REPLACEMENT OF SPLIT TYPE AC OF THE PLANT:

A. REPLACEMENT OF FLOOR STANDING AC AND SCREW TYPE OF WATER-COOLED SCREW CHILLER (3 X 80 TR. CAPACITY) ALONGWITH FRP COOLING TOWERS (3 NUMBERS):

Orders has been placed to M/S Blue Star Limited (OEM of our central AC plant), M/S Ankit Appliances and M/S R. B. Electronics for the following works and the total financial involvement is as follows:

SL. NO.	DESCRIPTION	AMOUNT IN INR (Lakhs)	DATE OF COMPLETION
1	Installation of 5 nos. of Floor Standing AC (8 Tr. Capacity each) for DDC room at CCR building	12.26	Completed on 29.1.2021
2	Replacement / retrofitting of 3 nos. of 70 Tr. Existing chiller units by new 3 nos. of 80 Tr. Water cooled Screw Compressors at Central AC plant along with other accessories	88.17	Completed on 24.11.2021 & 26.03.2022

B. REPLACEMENT OF 2 TR CAPACITY DUCTABLE SPLIT AC AT DM PLANT, C&I OFFICE AND LABORATORY, PEM LABORATORY:

A order has been placed to M/S R.B. Electronics, the financial involvement shall be:

SL. NO.	DESCRIPTION	AMOUNT IN	DATE OF
---------	-------------	-----------	---------



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

		INR (LAKH)	COMPLETION
1	<i>Replacement of old split AC by new one at DM plant and other area of the plant (2 numbers at DM Laboratory, 3 nos. at DM PLC room, 2 numbers at C&I office room and 1 number each at C&I & PEM Lab and GBS Control room)</i>	06.62	Aug-2021

C. KEY BENEFITS:

1. *Extension of Chillers and other equipment life.*
2. *Availability and reliability of cooling for various control panels at DDC room at CCR building.*
3. *Reduction in Running Energy Cost through optimized performance during off peak conditions.*
4. *Reduced Repair/Maintenance Costs.*
5. *Reduced CO2 Emissions.*
6. *Replacement of Chiller without major interruption.*



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.05: DETAILS OF LIFE EXTENSION (LE) FOR PLANT ELECTRICAL SYSTEM, LIKE, CIRCUIT BREAKER, GENERATOR, EXCITER, SWITCH YARD, BATTERY BANK, CHARGER ETC. OF THE PLANT

4.05.01: INTRODUCTION:

Plant Electrical Maintenance Division is one of the core maintenance division of AGBPS, NEEPCO to carry out the maintenance of all electrical equipment/systems, transformer & switchyard, Generators & exciter, etc of the plant. The objective of Plant Electrical Maintenance Division is to reduce forced outage due to plant electrical system, carry out plant maintenance as per schedule and optimization of maintenance cost to achieve generation target of the plant.

The electrical equipment is in operation almost for 25 years since commissioning of this plant. Based on operating conditions, aging factor, life periods of equipment's and non-timely availability of spare parts, it has reached the time to review for Life Extension and Retrofitting works.

It is apprised that as per Indian Electricity Grid Code, all agencies connected to ISTS would ensure providing of RTU and other communication equipment as specified by RLDC/SLDC. The RTU of AGBPS originally installed by M/S PGCIL was reporting real time data from AGBPS to NERLDC for long period and raised the matter in many OCC Meetings. As such to comply CERC regulation and as per decision of OCC Meeting, this department has taken necessary initiative on topmost priority through limited tender and successfully completed the Retrofitting, Integration, Testing and Commissioning of RTU at AGBPS, Bokuloni within shortest possible time framed by NERPC. As a result, this department is capable to achieve the appreciation letter vide no: User NE/2016-17/5/7513-16 dtd.20/01/2017 from the POSOCO/NERLDC, Shillong for successful & timely completion of retrofitting of RTU, AGBPS that was the 1st retrofitting works within the NER.

Life extension (LE) of some critical electrical equipment's has already completed and other critical & essential retrofitting/uprating works as per planning is to complete within next 5(five) years plan i.e. 2024-25 to 2029-30 in phase wise.

LE of 2 (two) critical & remarkable retrofitting works i.e. 4KVA UPS for GTG#1 and 2x100KVA central UPS system has already completed. It is to state that 4KVA UPS for GTG#1



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

that was out of service since long back and which has been providing critical 110V AC power to controller of GT#1 and GBS#1&2. Also, one module of 2x100KVA UPS providing critical control power 110V/230V AC to MHI of STGs, GTGs (for C&I) was out of two was nonfunctioning since long back and could not able to attend the servicing/repairing due to non-availability of spares. Both of critical retrofitting works of 4KVA UPS for GTG#1 and 2x100KVA central UPS system including 5KVA UPS at independently GBS has successfully completed online without major outage of generating units and within schedule time.

As a part of LE works, replacement of old obsolete thermal overload relays of different motors of this plant by retrofitting/uprating L & T makes Mini Motor Protection Relay have saved from frequent damage of motor winding as well as saving the repairing cost of the motors with negligible financial involvement.

Detailed Implementations & planning for Life Extension (LE) of electrical equipment's including procurement of critical spares, which have already become obsolete, on the verge of expiry of its useful life periods, etc. are enlisted as follows:

4.05.02: A DETAIL OF MAJOR ELECTRICAL EQUIPMENT WITH SPECIFICATIONS:

Sl. No.	Equipment	Specification	Qty.	Physical location
1	Generator GTG-1 to GTG-4	44.6 MVA, 35.68 MW, 11 KV, 2341 Amp, P.F = 80%(lagging), 3000 R.P.M, Mitsubishi	04	GTG Building
2	Exciter	267 KVA, 0.9 pf, 240KW, 160V (AC), 8 P, 200 Hz, 3000 rpm. Mitsubishi	04	GTG Building
3	Generator GTG-5& 6 and STG-1 to 3.	44.625 MVA, 35.7 MW, 11 KV, 2341 Amp, P.F = 0.8 (lagging), 3000 R.P.M, Type- TAR1800-26P BHEL	05	GTG Building & STG Building
4	Exciter	Type- ELR44/22-30/6-3 Exciter Voltage-210 V, Exciter Current- 706 Amp Field Voltage- 220V Field current- 26 Amp.	05	GTG Building & STG Building
5	11 KV Isolated Phase Bus duct.	12 KV, 2900/200Amp, Mitsubishi	4 sets	GTG Building & Trans. yard
6	11 KV Isolated Phase Bus duct.	11 KV, 3000/100 Amp, BHEL	5 sets	GTG Building, STG Building & Trans.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Sl. No.	Equipment	Specification	Qty.	Physical location
				yard
7	Generator Transformer (1-4)	50 MVA, 11/220 KV, Mitsubishi	4 Nos.	Trans. Yard
8	Generator Transformer (5-9)	50 MVA, 11/220 KV, BHEL	5 Nos.	LCR & CCR
09	Local GT Control Panel		6 Nos.	LCR
10	Unit Aux. Transformer for GTG# 1 to4	500 KVA, 11 KV/433 Volts. Mitsubishi	4 Nos.	Transformer yard
11	Unit Aux. Transformer for GTG# 5 & 6.	500 KVA, 11 KV/433 Volts. BHEL	2 Nos.	Transformer yard
12	Station Transformer	15 MVA, 6.6/220 KV, BHEL	2 Nos.	Trans. Yard
13	Aux. Distribution Transformer	500 KVA, 6.6KV/433Volts.Mitsubishi	2 Nos.	GBS
		2MVA, 6.6KV/433 Volt., CG	10 Nos.	Diff. loc
		630 KVA, 11 KV/433 Volts.	1 Nos.	Intake W/P
		630 KVA, 6.6 KV/11 KV., CG	1 Nos.	Near HoP Off.
14	Switchyard Equipment			
1	Circuit Breaker	245 KV, Type 3AVI, BHEL	14 Sets.	Switchyard
2	Isolator	245 KV, 3 Pole Horizontal upright mounting, center break type	43 nos.	Switchyard
3	Current Transformer	245 KV, Turn Ratio (1/150 for Gen, 1/50 for Station, 1/800 for line & B/C)	14 Sets	Switchyard
4	Potential Transformer	220KV / 110 Volt, 2 Core, Make-BHEL	2 Sets	Switchyard
5	C.V.T.	220 KV / 3/ 110 V/ 3, 3 Core, accuracy 3P,3P,0.5 P, BHEL	2 Sets.	Switchyard
6	Lighting Arrestor	216 rms, 10 KA nominal Discharge	11Sets.	Trans. Yard
7	Lighting Arrestor	216 rms, 10 KA nominal Discharge	03	Switchyard
8	Wave Trap	220 KV	4 Nos.	Switchyard



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Sl. No.	Equipment	Specification	Qty.	Physical location
	9 | PLCC		5 Nos.	PLCC Room
15	Control, Relay Panel & PLCC Panel	Control panel (1 Panel per Bay)	14 Nos.	CCR
		Relay Panels (1 Panel per Bay)	14 Nos.	CCR
		CBRP	1 Nos.	CCR
		Protection Panel (1 Panel per Bay)	14 Nos.	CCR
16	Battery Chargers & UPS	220 V DC, 100 A, AFCO	6	STG 0 Mtrs
		220 V DC, 40A, I/P- 415 VAC, 3 ϕ charger, Chhabi Electrical	2	GBS
		300-220 VDC, 35 A, SABNIFE	2	CCR 0 Mtrs
		125V DC, 100A, 415 VAC, 3 ϕ Charger & 115V AC, 50 Hz, 1 ϕ Inverter Chhabi Electrical	2	LCR-1
		125V DC, 100A, 415 VAC, 3 ϕ Charger & 115V AC, 50 Hz, 1 ϕ Inverter SAFT NIFE, MHI	2	LCR-2
		300-125 V DC-50 A SABNIFE	2	LCR-3
		40 V 500AH & 48 V DC, Caldyne	4	CCR 0 Mtrs
		24 V DC / 650 A, AFCO	6	CCR 0 Mtrs
		100 KVA, 230 VAC, 360 VDC UPS, Consul Neowatt	2	CCR 0 Mtrs
17	Battery Bank	380 Volts, EXIDE, YHP11, 535AH	1 Nos.	Battery room (CCR 0 mtr.)
		220 Volts, EXIDE, TI600H	2 Nos.	
		220 Volts, EXIDE YKP15 175AH	2 Nos.	GBS
		220 Volts, EXIDE TL 700H, 700AH	3 Nos.	Battery room (STG 0 mtr)
		120 V, EXIDETM 400H, 400AH		LCR -3
		125 Volts	6 Nos.	GT building
		48 Volts, EXIDE, STBS500, 500AH	2 Nos.	Battery room (CCR 0 mtr.)
		24 Volts, 1900 AH, EXIDE	6 Nos.	
18	<u>6.6 KV Panel</u> i) OCA ii) OCB iii) OCC		3 Nos.	i) CCR 0 mtr ii) STG 0 mtr iii) CW pump house



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Sl. No.	Equipment	Specification	Qty.	Physical location
19	6.6 kV VCB		35 nos.	
20	<u>LT Panel</u> i) ODA ii) ODB iii) ODC iv) ODD v) ODE vi) 1 DA vii) 1DF viii) 2DA ix) 2DF x) 3DA xi) 3DF xii) GBS	415 Volts PCC/PMCC	12 Nos.	i) CCR '0' mtr ii) CCR '0' mtr iii) F/F Pump House iv) CCR '0' mtr v) CW Pump House vi) GTG#1 Switchgear vii) GTG#2 Switchgear viii) GTG#3 Switchgear ix) GTG#4 Switchgear x) GTG#5 Switchgear xi) GTG#6 Switchgear xii) GBS
21	415 V ACB		73	
22	<u>415 V MCC Panel</u> 1. 1HP 2. 2HP 3. 3HP 4. 1KK 5. 2KK 6. 3KK 7. 1DU 8. 2DU 9. 3DU 10. OTA 11. OSC 12. OSH 13. OSD 14. OSJ	415 V MCC Panel	29 nos.	1. STG '0" mtr 2. STG '0" mtr 3. STG '0" mtr 4. STG '0" mtr 5. STG '0" mtr 6. STG '0" mtr 7. STG '0" mtr 8. STG '0" mtr 9. STG '0" mtr 10. CCR '0" mtr 11. Pre-Treatment Plant MCC 12. Effluent Plant MCC 13. Air Compress



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Sl. No.	Equipment	Specification	Qty.	Physical location
	15. OSE 16. OSE 17. OSF 18. 1QU 19. 2QU 20. 3QU 21. 1TA 22. 2TA 23. 3TA 24. ODG 25. OSG 26. OSA 27. GTG#5 CW Panel 28. GTG#6 CW Panel 29. Chlorination Plant MCC			MCC 14. Fire fighting MCC 15. DM plant MCC 16. Clarified water pump house 17. Raw water MCC 18. STG# '0' mtr. 19. STG# '0' mtr. 20. STG# '0' mtr. 21. GT # 6 MCC room 22. GT # 4 MCC room 23. GT # 2 MCC room 24. CCR '0" mtr 25. Workshop 26. LVAC 27. GTG#5 CW Panel 28. GTG#6 CW Panel 29. Chlorination Plant
23	Various Motors (6.6 KV & LT motors)		874 nos.	
24	Relays mounted in various panels			



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.05.03: COMPLETED LIFE EXTENSION (LE) OF PLANT ELECTRICAL EQUIPMENT DURING THE PERIOD 2019-20 TO 2023-24 (UPTO DEC 2023):

SL. NO.	DESCRIPTION	DATE OF COMPLETION	AMOUNT IN INR (LAKH)	REMARKS
1	20 MVAR Line Reactor	24.10.2017	122.72	25 YEARS
2	Replacement of 2 sets 48 V PLCC Battery Bank (48 V, TBS (Opz) 500 AH Exide make Tubular Lead Acid Stationary Battery Bank through Exide Industries Ltd. (the OEM))	10.06.2019	30.21	15 YEARS
3	Supply, Installation & Commissioning of External GPS system for synchronization of RTU at AGBPS through the OEM of RTU	19.06.2019	2.81	15 YEARS
4	Retrofitting, Installation, testing & Commissioning of 2x100 KVA UPS along with 180 Nos. plante Batteries, 1 No. SCVS, 3 Nos. output ACDBs etc.by replacing old obsolete UPS System through open tender (M/s Consul Neowatt Power Solutions Pvt. Ltd.) (Central UPS at CCR "0"- meter)	28.08.2019	119.78	10-15 YEARS
5	Retrofitting of Numerical Relay at 6.6 KV OCC Panel & 415 V fire Fighting Panel (P241=7 nos.; P14N=4 nos.; P94V=2 nos.)	16.10.2019	18.78	10-15 YEARS



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

6	Retrofitting, Testing and Commissioning of 8(eight) nos. 245 KV SF6 Spring Operated Mechanism Circuit Breaker as per Breaker Standard IEC 62271-100 by dismantling old existing BHEL make 245 KV SF6 CB including Mandatory Spare Parts of GTG Unit # 1-6, B/C & STG Unit # 3.	2020-21	162.78	15 YEARS
7	Procurement of transformer filtration plant	25.06.2021	29.66	15 YEARS
8	Retrofitting 7 (Seven) nos. 245 KV SF6 circuit breaker including mandatory spare parts and AMC.	2021-22	145.11	15-20 YEARS
9	Major overhauling / servicing of M/S CGL make aux. transformer (2 MVA) (8 nos.)		12.74	15 YEARS
10	Upgradation of protection of 415 v system (auxiliary panel) with numerical relay		34.95	15 YEARS
11	Procurement of M/S BHEL make 50 MVA generator transformer		525.10	15 YEARS
12	Major overhauling / servicing of M/S MITSUBISHI make generator and exciter (GTG Unit # 2).	2022-23	78.18	15 YEARS
13	Retrofitting, testing and commissioning of 245 KV current transformer	28-06-2023	222.94	15 YEARS
14	Procurement/installation of disturbance recorder and event logger (DR & EL)	26-09-2023	59.74	15 YEARS



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

15	Major overhauling / servicing of M/S BHEL make generator and exciter (GTG Unit # 5)	Dec-23	76.70	15 YEARS
16	Commissioning of 50 MVA new Generator transformer of GT#5	Dec-23	44.52	15 YEARS

4.05.04: LE AND RETROFITTING PROGRAMME TO BE IMPLEMENTED DURING THE PERIOD 2023-24 (JAN 2024) TO 2029-30 FOR VARIOUS ELECTRICAL EQUIPMENT AND SYSTEM OF THE PLANT

4.05.04.01: RETROFITTING OF STATIC RELAYS BY NUMERICAL RELAYS IN MHI GENERATORS (GTG#1-4):

a) Equipment: Protection system of Mitsubishi make GTG 1-4.

b) Purpose: The old relays are continuously in service for last 25 years and becoming old/obsolete. Moreover, they had completed their expected life period and prone to malfunctioning with time. As such, it is proposed for upgrading of protection system GTG 1-4 to numerical relays in phased manner.

c) Process: It is proposed to procure and install the relays through the OEM i.e. M/s GE T&D India Ltd.

d) Estimated Budget: The estimate is prepared based on the budgetary offer received from M/S MHI, Japan vide ref. no. Ref. no. XAF-NEEPCO-M4616U265-SP DTD. 05/04/2018, XAF-NEEPCO-M4616U265-RT DTD. 05/04/2018 & XAF-NEEPCO-M4616U265-0-VS-TA DTD. 05/04/2018. The total estimated amount is **Rs.1,744.07 Lakh**.

e) Target of completion: In phased manner within 2024-25, 2025-26, 2026-27, 2027-28

f) Technical & Cost benefit Effectiveness/Results: Numerical relays inherently are much superior to our existing Static relays from the operational speed, flexibility and reliability point of view.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.05.04.02: REPLACEMENT OF 24V AND 220V DC AFCOSET MAKE BATTERY CHARGER

(OBSOLETE) WITH NEW UPGRADED CHARGER – 12 (TWELVE) NOS:

a) Equipment: 220 V DC Chargers: 220 V DC, 100 A, Make: AFCO (6 Nos.) {For STG- 1, 2, 3 & GTG # 5 & 6 and protection system of all 6.6 KV & 415 Volts}, 24 V DC Chargers: 24 V DC/ 650 A, Make: AFCO (6 Nos.) {For Pro-control and DDC panels of STG Control system.}

b) Purpose of Replacement: There are 12 (twelve) numbers of AFCOSET make battery chargers at AGBPS of rating 220 Volts (DC) and 24 Volt (DC). 220 Volts (DC) chargers (6 Nos) are required for 220 Volt D.C. devices (like EOP, DC JOP) of STGs, Generator Relay Panel of STG- 1,2,3 & GTG # 5 & 6 and also protection system of all 6.6 KV & 415 Volts. Drives. 24 V DC AFCOSET Charger (6 Nos) are required for Pro-control and DDC panels of STG Control system. AFCOSET (the OEM of the Chargers) has discontinued manufacturing and service activities of battery chargers. Moreover, the aging electric/electronic components and non-availability of spare parts is a concern for the chargers, as such the chargers are considered for upgradation.

c) Procurement Process: Open Tender through E-Tendering among the manufacturer/manufacturer's authorized dealer of the battery chargers.

d) Estimated Budget: Rs.229.22 lakh (Rs 14.2 Lakh/set, As per last Order (2017) for GTG#1/2, the price of Battery Charger Rs.12.4 lakh/set. Considering +10% to 15% margin for probable increase of price in subsequent years, the estimated Price may be considered around Rs.14.2 lakhs/set.

e) Target of completion: Within 2024-25.

f) Technical & Cost benefit Effectiveness/Results: Upgraded Chargers will increase the reliability of DC system, Spare support and service support will be available for next 15-years and Chargers will be supplied with latest technology and new electronic components.

4.05.04.03: MAJOR OVERHAULING/SERVICING OF M/S MITSUBISHI MAKE GENERATOR AND EXCITER (GTG # 1, 3 & 4).

a. Equipment: M/s Mitsubishi make Generator and Exciter (GTG#1, 3 & 4).

b. Purpose: As per the recommendations/instruction given in the O&M instruction manual, inspection and overhauling of the turbine generators, exciter with accessories are required to ensure for reliable operation of the turbo generators. Inspection and Overhauling provides the opportunity for taking corrective measures if any faults gets detected which otherwise may



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

cause a major failure resulting generation loss, even breakdown and consequently a very high restoration cost. Initial Major Inspection of Generator & Exciter for Gas Turbine U # 1- 4 had been executed during the period from 2008-2010 and has already due for full scale inspection for each MELCO units. It is to be noted that the Stator and Rotor of Generator have to rewind or replace before reaching design life period, i.e. 25 years as per standards procedures of OEM. Based on guidelines of OEM to enhance life periods, NEEPCO has express the views to carry out servicing/overhauling of Gas Turbine Generator, Exciter, UAT, MCC one by one in phase manner.

c. Estimated Budget: Rs.540.56 lakh. The estimate is based on the last PO & WO placed to M/S MHI for GTG # 2. The estimate is Based on last PO TO M/S MHI REF. NO. NEEPCO/AGBP/PEM/2020-21/O&M-05/260 DTD. 17/10/2020, PO TO M/S MHI REF. NO. NEEPCO/AGBP/PEM/2020-21/O&M-05/229 DTD. 10/09/2021 & WO TO M/S MHI REF. NO. NEEPCO/AGBP/PEM/2020-21/O&M-05/268 DTD. 23/10/2021

d. Target of completion: Within 2025-26

e. Present Status: To be process after obtaining offer from M/s MHI, Japan.

f. Technical & Cost benefit Effectiveness/Results: Overhauling will ensure reliable operation of the turbo generators and it will provide Opportunity for taking corrective measures if any faults get detected which otherwise may cause a major failure resulting generation loss, even breakdown and consequently a very high restoration cost.

4.05.04.04: PROCUREMENT OF SPARES FOR MAJOR OVERHAULING/SERVICING OF M/S BHEL MAKE GENERATOR AND EXCITER (U# 5, 6, 7, 8 & 9):

a) Equipment: M/s BHEL make Generator and Exciter (U# 5, 6, 7, 8 & 9).

b) Purpose: As per the instruction given in the O&M instruction manual for Turbine Generator and accessories (M/s BHEL Make), inspection and overhauling of the turbine generators are required to ensure reliable operation of the turbo generators. Inspection and Overhauling provides the opportunity for taking corrective measures if any faults gets detected which otherwise may cause a major failure resulting generation loss, even breakdown and consequently a very high restoration cost. First Overhauling/inspection of the all the generators already completed. As per the instruction manual full-scale inspection has to carry out after eight to twelve years. As such, we have planned to be carry out second



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

overhauling/servicing of Gas Turbine Generator and Exciter # 5. Spares were already procured for overhauling of GTG#5. As such, overhauling Spares needs to be procured for U# 6, 7, 8, 9

c) Procurement Process: Single offer basis from M/s BHEL, OEM of Gas Turbine generator and exciters.

d) Estimated Budget: Rs.413.95 Lakh. The estimate is based on earlier PO placed to M/S BHEL, vide ref. no. NEEPCO/AGBP/PEM/O&M-05/19-20/494 dtd. 06/02/2020 & NEEPCO/AGBP/PEM/O&M-05/20-21/39NCA153/449 dtd. 10/02/2021 for supply of overhauling spares for 1 unit.

e) Target of completion: 2024-25 (GTG#6), 2026-27 (STG#1), 2027-28 (STG#2), 2028-29 (STG#3)

f) Technical & Cost benefit Effectiveness/Results: Overhauling will ensure reliable operation of the turbo generators and Provide Opportunity for taking corrective measures if any faults get detected which otherwise may cause a major failure resulting generation loss, even breakdown and consequently a very high restoration cost.

4.05.04.05: MAJOR OVERHAULING/SERVICING OF M/S BHEL MAKE GENERATOR AND EXCITER (GTG # 5, 6, 7, 8 & 9):

a) Equipment: M/s BHEL make Generator and Exciter (U# 5, 6, 7, 8 & 9).

b) Purpose: As per the instruction given in the O&M instruction, for Turbine Generator and accessories (M/s BHEL Make), inspection and overhauling of the turbine generators are required to ensure reliable operation of the turbo generators. Inspection and Overhauling provides the opportunity for taking corrective measures if any faults get detected which otherwise may cause a major failure resulting generation loss, even breakdown and consequently a very high restoration cost. First overhauling/inspection of the all the generators already completed. As per the instruction manual full-scale inspection has to carry out after eight to twelve years. As such, we have planned to be carry out second overhauling/servicing of Gas Turbine Generator and Exciter # 5. Spares were already procured for overhauling of GTG#5.

c) Procurement Process: Single offer basis from M/s BHEL, OEM of Gas Turbine generator and exciters.

d) Estimated Budget: Rs.390.72 Lakh. The estimate is based on offer received from M/s BHEL,



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

HYDERABAD for Technical Advisory service charges for major overhauling and testing of Generator and Exciter of GTG # 5 VIDE HY/ES/21FSSQ905084/2021-22 DATED 20.08.2021.

e) Target of completion: 2022-23 (GTG#5), 2024-25 (GTG#6), 2026-27 (STG#1), 2028-29 (STG#2), 2029-30 (STG#3)

f) Technical & Cost benefit Effectiveness/Results: Overhauling will ensure reliable operation of the turbo generators and Provide Opportunity for taking corrective measures if any faults get detected which otherwise may cause a major failure resulting generation loss, even breakdown and consequently a very high restoration cost.

4.05.04.06: RETROFITTING, TESTING AND COMMISSIONING OF CAPACITIVE VOLTAGE TRANSFORMER (CVT), BUST PT :

a) Purpose of Retrofitting/Installation: We are having 2 sets of CVT in our plant. These CVTs were manufactured in the year 1994 and in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive Life Extension works. As such, we proposed to carry out retrofitting of these CVTs in phase manner.

The Bus Potential Transformers are in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive Life Extension works. As such, we proposed to carry out retrofitting of these Bus PT.

b) Estimated amount: Rs.74.47 Lakh. The order has already been placed to M/S Everlite Engineering Industries vide PO ref. no. GEMC-51168777118 dtd. 08/02/2023.

c) Target of completion: 2024-25

d) Technical & Cost benefit Effectiveness/Results: It will enhance the reliability of the system.

4.05.04.07: RETROFITTING, TESTING AND COMMISSIONING OF LIGHTENING ARRESTER (LA):

a) Purpose of Retrofitting/Installation: We are having 14 sets of LA in our plant. These LAs were manufactured in the year 1994 and in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

for comprehensive works for Life Extension. As such, we proposed to carry out retrofitting of these LAs in-phase manner.

b) Estimated Budget: Rs.70.52 Lakh. The estimation is Based on budgetary offer received from M/S OBLUM Electrical Industries Private Limited, vide ref. no. AST/Oblum/NEEPCO/216KV/2021 dtd. 07/12/2021.

c) Target of completion: 2024-25

d) Technical & Cost benefit Effectiveness/Results: It will enhance the reliability of the system.

4.05.04.08: RETROFITTING, TESTING AND COMMISSIONING OF 245 KV HCB ISOLATOR:

a) Purpose of Retrofitting/Installation: We are having 42 sets of 245 KV HCB ISOLATOR in our plant. These isolators were manufactured in the year 1994 and in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive works for Life Extension. As such, we proposed to carry out retrofitting of these isolators in phase manner.

b) Estimated Budget: Rs.719.43 Lakh. Based on the budgetary offer received from M/S Hitachi ABB vide ref. no. CPP-21-673363 dtd. 30/03/2021.

c) Target of completion: 2026-27, 2027-28, 2028-29

a) Technical & Cost benefit Effectiveness/Results: It will enhance the reliability and safety of the system. Newly installed isolators will reduce the loss of generation in case of failure of the old isolators.

Based on the above, the LE works which were already completed (2019 to Dec 2024) and LE works to be completed (Jan 2024 to 2029-30) are summarized as below:

Table: C

Sl. No.	Item	Date of Commissioning / Proposed date	Expenditure (Lakhs)	Expected Life Extension	Remarks
1	20 MVAR Line Reactor	24.10.2017	122.72	25 YEARS	Completed
2	Replacement of 2 sets 48 V PLCC Battery Bank (48 V, TBS (Opz) 500	10.06.2019	30.21	15 YEARS	Completed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

	<i>AH Exide make Tubular Lead Acid Stationary Battery Bank through Exide Industries Ltd. (the OEM))</i>				
3	<i>Supply, Installation & Commissioning of External GPS system for synchronization of RTU at AGBPS through the OEM of RTU</i>	19.06.2019	2.81	15 YEARS	Completed
4	<i>Retrofitting, Installation, testing & Commissioning of 2x100 KVA UPS along with 180 Nos. plante Batteries, 1 No. SCVS, 3 Nos. output ACDBs etc.by replacing old obsolete UPS System through open tender (M/s Consul Neowatt Power Solutions Pvt. Ltd.) (Central UPS at CCR "0"- meter)</i>	28.08.2019	119.78	10-15 YEARS	Completed
5	<i>Retrofitting of Numerical Relay at 6.6 KV OCC Panel & 415 V fire Fighting Panel</i>	16.10.2019	18.78	10-15 YEARS	Completed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

	(P241=7 nos.; P14N=4 nos.; P94V=2 nos.)				
6	Retrofitting, Testing and Commissioning of 8(eight) nos. 245 KV SF6 Spring Operated Mechanism Circuit Breaker as per Breaker Standard IEC 62271-100 by dismantling old existing BHEL make 245 KV SF6 CB including Mandatory Spare Parts of GTG Unit # 1-6, B/C & STG Unit # 3.	2020-21	162.78	15 YEARS	Completed
7	Procurement of transformer filtration plant	25.06.2021	29.66	15 YEARS	Completed
8	Retrofitting 7 (Seven) nos. 245 KV SF6 circuit breaker including mandatory spare parts and AMC.	2021-22	145.11	15-20 YEARS	Completed
9	Major overhauling / servicing of M/S CGL make aux. transformer (2 MVA) (8 nos.)		12.74	15 YEARS	Completed
10	Upgradation of protection of 415 v system (auxiliary panel) with numerical relay		34.95	15 YEARS	Completed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

11	Procurement of M/S BHEL make 50 MVA generator transformer		525.10	15 YEARS	Completed
12	Major overhauling / servicing of M/S MITSUBISHI make generator and exciter (GTG Unit # 2).	2022-23	78.18	15 YEARS	Completed
13	Retrofitting, testing and commissioning of 245 KV current transformer	28-06-2023	222.94	15 YEARS	Completed
14	Procurement/installation of disturbance recorder and event logger (DR & EL)	26-09-2023	59.74	15 YEARS	Completed
15	Major overhauling / servicing of M/S BHEL make generator and exciter (GTG Unit # 5)	Dec-23	76.70	15 YEARS	Completed
16	Commissioning of 50 MVA new Generator transformer of GT#5	Dec-23	44.52	15 YEARS	Completed
17	Retrofitting of static relays by numerical relays (MELCO, GTG Unit # 1-4):	2024-25 2025-26 2026-27 2027-28	1,343.72	15 YEARS	To be processed
18	Replacement of 24V and 220V DC AFCOSET make battery charger (obsolete) with new upgraded charger – 12 (twelve) sets	2024-25	170.40	15 YEARS	To be processed
19	Major overhauling / servicing of M/S MITSUBISHI make generator and exciter	2024-25 2025-26 2026-27	495.99	15 YEARS	To be processed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

	(GTG Unit # 1, 3 & 4).				
20	Procurement of Overhauling / Servicing spares for M/S BHEL make Generator and Exciter (Unit # 6, 7, 8 & 9)	2024-25, 2026-27, 2027-28, 2028-29	333.67	15 YEARS	To be processed
21	Major overhauling / servicing of M/S BHEL make generator and exciter (Unit # 6, 7, 8 & 9)	2024-25, 2026-27, 2028-29, 2029-30	383.50	15 YEARS	To be processed
22	Retrofitting, testing and commissioning of CVTs, Bus PT	2024-25	74.47	15 YEARS	To be processed
23	Retrofitting, Testing and Commissioning of Lightening Arrestor (LA)	2024-25	66.24	15 YEARS	To be processed
24	Retrofitting, testing and commissioning of 245 KV HCB Isolator	2026-27 2027-28 2028-29	719.43	15 YEARS	To be processed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.06: LIFE EXTENSION (LE) OF ALL CONTROL AND INSTRUMENTS EQUIPMENT, LIKE, CONTROL MODULE, AVR /DAVR, VIBRATION & TEMPERATURE MONITORING OF STG AND GTG, ETC.

4.06.01: DETAILED SCOPE OF LIFE EXTENSION (LE) WORKS (COMPLETED DURING 2019-20 TO DEC. 2023-24):

Detailed scope and quantum of works has already carried out for LE of various works under Control & Instrumentation System, like upgradation of Governor system of GTG, STG, control system of DM plant, Upgradation of HMI of GTG, upgradation SWAS system etc. of plant based on **Obsolescence of the items and therefore non-availability of spare support from the OEM** have been worked out for implementation. Detailed scope of work, system and equipment wise, is furnished below:

4.06.01.01: UP GRADATION OF 7200 / 3300 SERIES BENTLEY NEVADA MAKES VIBRATION MONITORING SYSTEM:

A order was placed to M/S Willstrong Solutions Private Limited vide ref. no. NEEPCO/AGBP/C&I/T-13©/2018-19/90NBI155/410 DTD. 28/02/2019 for upgradation / replacement of vibration monitor of GTG unit # 1 & 2. The job was completed on June 2019.

Item	Date of Commissioning	Expenditure in lakhs	Expected Life Extension
GT Unit # 1	19/06/2019	103.00	15 Years
GT Unit # 2	20/06/2019		

4.06.01.02: UP GRADATION OF AVR (AUTOMATIC VOLTAGE REGULATION) SYSTEM TO DVAR FOR STEAM TURBINE GENERATOR UNIT # 2:

An order was placed to M/S ABB India Limited, vide ref. no. NEEPCO/AGBP /C&I/T-52/2018-19/90NBI115/293 DTD. 23/11/2018 for Up gradation of AVR (Automatic Voltage Regulation) system to DVAR for Steam Turbine Generator Units (STG Unit # 2).

Item	Date of Commissioning	Expenditure in lakhs	Expected Life Extension
STG Unit # 2	April, 2019	18.34	15 Years



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.06.01.03: UP GRADATION OF 3300 SERIES BENTLEY NEVADA MAKES VIBRATION AND TEMPERATURE MONITORING SYSTEM (STG UNIT # 1, 2 & 3):

For Up gradation of 3300 series Bentley Nevada makes Vibration and Temperature Monitoring system (STG Unit # 1 & 3), an order was placed to M/S GE Oil & Gas India Private Limited, vide PO ref. no. NEEPCO/AGBP/C&I/T-52/2018-19/90NBI129/285 DTD. 22/11/2018. The job was completed on Sept & Oct 2019.

Up gradation of 3300 series Bentley Nevada makes Vibration and Temperature Monitoring system (STG Unit # 2) an order was placed to M/S GE Oil & Gas India Private Limited vide PO ref. no. NEEPCO/AGBP/C&I/T-52/2019-20/293 DTD. 13/03/2020. The job was completed on 12/12/2020.

Item	Date of Commissioning	Expenditure in lakhs	Expected Life Extension
STG Unit # 1	Sept 2019	129.17	15 Years
STG Unit # 3	Oct 2019		15 Years
STG Unit # 2	12.12.2020	65.30	15 Years

4.06.01.04: UPGRADATION OF HMI OF GT#5 AND GT#6 (FROM WINDOWS XP/WINDOWS-7 TO WINDOWS-10):

For Upgradation of HMI of GT#5 and GT#6 (from Windows XP/windows-7 to windows-10), a order was placed to M/S BHEL-GE Gas Turbine & Services Pvt. Limited, vide order ref. no. NEEPCO/AGBP/HOP/2020-21 /W-11(B)/204 DTD. 29/08/2020. The job was completed on 2020-21.

Item	Date of Commissioning	Expenditure in lakhs	Expected Life Extension
Upgradation of HMI of GT#5 and GT#6 (from Windows XP/windows-7 to windows-10)	2020-21 (Completed)	124.37	10-years (windows system related issues)



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.06.01.05: UP GRADATION OF AUTOMATIC VOLTAGE REGULATORS OF BHEL GT UNIT # 5 & 6:

For Upgradation of AVR to DAVR of GTG Unit -5 & 6, an order was placed to M/S ABB India Private Limited, vide order ref. no. NEEPCO/AGBP/C&I/T-55/2020-21/90NBC110/161 DTD. 19/11/2020.

Item	Date of Commissioning	Expenditure in lakhs	Expected Life Extension
DVAR for GT Unit # 6	18.09.2021	19.41	15 years
DVAR for GT Unit # 5	25.03.2022	20.59	15 years

4.06.01.06: UP GRADATION OF SERVER OF ABT MANAGEMENT SYSTEM AND LICENSE FOR THIRD PARTY VIEW.

The system -server is windows server-2012 based which is already obsolete. Presently, windows server-2016 and server-2020 is available. As desired at HQ, NEEPCO and Delhi office, NTPC, procurement of 02 (two) licenses for remote access (view only) were already completed. The order was placed to M/S Energia system Pvt. Ltd. vide PO ref. no. NEEPCO/AGBPS/C&I/T-09/2022-23/360000 dtd. 28/03/2022. The total financial involvement shall be Rs.29.73 Lakhs.

4.06.01.07: UPGRADATION / LE OF GOVERNOR SYSTEM OF STG UNITS ALONG WITH DDC PRO CONTROL SYSTEM:

The existing Governor system with DDC pro control system is old and obsolete one. Moreover, due to non-availability of necessary spares, LE by upgrading the Governor with DDC Pro Control System is urgently required. Accordingly, LE by upgrading Governor system alongwith DDC Pro Control system of Module-1 was carried out and the order was placed to M/S ABB India Pvt. Limited vide order ref. no. NEEPCO/AGBP/HOP/2021-22/W-11(B)/3600000/133 dtd. 23/07/2021. The job was completed on 31/05/2022.

Item	Proposed Date of Commissioning	Expenditure in lakhs	Expected Life Extension
-------------	---------------------------------------	-----------------------------	--------------------------------



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Governor with DDC Pro Control System of Module-1	2022-23 (Completed)	689.20	15 years
--	------------------------	--------	----------

4.06.01.08: UP-GRADATION OF PLC OF DM PLANT:

For upgradation of PLC of DM plant, an order has been placed to M/S Sonepar India Private Limited vide PO ref. no. NEEPCO/AGBP/C&I/T-13/2021-22/360000/366 dtd. 28/06/2021. The job was completed on 11/02/2023.

Item	Date of Commissioning	Expenditure in Lakhs	Expected Life Extension
Up-gradation of PLC of DM plant	11/02/2023	26.66	15 Years

4.06.01.09: UPGRADATION OF SWA-SYSTEM OF MODULE -1:

For upgradation of SWA-system of Module-1, an order has been placed to M/S M/S TJA Engineering & Trading Company, vide PO ref. no. NEEPCO/AGBPS/C&I/T-48/2022-23/96 dtd. 05/07/2022. The job has completed on 25/07/2023.

Item	Date of Commissioning	Expenditure in Lakhs	Expected Life Extension
Upgradation of SWA-system of Module-1	25/07/2023	201.73	15 years

4.06.02: DETAILED SCOPE OF LIFE EXTENSION (LE) WORKS (TO BE COMPLETED DURING THE PERIOD JANUARY 2024 TO 2029-30):

Detailed scope and quantum of works to be carried out for the LE of various works under Control & Instrumentation System, like upgradation of Governor system of GTG, STG, control system of DM plant, Upgradation of HMI of GTG, upgradation SWAS system etc. of the plant is based on **Obsolescence of the items and therefore non-availability of spare support from the OEM**. Detailed scope of work, system and equipment wise, is furnished as below:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.06.02.01: LE OF GOVERNOR SYSTEM OF STG UNITS ALONG WITH DDC PRO CONTROL

SYSTEM:

For LE of Governor with DDC Pro Control System of Module-1, an order was placed to M/S ABB India Pvt. Limited vide order ref. no. NEEPCO/AGBP/HOP/2021-22/W-11(B)/3600000/133 dtd. 23/07/2021. The job has already completed on 2022-23.

The estimate for LE of Governor with DDC Pro Control System of Module-2 & 3 is based on the order was placed to M/S ABB India Pvt. Limited ref. no. NEEPCO/AGBP/HOP/2021-22/W-11(B)/3600000/133 dtd. 23/07/2021 for Module-1. The estimation for Module -2 & 3 is considered PL Dec 2023. The detail is enclosed at Annexure-C.

Item	Proposed Date of Commissioning	Expenditure in lakhs	Expected Life Extension
Governor with DDC Pro Control System of Module-2 & 3	2024-25	2,009.97	15 years

4.06.02.02: UPGRADATION OF SWA-SYSTEM OF MODULE -2 & 3:

For upgradation of SWA-system of Module-1, an order has been placed to M/S M/S TJA Engineering & Trading Company, vide PO ref. no. NEEPCO/AGBPS/C&I/T-48/2022-23/96 dtd. 05/07/2022.

For upgradation of SWA-system of Module-2 & 3, the estimation is based on the order placed to M/S M/S TJA Engineering & Trading Company, vide PO ref. no. NEEPCO/AGBPS/C&I/T-48/2022-23/96 dtd. 05/07/2022 for Module-1. The estimation is calculated on PL Dec 2023.

Item	Proposed Date of Commissioning	Expenditure in Lakhs	Expected Life Extension
Upgradation of SWA-system of Module-2	2024-25	204.87	15 years
Upgradation of SWA-system of Module-3	2025-26	200.00	15 Years



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.06.02.03: UPGRADATION OF GOVERNOR OF GTG UNIT # 1, 2, 3 & 4:

All the 04 (four) Gas Turbines have same Pneumatic control type of governor as outlined above. Control loop is included in the upgradation of control system and no need of separate upgradation. However, field devices like control valves & accessories are too old and phase-wise replacement is required to carry out. Although supplied by M/S MHI, Japan, original manufacturer of the field devices is of M/S Nakakita, Japan and are planning to source directly from the OEM. Division has already procured some other Control Valve accessories directly from M/S Nakakita, Japan.

Accordingly, for upgradation of Governor GTG Unit # 1 & 2, an order has been placed to M/S MHI vide order reference no. NEEPCO/AGBPS/C&I/T-54/2022-23/273 dtd. 15/02/2023 and the total financial involvement of Rs. 88.46 Lakhs. The job shall be completed on 2024-25.

Based on the above referred PO, the estimation for upgradation of Governor of GTG Unit # 3 & 4 is worked out as Rs. 88.46 Lakhs and the same shall be proposed to be completed on 2025-26.

The details of upgradation of Governor for GTG Unit # 1 – 4 is as follows:

Description	Proposed Date of Commissioning	Expenditure (IN LAKHS)	Expected Life Extension
Upgradation of Governor GTG # 1	2024-25	88.46	15 years
Upgradation of Governor GTG # 2			15 years
Upgradation of Governor GTG # 3	2025-26	88.87	15 years
Upgradation of Governor GTG # 4			15 Years

4.06.02.04: UPGRADATION OF GOVERNOR OF GT# 5 & 6:

Both the 02(two) Gas Turbines have same Hydraulic control type of governor as outlined above. Control loop is included in the up gradation of control system. Field devices like control valves & accessories are too old and phase-wise replacement is required to carry out within coming 5-years. M/S Young & Franklin, USA is the original manufacturer of the Governor. Cost of a set of spares of Governor was 50.0 lac in 2016 and Considering that cost of a whole governor is presumed to be nearly Rs. 75.0 lac and Rs. 150.0 lac for 02(two) GTs.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Estimation based on the Order placed to M/S Sherman Sales & Services (P) Limited for supply of part spares vide PO ref. no. NEEPCO/AGBP/C&I/T-39/2016-17/38NBG092/239 dtd. 12/09/2016 and considering PL Dec 2023.

Description	Expected Date of Commissioning	Expenditure (IN LAKHS)	Expected Life Extension
Upgradation of Governor GTG # 5 & 6	2024-25	73.83	15 years

4.06.02.05: RECONFIGURATION / MODIFICATION OF CONTROL SYSTEM OF GAS TURBINES FOR AGC (AUTOMATIC GENERATION CONTROL) FOR GTG # 1-4:

As per CERC's order No.319/RC/2018, dated 28/08/2019, all Thermal Power Plant with installed capacity of > 200MW and > 25MW Hydro Plant and whose tariff is determined or adopted by CERC are directed to install AGC system at the Generator end (control room) to adhere the requirements of NLDC. Since the modification works needs some extra I/Os, wherein the standard delivery period of OEM is more than 6 (six) months, it is proposed the works to be carried out in FY 2024-25.

Accordingly, Order has been placed to M/S Power System Export Unit, Mitsubishi Corporation, Japan vide PO ref. no. NEEPCO/AGBPS/C&I/T-54/2022-23/3700000/30 dtd. 28/04/2022. The proposed work shall be completed within 2024-25.

Description	Expected Date of Commissioning	Expenditure (IN LAKHS)	Expected Life Extension
Reconfiguration / modification of control system of Gas Turbines for AGC (Automatic Generation Control) for GTG # 1-4	2024-25	102.33	15 YEARS

4.06.02.06: RECONFIGURATION / MODIFICATION OF CONTROL SYSTEM OF GAS TURBINES FOR AGC (AUTOMATIC GENERATION CONTROL) FOR GTG # 5-6:

As per CERC's order No.319/RC/2018, dated 28/08/2019, all Thermal Power Plant with installed capacity of > 200MW and > 25MW Hydro Plant and whose tariff is determined or



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

adopted by CERC are directed to install AGC system at the Generator end (control room) to adhere the requirements of NLDC. Since the modification works needs some extra I/Os, wherein the standard delivery period of OEM is more than 6 (six) months, we proposed the works to be carried out during FY 2024-25

Order placed to M/S BHEL vide PO ref. no. NEEPCO/AGBPS/C&I/T-55/2022-23/3700000/38 dtd. 28/04/2022. The proposed work shall be completed within 2024-25.

Description	Expected Date of Commissioning	Expenditure (IN LAKHS)	Expected Life Extension
Reconfiguration / modification of control system of Gas Turbines for AGC (Automatic Generation Control) for GTG # 5-6	2024-25	102.07	15 YEARS

4.06.02.07: IMPLEMENTATION OF AUTOMATIC GENERATION CONTROL (AGC) SYSTEM:

As per CERC's order No.319/RC/2018, dated 28/08/2019, all Thermal Power Plant with installed capacity of > 200MW and > 25MW Hydro Plant and whose tariff is determined or adopted by CERC are directed to install AGC system at the Generator end (control room) to adhere the requirements of NLDC.

Accordingly, for implementation of AGC system, a similar type of order of M/S Prayagraj Power Gen. Co. Limited and estimate is prepared accordingly. The proposed work shall be completed within 2024-25.

Description	Expected Date of Commissioning	Expenditure (IN LAKHS)	Expected Life Extension
Implementation of Automatic Generation Control	2024-25	77.16	15 YEARS



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.07: LIFE EXTENSION (LE) & AUTOMATION OF FIRE FIGHTING SYSTEM OF THE PLANT:

4.07.01: CO2 FLOODING SYSTEM OF GAS TURBINE UNITS #1, 2, 3 & 4 (COMPLETED):

CO2 Flooding system is consisting of a fixed supply of carbon dioxide permanently connected to fixed piping, with fixed nozzles arranged to discharge carbon dioxide from the series of large CO2 cylinders into an enclosed space or enclosure. It is designed to displace the oxygen in the protected space and thus extinguish the fire. It is mandatory to have a fixed type fire suppression system (total flooding system) running in auto mode in a gas turbine unit. Normally it is designed as per globally approved NFPA-12 codes.

The fire suppression system of Mitsubishi makes Gas Turbine units of Assam Gas Based Power Plant, NEEPCO Ltd is CO2 type total flooding system which was originally designed, engineering, installation by M/S Chubb Fire (UK) during the period of commissioning of the respective gas turbine units. The system covers Auxiliary package, Generator and Turbine package. The extinguishment containers are in two groups of ten cylinders, initial discharge and extended discharge cylinder bank. Each CO2 cylinder having 45 kg of capacity. For detection of fire, probe type flame proof heat detectors are installed in each unit as follows:

- a) Turbine package- Heat detectors (135°C) -----10 nos
- b) Auxiliary package- Heat detectors (71°C) -----4 nos
- c) Generators package- Heat detectors (107°C) -----4 nos

On receipt of discharge signal, the solenoid actuator of nitrogen cartridge will be operated, the release of nitrogen will operate the pneumatic actuators on the CO2 cylinder valves (TF12) and carbon di oxide discharge initiated. Discharged of CO2 gas will be based on cross zoning principle only. This system can also operate through manual operation via push button on extinguishment control panel and solenoid actuator lever on the nitrogen cartridges.

But the system is presently running in manual mode because of malfunctioning of heat detector and wear & tear of cables connection of heat detector resulting to often false alarm. Few of the master cylinder valve are also found defective during hydrotesting of cylinder. Due to unrepairable problem of control panel, Flooding system of Unit #3 is become inoperative since last few months.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

M/S CHUBB Fire Engineering Ltd (UK), the OEM did not response to our several correspondences done from this wing since the year 2006. However, while correspondence with Mitsubishi Corporation, they had proposed for another system with cost involvement of around 6.5 crore Yean (Japanese currency) by mentioning that the spares of existing system is become obsolete and not available.

Only one intermittent repairing was done in the system during the entire period of its service which was done in the year 2015-16 to make the system functional as the solenoid actuator of nitrogen cartridge became inoperable because of empty nitrogen cartridges and malfunctioning of few valves of CO2 cylinders (TF12 type). In this intermittent repairing work, only the following items of CO2 flooding system were either changed or modified so as to make the system functional:

- Master Cylinder Valves
- Pilot Valves
- Discharge Head
- Installation of Electrically/ mechanically operated Control Box
- High pressure discharge hose
- Head modification of Slave cylinder valves

LE of fire suppression system of these units are the need of time as the existing CO2 flooding system have already rendered almost twenty-five years of service and the lot of upgraded version is available in the present market. While doing the LE & automation, our emphasis is to use of maximum possible items from the existing units and if necessary by modification of the existing items without changing the existing design aspects of CO2 Flooding system. In this connection, this office has identified that CO2 cylinders, Discharge pipes, mounting frame of CO2 bank and platform of CO2 bank can be utilized.

PO has already placed to M/S Pranjana & Associates vide order ref. no. NEEPCO/AGBP/O&AWC/T-11(Vol-IV)/2021-22/739 dtd. 31/03/2022. The total cost shall be Rs. 110.80 Lakhs. The job has already been completed as follows:

Description	Date of Commissioning	Expenditure (IN LAKHS)	Expected Life Extension



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

LE & Upgradation of CO2 flooding system of GTG Unit # 3	12/01/2023	27.70	15 YEARS
LE & Upgradation of CO2 flooding system of GTG Unit # 4	29/03/2023	27.70	15 YEARS
LE & Upgradation of CO2 flooding system of GTG Unit # 2	25/07/2023	27.70	15 YEARS
LE & Upgradation of CO2 flooding system of GTG Unit # 1	28/12/2023	27.70	15 YEARS

TECHNICAL & COST BENEFIT:

Auto operated Fire suppression system in Gas Turbine unit is a mandatory requirement which give protection against fire. Since this units are unmanned area and considered as fire prone area hence fully automated fire system will minimize the loss of life and property in case of any untoward incident. Also, no insurance claim is valid without having such system in gas turbine.

4.07.02: REPLACEMENT OF EMERGENCY DIESEL ENGINE AND PUMP OF FIRE FIGHTING PUMP HOUSE (PROPOSED):

The Cummins make Emergency Diesel Engine and KBL make pump has already crossed its useful life. Moreover, M/S Cummins has intimated that the said Engine is obsolete and no spares available. Similarly, the KBL make pump has also crossed its useful life. Considering the safety and security of the plant, the Diesel Engine and pumps needs to be replaced immediately.

Accordingly, a budgetary offer has already collected from M/S Cummins for replacement of the Emergency Diesel Pump and the total estimated financial involvement shall be Rs. 21.43 Lakhs.

Similarly, budgetary offer for replacement of KBL make pump is also collected from M/S KBL and total financial involvement is worked out as Rs. 15.84 Lakhs.

It is proposed that the LE works shall be completed within 2024-25.

The key benefit by LE will ensure to maintain the hydrant & emulsifier network in pressurized condition which is mandatory for power plant.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.07.03: LIFE EXTENSION (LE) & AUTOMATION OF FIREFIGHTING SYSTEM (PROPOSED):

A. DESCRIPTION: AGBP firefighting system consist of pressurized hydrant network with various single/double hydrant point and landing valves installed at all location of the power plant. In addition to that high velocity water sprinkler system is provided in all eleven transformers including station transformer, main oil tank, lube oil filter and dirty oil tank of Steam Turbines. Medium velocity water sprinkler system is installed at cable galleries. All these sprinkler systems are operated through deluge valve. As per norms/BIS, hydrant system should be always in pressurized condition and water sprinkler system (emulsifier system) should be operated in auto mode in case of emergency arises.

But due to ageing, most of the associated item of the system such as main panel, local panel, solenoid switches etc are not properly functioned resulting to difficulty in maintaining the system in automated mode.

Life Extension (LE) & automation of firefighting system which includes replacement of existing fire water pump house operation panel, annunciation panel and local operative panels of individual pumps etc with new intelligent panel so that auto operation of jockey pumps, electrical driven & diesel driven main pumps can be ensured at the time of emergency.

This also include of auto operation of all twenty-seven deluge valves already exist in the system for high velocity sprinkler for transformers, MOT, DOT etc and medium velocity for cable galleries. This can be achieved by replacing local control panel, solenoid switch, pressure switch etc of all such deluge valves. As the fire signal for auto operation of medium velocity water spray system will go through LHS (Linear Heat Sensing) Cables, hence it is necessary to replace the remaining 4000 RM LHS cable by new one to avoid any false signal. (2500 RM of LHS cables of cable galleries of AGBP was already changed in the year 2017 to make the detection system in operative mood)

For automation of hydrant & emulsifier system of AGBP, NEEPCO Ltd, replacement of various item is become necessary. This is also viewed by the consultant appointment for the purpose. This includes existing Mather & platt makes firefighting panel installed at Fire water pump House of AGBP, NEEPCO Ltd during commissioning of the plant is frequently give problem due to ageing, hence it is proposed to

1. Replace replaced the existing main panel,



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

2. Replacement of annunciation panel
3. Replacement of local panel of pumps
4. Replacement of portion of Linear Heat Sensing Cable installed at cable galleries so as to avoid faulty signal to deluge valves of medium velocity water sprinkler system
5. Replacement of local panel, solenoid switches, pressure switches etc all twenty-seven deluge valves

B. FINANCIAL INVOLVEMENT:

a. Cost for automation of Fire water Pump House, all complete including supply installation of main panel, annunciation panel, local panels, pressure gauges, pressure switches etc = **Rs 20,00,000.00**

(LS basis)

b. Cost for repairing & modification of high & medium velocity system including local control panel for twenty-seven deluge valves, solenoid switches, pressure switches etc also including supply of 4000 RM NFPA standard LHS Cable = **Rs 35,00,000.00 (LS Basis)**

Total financial involvement (A) + (B) = Rs 55,00,000.00

Add GST @ 18% = Rs 9,90,000.00

Grand Total = Rs 64,90,000.00

NB: Rate for above modification work is taken on the basis Budgetary offer received from M/S Safety & Security Engineering, vide Ref. no. SSE/029/21-22 dtd. 18/01/2022.

The estimated at PL Dec 2023 is **Rs.68.85 Lakhs.**

C. TARGET OF COMPLETION: Time framed for LE & automation work firefighting system will be done in the financial year 2024-25. However, the replacement of existing underground fire pipe lines by over ground one will be done on phase basis considering the requirement

D. TECHNICAL & COST BENEFIT: Auto operation of firefighting system which includes emulsifier system is a statutory requirement. This plant is completed almost 27 years and the risk involvement is also increasing. Therefore, a full proof firefighting system become a need apart from statutory requirement.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.08: LE OF BUILDINGS, ROADS, CIVIL STRUCTURE ETC.

4.08.01: STRUCTURAL STABILITY CHECKING AND EARTH QUACK RESISTANCE OF BUILDINGS AND OTHER STRUCTURES OF THE PLANT:

Structural Audit is an overall health and performance check-up of a building, various building structure, bridges etc under this plant. It ensures that the building and its premises are safe and have no risk. It analyses and suggests appropriate repairs and retrofitting measures required for the buildings to perform better in its service life. Structural audit is done by an experienced and licensed structural consultant

Purpose of Structural Audit are

- *To save human life and buildings*
- *To understand the condition of building*
- *To find critical areas to repair immediately*
- *To comply with statutory requirements*
- *To enhance life cycle of building by suggesting preventive and corrective measures like repairs and retrofitting*

The structure and buildings of the plant has already crossed 25 years of its life and assessment of building and structure is very much essential to enhance its life.

Accordingly, he Non-Destructive, Partially Destructive Test and visual inspection of various structural compounds of Assam Gas Based Power Plant at Bokuloni, Assam. North Eastern Electric Power Corporation Limited had allotted to this job to Dr. Partha Ghosh, Professor of Construction Engineering Department, Jadavpur University, Salt Lake Campus, Plot-8, Block-LB, Sector-III, Kolkata-700106 vide Work Order No. NEEPCO/AGBF/CWC/2021-22/T-99/549, Dated on 10.09.2021.

*The stability checking of structure and earth quack resistance of buildings has already completed. The details report and recommendation is enclosed at **Annexure-III (Vol-II)**.*

4.08.02: LE WORK OF CIVIL STRUCTURE AND BUILDINGS (FOR THE PERIOD 2019-20 TO 2023-24):

The structure and buildings of the plant has already crossed 25 years of its life and strengthening of building and structure is very much essential to enhance its life. Accordingly, a stability checking and earthquake resistance of various buildings and structure were carried out



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

by Jadavpur University and as per recommendation, it is proposed to carry out LE of various buildings and structure of the plant. The details report and recommendation is enclosed at Vol-II (Annexure-III).

Considering the recommendation, the LE works which are already completed as summarized as follows:

Description	Date of Completion	Expenditure (IN LAKHS)	Expected Life Extension
Repairing & LE works of 2 nos. of Clarifloculator	31-01-2023	8.03	15 YEARS
Repairing & LE works of Aerator	11-03-2023	4.64	15 YEARS
Repairing & LE works of Intake Well Pump House	24-03-2023	4.89	15 YEARS

4.08.03: LE WORK OF CIVIL STRUCTURE AND BUILDINGS (FOR THE PERIOD JANUARY 2024 TO 2029-30):

Based on recommendation of Jadavpur University, it is proposed to carryout LE of Steam Turbine building, Cooling Towers and Clarified water storage tank.

For LE works of Steam turbine building, the WO has already been placed to M/S Buildrite Contruction vide WO ref. no. NEEPCO/QP/ED/C&P/F/C/AGBPS(STB)/591/2023-24/967 dtd. 21/12/2023. The LE work is under progress and shall be completed within 2024-25.

For LE works of Cooling Towers, the WO has already been placed to M/S Loknath & Co. vide WO ref. no. NEEPCO/QP/ED/C&P/F/C/AGBPS(CT)/590/2023-24/976 dtd. 21/12/2023. The LE work is under progress and shall be completed within 2024-25.

The proposal for LE works of Clarified water Storage Tank is under process and the proposed works shall be completed within 2025-26.

The details of LE works, which are schedule to be completed within 2024-25 to 2029-30 are summarized as follows;

Description	Date of Completion	Expenditure (IN LAKHS)	Expected Life Extension
--------------------	---------------------------	-------------------------------	--------------------------------



ISO 9001, 14001, 27001, 45001 & 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

<i>LE work for steam turbine building</i>	<i>2024-25</i>	<i>179.59</i>	<i>15 YEARS</i>
<i>LE work of Cooling Towers at AGBPS</i>	<i>2024-25</i>	<i>54.15</i>	<i>15 YEARS</i>
<i>LE of Clarified water storage Tank</i>	<i>2025-26</i>	<i>103.00</i>	<i>15 YEARS</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.09: MISCELLANEOUS WORKS

4.09.01: PURCHASE OF MEDIUM VOLTAGE COVERED CONDUCTOR (MVCC) FOR INTAKE WATER PUMP HOUSE 11 KV LINE (COMPLETED):

A. INTRODUCTION:

The Intake Pump House is one of the integral parts of the plant for supplying raw water from river Buridihing. Since, the life of the 11 KV intake line has already crossed more than 25 years of service, the LE of intake 11 KV line needs to be carried out in phase manner. Accordingly. The MVCC of 11KV intake line is carried out and completed by 30/10/2021.

B. EXPENDITURE:

For supply and erection of MVCC in 11 KV line an order was placed to M/S Glocon Enterprise, vide ref. no. NEEPCO/AGBP/U&WC/T-6/2020-21/277 dtd. 04/01/2021. The total expenditure was **Rs.15.39 Lakh**

C. COMPLETION TIME:

The job was on 30/10/2021.

4.09.02: PURCHASE OF A 5 TON CAPACITY FORKLIFT (COMPLETED):

A. INTRODUCTION:

There was a 3 Ton capacity ACE make forklift (Model: AF30D) was procured vide PO no. NEEPCO/AGBPS/MMW/W-7/2010-11/177 dtd. 06/10/2010 for loading / unloading / shifting of various materials / equipment / spares of the plant. The life of the Forklift had already completed 10 years of its life. Though servicing of the said Forklift was done on regular basis, but due to various mechanical problem / hydraulic oil leakage from various seals / aging of the Forklift, a new higher capacity 5Ton Forklift has been procured.

B. EXPENDITURE:

The order was placed to M/S Action Construction Equipment Limited, vide order ref. no. GEMC-511687767765842 dtd. 08/02/2021. The total expenditure for procurement of 5 Ton capacity ACE make fork lift was **Rs.15.95 Lakh**

C. COMPLETION TIME:

The forklift was delivered on 24/04/2021



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.09.03: PURCHASE OF A 12 TON HYDRAULIC MOBILE CRANE (COMPLETED):

A. INTRODUCTION:

There was a 8-10 Ton capacity VOLTAS make hydraulic mobile crane in the plant for loading / unloading / shifting of various materials / equipment / spares of the plant. The life of the hydraulic mobile crane had already completed its life. Though servicing of the said crane was done on regular basis, but due to various mechanical problem / hydraulic oil leakage from various seals / aging of the hydraulic crane, a new higher capacity 12 Ton has been procured.

B. EXPENDITURE:

The order was placed to M/S Uttam Construction Equipment, vide order ref. no. GEMC-511687775863639 dtd. 18/09/2021. The total expenditure was **Rs.16.89 Lakh**

C. COMPLETION TIME:

The forklift was delivered on 04/02/2022

4.09.04: INSTALLATION AND COMMISSIONING SEWAGE TREATMENT PLANT (COMPLETED):

Sewage Treatment Plant for AGBPS Colony & office premises: As per instruction of Pollution Control Board of Assam and honourable Supreme Court of India's verdict, all waste water including generated by residential complex, industrial area should be treated in STP to get required parameter prior to discharge in to natural stream. As the Assam Gas Based Power Plant Colony was constructed long before hence no sewage treatment plant is available for liquid domestic waste generated by the residential colony. However, it has individual septic tank for each residential quarter for collection & treatment of human excreta. Hence to oblige the Pollution Control Board instruction & consequent verdict of honourable Supreme Court, a STP is proposed for treatment of domestic waste water of AGBPS colony.

Considering the volume of pollution load on sewage water, latest technology, space constrain, site specific suitability, economy, cost effectiveness and low maintenance cost Moving Bed Bio reactor (MBBR) type STP is proposed. MBBR is a combination of Activated Sludge Process i.e. suspended growth and bio filter i.e. attached growth. In this type free floating plastic fill media are uses for attached biofilm growth.

The salient features are as follows:

- ❖ The system is based on proven process fully backed by R&D inputs for up gradations to scope up with variations in effluent quality due to products change.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

❖ *The process ensures:*

- *Complete decolonization*
- *Easy handling of sludge*
- *Minimum area requirement*
- *Simple operation and controls*
- *Quick erection and commissioning as units may be prefabricated*
- *Many more*

Accordingly, the PO was placed to M/S Eco Clean vide GeM contract no GEMC-511687749634350 dtd. 09/06/2023 and the job was STP was commissioned on 12/12/2023.

Having a sewage treatment plant (STP) for all liquid waste generated by residential colony/ office complex is a statutory requirement and after the honorable Supreme court verdict in this regard, matter has been strictly look after by concerned pollution control board and hence noncompliance of this may lead to violation of pollution norms.

4.09.05: MAJOR SPARES (COMPLETED):

A. INTRODUCTION:

For schedule / plan maintenance of various equipment, like, Gas Turbines, Generators, Steam Turbines, Gas Engines, Gas Compressors etc of the plant, some major spares were procured time to time basis. The detail list of major spares with effect from 2016-17 to Nov. 2021, which has already been capitalized, are enlisted at Annexure-3.

B. EXPENDITURE:

*The year wise expenditure towards procurement of Major spares (already capitalized) are reflected at Annexure-B. The total expenditure for Major Spares (Capitalized) for the year 2019-20 was Rs.3,377.68 lakhs, for the year 2020-21 was Rs. 2,478.08 Lakhs, for the year 2021-22 was Rs. 359.33 lakhs, for the year 2022-23 was Rs. 1,272.73 Lakhs and for the year 2023-24 upto Dec 2023) was Rs. 177.51 Lakhs. The total expenditure towards capital spares effect from 2019-20 to 2023-24 was **Rs.7,665.33 Lakhs**. However, the expenditure against spares shall be considered based on the actual utilization of the spares only.*

4.09.06: UPGRADATION / INSTALLATION, ERECTION & COMMISSIONING OF ADDITIONAL BLACK START 1010 / 1250 KVA EMERGENCY DIESEL GENERATOR (EDG) FOR THE PLANT (PROPOSED):



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

A. INTRODUCTION:

The plant has one number of DALE Generator set, model no. RP/310/DCE and plant no. 93033101P. The date of manufacture was 06/12/1993 and commissioned in the year 1995. The DALE generator set has a **KTA38G5 Cummins diesel engine** driving a **Marathon 742RSL4046 alternator**. The combination has the following site outputs:

General	430/248 VAC, 3 ph, 4 wire, 50 Hz at 1500 RPM
Continuous rating	789 KW at 0.8 p.f. 987 KVA 1325 A per phase
Standby rating	868 KW at 0.8 p.f. 1085 KVA 1458 amps per phase

Engine starting and plant control voltage is derived from 24 VDC lead acid battery system. The batteries are sized to allow six, ten second starting attempts at 0 deg C. The Engine is governed by an EFC electronic controller system with Barber Colman remote droop unit. A free-standing panel, located in the generator room, contains a DALE 8000 control unit, various meters and control switches.

B. OBJECTIVES:

For catering load during Black Start of Gas Turbines, Battery Chargers, essential load of Gas Turbines and Steam Turbines and emergency lighting load of the Power Plant.

C. NEED OF ADDITIONAL 1010 KVA EDG:

The followings are the basic reasons for considering installation of a new additional higher capacity 1010 KVA EDG in addition to 987 KVA existing EDG:

1. The existing 987 KVA EDG was commissioned in the year 1995 and already crossed 26 years of operation.
2. Since the black start EDG plays a vital role during black out for feeding essential power to the equipment like GTG, STG and other emergency pumps etc., the healthiness of the plant



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Black Start EDG is one of the vital requirements owing to 26 years of operation of the existing EDG.

3. The DALE generator set has **KTA38G5 Cummins diesel engine** driving a **Marathon 742RSL4046 alternator**. The servicing of Cummins diesel engine is provided by authorised dealer of M/S Cummins India Sales and Services Limited. The Alternator is manufactured by M/S Marathon Electric, USA and no authorised sales and service provider in India. Presently, the alternator is maintained by Plant Electric Maintenance Wing (PEM), as and when required basis. Since, there is no Dealer / Sales and Service provider of MARATHON Alternator in India, it is high time to either replace or install an additional higher capacity EDG.

D. ESTIMATED COST:

Based on the requirement of the plant, a budgetary offer was collected from M/S Garuda Power Private Limited, who is the authorised sales and service provider of OEM i.e M/S Cummins.

The basic price for 1010 KVA EDG:	Rs. 1,13,82,457.00 (Inclusive of Taxes and duties)
Other expenditure: (erection commissioning etc)	Rs. 36,00,000.00 (Civil work, additional panel,

Total estimated amount (R/O) Rs.1,50,00,000.00

The estimated price on PL Dec 2023 is Rs. 159.18 Lakhs (Annexure-C)

E. TARGET OF COMPLETION: The proposed work is planning to complete within 2024-25.



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

4.10: SUMMARY OF NEED OF LIFE EXTENSION OF VARIOUS PLANTS AND EQUIPMENTS OF THE PLANT AND JUSTIFICATION: -

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
A. LE of MHI and BHEL GTG and its auxiliaries:		
1	Replaced with new Rotor of MHI GTG Unit # 4 along with technical advisory services (Completed)	❖ As per recommendation of OEM, M/S MHI, Japan, Comprehensive inspection of turbine rotor and refurbishment of compressor rotor of Gas Turbines after certain fired hours is necessary to obtain the desired output of the turbine.
2	CRR & CRI of MHI GTG Unit # 3 (Completed)	❖ For CRI and CRR, the rotor is to be sent to Japan leading to prolong shutdown of a GT and thereby generation loss.
3	CRR & CRI of MHI GTG Unit # 2 (completed on April 2022)	❖ As informed by OEM, it is impossible to conduct CRR and CRI at site since to carry out the same, special equipment such as big lathe machine along with balancing tunnel are required.
4	CRR & CRI of MHI GTG Unit # 1	❖ CRI & CRR will enhance the life of the GT
5	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 1	❖ As per recommendation OEM Mitsubishi Corporation, Japan, in MHI (Mitsubishi Heavy Industries) make Gas turbines, Compressor Rotor Refurbishment (CRR) of Compressor Rotor along with Disc replacement & Comprehensive Rotor Inspection (CRI) of Gas Turbine Rotor should be carried out at around 1,00,000 EOH operation to clean & verify each part of the rotor. As our
6	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 4	
7	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 2	
8	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 3	
9	Exhaust cylinder & manifold of MHI GTG Unit # 1	
10	Exhaust cylinder & manifold of MHI GTG Unit # 4	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
11	Exhaust cylinder & manifold of MHI GTG Unit #	MHPS/MHI supplied Gas Turbines had crossed more than 1,40,000 Actual Operating Hours and as we were experiencing vibration in all these units due to Compressor Rotor Disc migration, we
12	Exhaust cylinder & manifold of MHI GTG Unit # 2	planned CRR & CRI of all MHPS/MHI supplied Gas Turbines one by one.
13	New bucketed GT Rotor of BHEL GTG Unit # 5	❖ . In addition to this, cracks and abrasion were observed in Turbine Blade Ring, Torque Tube covers and Turbine Exhaust Casing of all the
14	New bucketed GT Rotor of BHEL GTG Unit # 6	MHPS/MHI supplied Gas Turbines. Wall reduction was also observed in many places of the Turbine Blade Ring and Torque Tube cover due to high temperature oxidation. Some cracks were repaired by welding but some could not be repaired due to wall reduction. Moreover, due to long and sustained operation of the Gas Turbines at varied load, permanent deformation has occurred in the Turbine Blade Ring of the unit. Due to this, loss occurs owing to uneven clearance between moving blades and baffle segments. Due to cracks in Turbine Exhaust Casing, leakage of hot burnt gas occurs, which increases the temperature in Turbine compartment. If the leakage increases, it will affect the performance of the HRSGs resulting in decrease in STG generation. These cracks have been repaired by welding several times during overhauling but now the OEM has suggested to replace the Exhaust Casings with new ones. To



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p>rectify these, we planned to replace the Blade Ring, Torque Tube covers and Turbine Exhaust Casing of all the units one by one and we have already placed an order with Mitsubishi Corporation, Japan for supply of Parts for replacement of Turbine Blade Ring and Torque Tube cover of MHPS supplied Gas Turbine Unit # 1.</p> <p>❖ BHEL make Gas Turbine Unit # 5 & 6 completed more than 1,50,000 and 1,40,000 run hours respectively. As per the recommendation of GE, at 5,000 factored starts or 2,00,000 factored hours, compressor and turbine rotors should be disassembled and thoroughly inspected to detect possible wheel forging discontinuities or other service related damage. Such discontinuities or damage may develop into cracks of a critical size as a result of repeated cyclic loading. Under continued operation such critical flaws could lead to a turbine wheel failure, which, in addition to resulting in extensive damage to the turbine, may also result in substantial damage to adjacent equipment and in serious injury to any nearby personnel. M/s. BGGTS, the authorized spares and services agency for Gas Turbine Units supplied by BHEL in India, submitted their offers for new un bucketed Gas Turbine Rotor as well as for repair of the existing Gas Turbine Rotor at BHEL/BGGTS workshop. Their estimated quoted price for the</p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p><i>new bucketed Rotor is 32 Cr and the quoted price for the repair is 13 Cr. In case of repair, we will have to procure 3 (three) sets of new buckets and that will cost additional 12 Cr. So in case of repair we will have to incur an expense of 25 Cr. After repair, the life of the Gas Turbine Rotor will be extended by 1,00,000 hrs, whereas, with the new Rotor, we will get 2,00,000 hrs. Moreover, the repair of the Rotor will take 12 months after receipt of the Rotor at BHEL/BGGTS workshop. So the Gas Turbine will be under shutdown for more than a year. We cannot afford such long shutdown of a Gas Turbine at a stretch, because other Gas Turbines will also have their scheduled inspections within that period. As the price difference is only 7 Cr and the repair period are more than 1 year, we propose to procure 2 new Gas Turbine Rotors for Gas Turbine Unit # 5 & 6.</i></p>
15	<p><i>New Starting Diesel Engine for Gas Turbine Unit # 5 (Order placed and completed by 2021-22)</i></p>	<p><i>❖ Cummins make Starting Diesel Engine (Model: KTA-1150C) of BHEL supplied Gas Turbine Units have already completed more than 20 years. Both the Engines are showing wear and tear due to ageing, particularly the Engine of Gas Turbine Unit # 5. Recently, the Engine broke down. As we did not have any spare Engine and we needed to restore the engine at the earliest, we placed orders to M/s Garuda Power, Tinsukia, the authorized Dealer of Cummins Diesel Sales &</i></p>
16	<p><i>New Starting Diesel Engine for</i></p>	<p><i>the authorized Dealer of Cummins Diesel Sales &</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	use in Gas Turbine # 6	Service (India) Ltd., Pune for a new Starting Diesel Engine and its auxiliaries for an amount of Rs. 54,00,906.00 (Rupees Fifty-Five Lac Nine Hundred Six) only. It will enhance the life of the Starting Diesel Engine and will solve the starting problem of Gas Turbine Unit # 5 & 6.
B	LE of BHEL make STG and its auxiliaries.	
1	<p>LE of Cooling Tower:</p> <p>1. PVC fill pack replacement of Cooling Towers. (Completed)</p> <p>2. Replacement of drive mechanism of Cooling tower (8 set of drive mechanism)</p>	<ul style="list-style-type: none"> ❖ High PH of circulating water escalated fouling of cooling tower fills as well as scale formation in condenser tubes. By controlling PH of circulating water, formation of scale shall be well under control and cooling tower as well as condenser shall perform efficiently for years. ❖ Present condition of cooling tower is not satisfactory for fouling of fill packs in particular. By replacing PVC fill packs performance of cooling tower shall improve i.e. approach temperature shall come down which in turn improve the efficiency of condenser. • Fast formation of hard scale in condenser tubes (fouling) has been observed during past few years. It is apprehended that surface of condenser tubes get rough for which rate of deposition of scale is increasing day by day. The condition of the tube could be ascertained by RLA study of the condensing system which shall invariably cover the following:
3	LE of condensing system performance of Steam Turbines Unit # 1, 2 & 3 (Condenser Tube	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	bundle replacement)	<ul style="list-style-type: none"> • Tube bundle- 100% testing for life assessment. • Condenser Shell • Support plate • Hot well • Water boxes • Foundation and connection to turbine • Condenser auxiliary system • Condenser vacuum system.
4	<p>Replacement of few critical drives having high lean time of delivery also have direct impact on availability of generating units</p> <ol style="list-style-type: none"> 1. Replacement of 6.6 KV CW pump motor set. 2. Replacement of boiler feed pump FRH:27 (2 numbers) 3. Replacement of 2 numbers of ACW pumps. 	<ul style="list-style-type: none"> • Base on the report of RLA, corrective action such as replacement of tube bundles, improvement of vacuum system shall be initiated. For RLA study of condenser, open e tender has already been floated and scheduled to be carried out in the month of December 2021. ❖ Circulating cooling water system of steam turbine unit is comprises of 04 numbers of CW pumps driven by 6.6 KV HT motors. In the year 2020, motor of CW pump no.1 was failed which was repaired at the works of BHEL and installed back. As all the pump motor set have crossed approx.. 23 years of service life and may fail due to ageing. For redundant operation, it is intended and proposed to purchase 01 no of complete pump motor set to keep in ready stock for one to one replacement in case failure of existing one.
5	LE / replacement of insulation of module-1 & module -2	Expected cost involvement shall be of Rs. 1.5 crore
6	Rotor refurbishment Steam turbine-1, 2 & 3	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p><i>(basic) and the expenditure shall be incurred in the financial year 2022-23.</i></p> <ul style="list-style-type: none"> ❖ <i>Each steam turbine units are comprising of 2 numbers of Boiler Feed Pump in which one shall be in service and another shall be in standby condition. There is a failure instance of boiler feed pump in which complete pump was replaced with a new one. Boiler feed pumps are considered one of a very critical auxiliaries and tendered 23 years of service counted from the year of commissioning. For redundant operation, it is also intended to purchase 01 no of Boiler feed pump to keep in ready stock for replacement if required. Calculated approx. cost involvement shall be of Rs. 1.00 Crore. OEM is the BHEL.</i>
7	<i>Recoating of DM water storage tank</i>	<p><i>of a very critical auxiliaries and tendered 23 years of service counted from the year of commissioning. For redundant operation, it is also intended to purchase 01 no of Boiler feed pump to keep in ready stock for replacement if required. Calculated approx. cost involvement shall be of Rs. 1.00 Crore. OEM is the BHEL.</i></p> <ul style="list-style-type: none"> ❖ <i>In thermal power plant heat energy is converted into electrical energy. As such, losses of heat energy in any form is the loss of efficiency. A properly designed and installed insulation system immediately reduces the need for energy and results in significant savings. Insulation act as a barrier for heat transfer from a object to surrounding.</i> ❖ <i>The benefit of insulation may be noted as follows:</i> ❖ <i>Reduces energy costs</i> ❖ <i>Prevents moisture condensation</i> ❖ <i>Reduces capacity and size of new</i>
8	<i>Replacement of 6 numbers of main lube oil cooler and 3 numbers of generator coolers (for 3 units)</i>	<p><i>of a very critical auxiliaries and tendered 23 years of service counted from the year of commissioning. For redundant operation, it is also intended to purchase 01 no of Boiler feed pump to keep in ready stock for replacement if required. Calculated approx. cost involvement shall be of Rs. 1.00 Crore. OEM is the BHEL.</i></p> <ul style="list-style-type: none"> ❖ <i>In thermal power plant heat energy is converted into electrical energy. As such, losses of heat energy in any form is the loss of efficiency. A properly designed and installed insulation system immediately reduces the need for energy and results in significant savings. Insulation act as a barrier for heat transfer from a object to surrounding.</i> ❖ <i>The benefit of insulation may be noted as follows:</i> ❖ <i>Reduces energy costs</i> ❖ <i>Prevents moisture condensation</i> ❖ <i>Reduces capacity and size of new</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p><i>mechanical equipment</i></p> <ul style="list-style-type: none"> ❖ <i>Enhances process performance</i> ❖ <i>Reduces emissions of pollutants</i> ❖ <i>Safety and protection of personnel</i> ❖ <i>Acoustical performance: reduces noise levels</i> ❖ <i>Maximizes return on investment (ROI)</i> ❖ <i>Improves Appearance</i> ❖ <i>Fire Protection</i> ❖ <i>Insulation of module-III was renovated in the year 2016. With the LE, significant</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
9	Replacement of Boiler duct expansion joints	<p>improvement has been noted. With time, insulation of module-1 and 2 is recorded degraded due to ageing for which skin temperature is rising. To prevent untoward heat losses, it is planned to renovate insulation of power cycle piping of module-1 and -2. To do it so, complete unit shutdown shall be required. Accordingly, it is planned to club the LE work of insulation with major inspection of steam turbines. Major overhauling of steam turbine 1 and 2 have been scheduled to carry out in the year 2022 and 2024 respectively:</p> <ul style="list-style-type: none"> ❖ First Major inspection of steam turbine units were carried out on the following dates: ❖ STG-1: 2012 ❖ STG-2: 2014 ❖ STG-3: 2016 ❖ Next major overhauling shall be due on the following dates: ❖ STG-1: 2022 ❖ STG-2: 2024 ❖ STG-3: 2026 ❖ During major overhauling of steam turbine units, turbine internals both guide blade carriers
C	LE of Gas booster station	
1	Replacement of Gas Engines and its auxiliaries of GBS Unit # 1, 2 & 3	<ul style="list-style-type: none"> ❖ During the initial years of operation, all units of GBS had experienced not only erratic behaviour due to inherited problem and grid



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
2	LE of Dresser-Rand Gas Compressors Unit # 1, 2 & 3. (Capacity enhancement)	instability, but also encountered huge number of tripping. ❖ Despite modifications of various systems, like, new ignition system, incorporation of TCMS system, replacement of thermostats, etc., there was no much improvement of behaviour and characteristics. Frequent tripping of GBS
3	Replacement of Gas Engines and its auxiliaries of GBS Unit # 4	compounded the breakdown maintenance of Gas Engines as well as enhanced the outages of GBS Units.
4	LE of Dresser-Rand Gas Compressors Unit # 4. (Capacity enhancement)	❖ To overcome unreliability situation of GBS and to enhance stability, it was decided to carry out LE GBS in phase manner. ❖ Gas Engines requires dry clean natural gas for smooth running. ❖ Liquid carryover along with natural gas creates problem for smooth operation of Waukesha Gas Engines. ❖ Individual fuel filters are installed keeping in view of supplied fuel quality to avoid unwarranted outages of the Gas Engines and therefore better efficiency, output and reliability of the GBS.
5	Individual Gas Engine Fuel filter assy. Complete with accessories	
D	LE of Central AC system:	
1	Installation for 5 nos. of Floor standing AC (8TR capacity each) at DDC room of CCR building)	❖ For effective cooling of DDC (Distributed Digital Control) rooms (where all the control panels for combined cycle operation, GTG operations, Diverter Damper operations, etc are installed), there are 5 numbers of 8 Ton capacity
2	Replacement of old split AC by	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	<i>new one at DM plant and other area of the plant (10 nos. of 2 Tr. Split AC)</i>	<p><i>Floor Standing AC installed and commissioned. The Central Air Conditioning system, split package AC and all other ventilation system of the plant was commissioned in the year 1995 by M/S Blue Star Limited. The life of the plant has already completed 25 years and due to aging frequent breakdown of some equipment occurred.</i></p> <p>❖ <i>The existing Chillers are water cooled reciprocation type of capacity 70 Ton each. The Reciprocating type compressors are used in chiller plants in comfort applications of cooling capacities between 15 TR to 240 TR but are rarely sold these days as this technology has become almost obsolete because there are newer and more energy efficient technologies available.</i></p> <p>❖ <i>The FRP Cooling towers, ductable Acs, FCU etc. has already crossed its useful life</i></p>
3	<i>Installation for 2 nos. of Floor standing AC (8TR capacity each) at CCR</i>	
4	<i>Replacement of 2 nos. of 70 Tr. Existing Chiller unit by 2 nos. 80 Tr. Water cooled Screw Compressors at Central AC plant along with FRP Cooling tower and other accessories</i>	
5	<i>Replacement of 1 no. of 70 Tr. Existing Chiller unit by 1 nos. 80 Tr. Water cooled Screw Compressors at Central AC plant along with other accessories</i>	
6	<i>Replacement of FRP Cooling Tower at Central AC plant (1 No.)</i>	
7	<i>Replacement of ductable AC at LCR # 1, 2 & 3</i>	
8	<i>Replacement of all FCU units of Central AC plant</i>	
E	<i>LE of all electrical equipment of the plant, like, Generator, Transformer, Switch yard, battery bank and chargers, CT, PT, Circuit</i>	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
1	<i>Retrofitting of Generator & Generator Transformer protection relay by installation & Commissioning of new numerical relay at STG # 1 & GTG # 6 Relay Panel</i>	❖ <i>For replacing old/ obsolete electro mechanical relays for increased sensitivity, reliability and speed. Numerical relays inherently are much superior to our existing electro-mechanical relays from the operational speed, flexibility and reliability point of view. Most of the basic protection relays of GTGs, STGs and their Generator Transformers and UATs are obsolete and their repairing is only possible subject to availability of spares. As such, in case of failure of any existing protection relay, repairing may not be feasible as repairing can be done subject to availability of spares only. (ii) To comply CEA standard guidelines/Regulation.</i>
2	<i>Replacement, installation commissioning and testing of 24 Volts Battery Bank # 2 for STG # 2 (TH 1900H) through the OEM (M/s Exide)</i>	❖ <i>The battery banks were commissioned during commissioning of the plant. The battery banks had crossed their normal life period. Replacement has provided reliability of the DC supply system which is the most essential in both normal as well as emergency condition.</i>
3	<i>Replacement, installation commissioning and testing of 220 Volts DC Battery Bank # 2 for Switchyard (TI 600 H) through the OEM i.e. M/s Exide.</i>	❖ <i>The battery banks were commissioned during commissioning of the plant. The battery banks had crossed their normal life period. Replacement has provided reliability of the DC supply system, which is the most essential in both normal as well as emergency condition.</i>
4	<i>Retrofitting of Generator & Generator Transformer</i>	❖ <i>For replacing old/ obsolete electro mechanical relays for increased sensitivity,</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	<i>protection relay by installation & Commissioning of new numerical relay at STG # 2 & STG # 3 Relay Panel through the OEM, i.e. M/s GE T&D India Ltd.</i>	<p><i>reliability and speed. Numerical relays inherently are much superior to our existing electro-mechanical relays from the operational speed, flexibility and reliability point of view. Most of the basic protection relays of STGs and their Generator Transformers are obsolete and their repairing is only possible subject to availability of spares. As such, in case of failure of any existing protection relay, repairing may not be feasible as repairing can be done subject to availability of spares only.</i></p> <p>❖ <i>To comply CEA standard guidelines/Regulation.</i></p>
5	<i>Replacement, installation commissioning and testing of 24 Volts Battery Bank # 3 (A) for STG # 3 (TH 1900H)</i>	<p>❖ <i>The battery banks were commissioned during commissioning of the plant. The battery banks had crossed their normal life period. Replacement has provided reliability of the DC supply system which is the most essential in both normal as well as emergency condition.</i></p>
6	<i>Retrofitting, Integration, Testing and Commissioning of RTU at AGBPS, Bokuloni through reputed manufacturer as per decision of OCC meeting to comply the CERC regulation</i>	<p>❖ <i>As per Indian Electricity Grid Code (effective from 1st April, 2006) all agencies connected to ISTS would ensure providing of RTU and other communication equipment as specified by RLDC/SLDC. The RTU at AGBPS of Alstom make bearing (Model No. S900) initially installed by M/S PGCIL had been found mismatched/suspect as reported by NERLDC and also raised the matter in many OCC Meetings. As such to</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>comply CERC regulation and as per decision of OCC Meeting it was proposed for Retrofitting, Integration, Testing and Commissioning of RTU at AGBPS, Bokuloni through reputed manufacturer.</i>
7	<i>Replacement of old 125V, 500AH battery bank and Retrofitting, testing & commissioning of 125 Volts, 500AH OBZ Exide make Tubular Lead Acid Stationary Battery bank for GTG # 2 through the reputed manufacture of battery</i>	<i>❖ The Battery bank proposed for replacement was installed during commissioning of the Gas turbine Generators and are in operation for more than 21 years. This Battery bank of the plant have already crossed more normal life period of battery bank and it is most essential to replace with the new battery bank to avoid any unwarranted breakdown leading to outage of the unit.</i>
8	<i>Replacement of old 125V, 500AH battery bank and Retrofitting, testing & commissioning of 125 Volts, 500AH OBZ Exide make Tubular Lead Acid Stationary Battery bank for GTG # I through the reputed manufacture of battery</i>	<i>❖ MHI supplied Gas Turbine Generators having 125 Volt, 500Ah Furukawa Tubular Plated Lead Acid Battery Banks were installed during commissioning of the Gas turbine Generators and are in operation for more than 21 years. This Battery bank of the plant have already crossed more normal life period of battery bank; hence, it is most essential to replace with the new battery bank to avoid any unwarranted breakdown leading to outage of the unit. The Expert Protection Group of NEEPCO in the 3rd EPG held at AGBPS on 04.01.2016 has suggested reviewing the status of DC system and taking necessary action for GTG U # 1, 2, 3</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		& 4 which were forwarded vide UO NO: NEEPCO/HOP/2386 dtd.09/02/2016.
9	L & T makes Mini Motor Protection Relay, MPR-300 for Service Water PUMP Motor	❖ Due to malfunctioning of Over Load Relay, some of the Motors in the Plant area have been found brunt frequently due to overload.
10	Retrofitting of Numerical Relay in GTG # 5 Relay Panel (Removal of existing Relays, wiring, testing, commissioning, engineering drawing for Micom P345 Relays with P391 and Micom P643) through M/s Alstom T&D India Ltd.	❖ (i) For replacing old/ obsolete electro mechanical relays for increased sensitivity, reliability and speed. Numerical relays inherently are much superior to our existing electro-mechanical relays from the operational speed, flexibility and reliability point of view. Most of the basic protection relays of GTGs and their Generator Transformers & UAT are obsolete and their repairing is only possible subject to availability of spares. As such, in case of failure of any existing protection relay, repairing may not be feasible as repairing can be done subject to availability of spares only. (ii) To comply CEA standard guidelines/Regulation.
11	20 MVAR Line Reactor	❖ The requirement of Line Reactor at Kathalguri/AGBPS End of 383 KM long Misa-Morioni Line was established through a study carried out at NERLDC to arrest the Line Voltage problem encountered at the time of re-synchronization of Line at Kathalguri End in the event of tripping of any fault. In line with discussion of 9 th RPC meeting, POWERGRID was 20 MVAR Line Reactor has been designed



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>supplied and commissioned by POWERGRID India Ltd. As deposited work.</i>
12	<i>Retrofitting, Installation Testing and commissioning of 01(one) set of 125 volts 535 AH Plante Lead Acid Flooded Stationary Battery bank at GTG U # 3 by replacing old battery bank through open tender</i>	<i>❖ MHI supplied Gas Turbine Generators having 125 Volt, 500Ah Furukawa Tubular Plated Lead Acid Battery Banks were installed during commissioning of the Gas turbine Generators and are in operation for more than 21 years. This Battery bank of the plant have already crossed more normal life period of battery bank; hence, it is most essential to replace with the new battery bank to avoid any unwarranted breakdown leading to outage of the unit. The Expert Protection Group of NEEPCO in the 3rd EPG held at AGBPS on 04.01.2016 has suggested reviewing the status of DC system and taking necessary action for GTG U # 1, 2, 3 & 4.</i>
13	<i>Retrofitting, Installation Testing and commissioning of 01(one) set of 125 volts 535 AH Plante Lead Acid Flooded Stationary Battery bank at GTG U # 4 by replacing old battery bank through open tender</i>	<i>❖ Due to malfunctioning of Over Load Relay, some of the Motors in the Plant area have been found burnt time to time. During last few years it has been observed that the 9.3 KW Service Water Pump Motors, 9.3 KW Sludge Disposal Pump Motor of Pre-Treatment Plant, 22 KW Clarified Water Forwarding Pump Motor and 15 KW Boiler Filling Pump of this Plant have been burnt several times due to failure of the Motor Overload protections. Same procedures follow as stated in 11(V) for year 2016-17. It may</i>
14	<i>L & T makes Mini Motor Protection Relay, MPR-300 for Service Water PUMP Motor, Boiler Filling Pump Motor, SDP Motor and Clarified Water Pump Forwarding Motor.</i>	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p><i>kindly be noted that after installation of the L& T make Motor Protection Relays (Model MPR 300), the Service Water Pump Motors has been found trip several times due to over current/overload while the discharge valve operated manually more than its set points. As such, the motors could get protected from damage of the Motor Windings.</i></p>
15	<p><i>Retrofitting, Installation Testing and commissioning of 220 V DC Battery Bank & 220 V DC Battery Charger at GBS#3 by replacing old battery bank and charger through open tender</i></p>	<p><i>❖ MHI supplied Gas Turbine Generators having 220 Volt DC, 170Ah Furukawa Tubular Plated Lead Acid Battery Banks were installed during commissioning of the Gas turbine Generators and are in operation for more than 21 years. This Battery bank of the plant have already crossed more normal life period of battery bank; hence, it is most essential to replace with the new battery bank to avoid any unwarranted breakdown leading to outage of the unit. The Expert Protection Group of NEEPCO in the 3rd EPG held at AGBPS on 04.01.2016 has suggested reviewing the status of DC system and taking necessary action for GTG U # 1, 2, 3 & 4 which were forwarded vide UO NO: NEEPCO/HOP/2386 dtd.09/02/2016.</i></p>
16	<p><i>Retrofitting, Installation Testing and commissioning of 4 KVA Inverter at GTG U # 2 by replacing old Inverter through</i></p>	<p><i>❖ The Inverter that proposed for replacement were installed during commissioning of the Plant which are in operation for more than 20 Years. It was found most essential to replace</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	<i>open tender</i>	<i>with new Inverter to avoid any unwanted breakdown leading outage of the unit.</i>
17	<i>Retrofitting, Installation Testing and commissioning of Automatic Float cum Boost (100 Amps) Battery charging Equipment at GTG U # 2 by replacing old chargers through open tender</i>	<i>❖ The battery bank and accessories, Battery Charger and Inverter that proposed for replacement were installed during commissioning of the Plant which are in operation for more than 20 Years. It was found most essential to replace with new Battery bank, Chargers and Inverter to avoid any unwanted breakdown leading outage of the unit.</i>
18	<i>Retrofitting, Installation Testing and commissioning of 4 KVA Inverter at GTG U # 1 by replacing old Inverter through open tender</i>	<i>❖ The Inverter that proposed for replacement were installed during commissioning of the Plant which are in operation for more than 20 Years. Further, 4 KVA Inverter providing 110V AC control power to GTG#1 & GBS#1&2 was non-functioning since long back and could not repair due to non-availability of spares and was in critical conditions for 110V control power. It was found most essential to replace with new Inverter to avoid any unwanted breakdown leading outage of the unit.</i>
19	<i>Retrofitting, Installation Testing and commissioning of Automatic Float cum Boost (100 Amps) Battery charging Equipment at GTG U # 1 by replacing old chargers through</i>	<i>❖ The battery bank and accessories, Battery Charger and Inverter that proposed for replacement were installed during commissioning of the Plant which are in operation for more than 20 Years. It was found most essential to replace with new Battery</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	<i>open tender</i>	<i>bank, Chargers and Inverter to avoid any unwanted breakdown leading outage of the unit.</i>
20	<i>Design, Re-Engineering, Supply, Retrofitting, Testing and Commissioning of M/s Alstom T&D India Ltd. Make numerical relays at STn. Tr.# 1 & 2 (HT) ; STn. Tr.#1 &2 (LT) ; BUS PT# OCA & OCB Panels ; 1 no. 220KV Bus Coupler ; 4 nos. 6.6 KV Tie-Breaker of OCA-OCB and 11 nos. Aux. Transformers</i>	<i>❖ Most of the relays used in protection system of Power Station were conventional Electro Mechanical Relays and Static Relays. Electro Mechanical relays are becoming Old /obsolete and prone to malfunctioning with time. The Expert Protection Group and NTPC energy audit team had suggested for upgrading of Protection System to Numerical Relay.</i>
21	<i>132 KW/177HP, 415Volts, 3Phase, 50Hz, 1485 RPM Pump Induction Motor (Marathon make) at EP#3 (Fire Pump House)</i>	<i>❖ There are 3 (three) nos. of GEC- Alstom make 132 KW, 3 phase induction motors coupled with the Electric Operating Fire Fighting Pumps (EP-1, EP-2 & EP-3) installed at Fire Fighting Pump house of AGBPS, Bokuloni. EP-1 & EP -2 pump is in use for Emulsifier Fire Fighting Pump and EP-3 is used for Fire Hydrant System of the Power Plant. The life of this Motors already crossed more than 20 (twenty) years. During this period these three motors had been repaired/rewinding done locally time to time that failed during operation time to time. Since Fire Fighting System is vital for a Gas Based Power Plant. As such, 1(one) no. spare motor have been procured for keeping as emergency</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>spares for replacement during the failure of any motors of the above-mentioned pumps.</i>
22	<i>L&T makes Mini Motor Protection Relay, MPR 300 for L&T make MCC panel for GTG#5&6 by replacing Thermal O/L Relay</i>	<i>❖ The L & T makes Motor Protection Relay used in various Plant Motors working satisfactorily and after installation of the MPR Relay in various Plant Motors, damage of motor winding due to overload or any other reason is not experienced for last one year. As such utility of this MPR relay has been observed more effective. Considering above, it was proposed for up gradation of motor protection system in the L&T make MCC Panel of Gas Turbine U # 5 & 6 by replacing Thermal Overload Relay (OLR) with L & T make Motor Protection Relay MPR -300 (the OEM of the said MCC panels). These Relays have: Thermal Overload Protection, Earth Fault Protection, Locked Rotor Protection. Single Phasing & Phase unbalance protection & Under Current protection.</i>
23	<i>Retrofitting of Check Sync. Numerical Relays P143 at GTG#5 &6 through OEM</i>	<i>❖ The existing Electro Mechanical relays are becoming Old /obsolete and prone to malfunctioning with time. One of Check Synchronizing. Relays and one 50 VA Transformer got damaged while in operation and there was no spare Relay available in stock. As per suggestion of OEM Expert it was decided for up gradation of the Electro Mechanical Check Synchronizing. Relays to Numerical Relay</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>Model. MiCOM P143.</i>
24	<i>Replacement of 2 sets 48 V PLCC Battery Bank (48 V, TBS (Opz) 500 AH Exide make Tubular Lead Acid Stationary Battery Bank through Exide Industries Ltd. (the OEM)</i>	<i>❖ The Battery of PLCC of AGBPS initially had installed and maintained by PGCIL. The deteriorated condition and requirement of immediate replacement of the 48 Volts Battery bank had informed to PGCIL. Accordingly, an Agenda was placed to 134th OCC meeting for replacement of the 48 Volts Battery bank by PGCIL. After detailed discussion the Forum has directed NEEPCO to replace the Battery bank on its own. The competent authority of NEEPCO also directed to procure the 48 Battery bank.</i>
25	<i>Supply, Installation & Commissioning of External GPS system for synchronization of RTU at AGBPS through the OEM of RTU</i>	<i>❖ For reporting correct field time of operation of Circuit Breaker to NERLDC in perfect manner external GPS System has been incorporate in the Existing RTU System <u>and to comply CEA guidelines for grid connectivity.</u></i>
26	<i>Retrofitting, Installation, testing & Commissioning of 2x100 KVA UPS along with 180 Nos. plante Batteries, 1 No. SCVS, 3 Nos. output ACDBs etc.by replacing old obsolete UPS System through open tender (M/s Consul Neowatt Power Solutions Pvt. Ltd.)</i>	<i>❖ The 2x100KVA UPS System along with Battery bank providing critical control power 110V/230V AC to MHI of STGs, GTGs (for C&I) were installed during commissioning of the Plant and already crossed more than 23 years. Further one Module of the UPS System out of two was non-functioning since long back and could not repair due to non-availability of spares. The condition of the common battery bank of the UPS was in very poor condition and already crossed its normal service life. The</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		control power 110V/230V AC providing to MHI of STGs, GTGs (for C&I) has been facing the critical conditions and was essential to replaced/uprating of UPS system.
27	Retrofitting of Electromechanical Relay at GTG#5&6 through OEM (Relays Model: MVAJM25LA1000A=4 nos., VAA23YF0752BA=9 nos., MVAJM14JB6004A1=12 nos.)	❖ We had already upgraded protection system of GTG # 5 & 6 and STG # 1, 2 & 3 from electromechanical relay to numerical relay in phase wise but we had retained the existing tripping and auxiliary relays. Some of these auxiliary relays were prone to malfunction with time and these relays are not available in the market and not in our stock. As such, retrofitting of the existing relay done with upgraded electromechanical relays.
28	Retrofitting of Numerical Relay at 6.6 KV OCC Panel & 415 V fire Fighting Panel (P241=7 nos.; P14N=4 nos.; P94V=2 nos.)	❖ As per recommendation of Expert Protection Group and NTPC Energy Audit Team and CEA Guidelines retrofitting of Electro Mechanical Relay done with Numerical Relays P241=7 nos.; P14N=4 nos.; P94V=2 nos. at GTG#5&6 Relay Panel at 550KW Pump Motor (CW#1,2,3&4); 132KW Pump Motor (EP#1,2&3; ODN Tr.; Bus-Coupler (OCC Panel); Incomer-A(OCA) (OCC Panel); Incomer-B(OCB)(OCC Panel); Bus PT-A(OCC Panel) & Bus PT-B(OCC Panel) through the OEM of the Relay
29	Dismantling & Retrofitting of 2 (two) nos. 415 Volts MCC Panels for GC # 3 & U # 4 at	❖ The rectification/modification of 415 Volts MCC Panels for Gas Compressor U # 3 & U # 4 has been done in line with LE works of GC # 3 &



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	GBS	# 4 done by Clark Energy Pvt. Ltd.
30	Repairing of 1(one) BL Exciter which will be kept as spares amongst of BHEL GTG U # 5 & U # 6 STG (1,2 & 3).	❖ PMG Pole of BL Exciter of STG unit 3 failed and subsequently the exciter got damaged on 13.03.2014 during running conditions. Accordingly, one purchase order was placed with the OEM, BHEL for one set of new BL exciter on urgent basis for restoration of STG#3 to reduce down time of outage. In view of incidents of failures of BL exciter and subsequent approval accorded, the damaged BL Exciter of STG#3 was transported to BHEL, Hyderabad for repairing and to keep as spares against 5(five) no BL Exciter that are in service at AGBPS as there is no spare BL Exciter.
31	Retrofitting, Testing and Commissioning of 8(eight) nos. 245 KV SF ₆ Spring Operated Mechanism Circuit Breaker as per Breaker Standard IEC 62271-100 by dismantling old existing BHEL make 245 KV SF ₆ CB including Mandatory Spare Parts	❖ AGBPS, Bokuloni, Dist: Dibrugarh having total 14 nos. of 245KV SF ₆ hydraulic operated 3(three) pole Circuit Breaker (Type: 3AV1) of BHEL and was installed during commissioning of the plant. One time overhauling of total 6(six) nos. 220KV SF ₆ Ckt. Breaker of GTG#1,2,3,4,5 and STG#1 have done under the supervision of BHEL during the period 2007 to 2014. Remaining overhauling is still pending for 8(eight) nos. 220KV SF₆ Ckt. Breaker i.e. for GTG#6, STG#2, STG#3, Station Transformer #1 & 2; Bus Coupler; L-1 & II. The overhauling of GTG#6, STG#2, and STG#3 is already due and could not be done due to non-availability of complete set of



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p>overhauling spares. The OEM, M/s BHEL, Hyderabad had expressed their difficulty to manufacture & supply of these CBs due to their problem in supply of raw materials. As per CEA guideline <i>vides</i> no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015 that unit above 15 years old qualify for Midlife LE works.</p>
32	<p>Procurement of spares for overhauling of 2 (two) Nos. 50 MVA Transformers and 1 (one) No. 15 MVA Station Transformer</p>	<p>❖ As per recommendation in O&M Manual of the OEM (BHEL) overall internal inspection including lifting of core and coil assembly is required to carry out in the interval of 7-10 years. Since, the BHEL makes 50 MVA Generator Transformers and 15 MVA Station Transformers have already crossed more than 20 years. It is proposed to carry out the internal inspection/overhauling of said transformers in phase manner basis. It is proposed to carry out 2 Nos. 15 MVA Station Transformers and one no. 50 MVA Transformer out of seven nos. BHEL Transformers installed at AGBPS. Accordingly, procurement of spares for these three transformers have made and overhauling of the BHEL makes Transformer will be carried out shortly.</p>
33	<p>Procurement of Servicing Spares of Gas Turbine Generator (Sl. No. 1284 &</p>	<p>❖ Overhauling of the Generator. As per instruction Manual full-scale inspection has to be carried out after eight to twelve months. Last</p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	1285) GTG # 5 & U # 6	<i>Inspection has been carried out in the Year Dec, 2008 & April, 2007 respectively.</i>
34	<i>Additional Modem for Fiber Optics (Supply, installation and Commissioning of MODEM with accessories</i>	<i>❖ As per suggestion of POWERGRID and as per Grid norms to integrate RTU to NERLDC SCADA over IEC 60874-5-101 & IEC 60870-5-104 protocol through newly installed Fiber Optics Panel order has been placed for Additional Modem for RTU at AGBPS, Bokuloni.</i>
35	<i>Procurement of Spares for overhauling of 10 (ten) Nos. 2 MVA Aux. Transformers</i>	<i>❖ There are 10 (ten) numbers of M/s CG Power and Industrial Solution Limited (Formerly Crompton Greaves Limited) make 6.6/0.433 KV, 2 MVA Distribution Transformers for auxiliary power distribution inside the Power Plant, Intake Water Pump House and also in AGBPS Colony area. The service life of these Transformers have already completed almost 20 years. As such, it is the high time for internal inspection and maintenance as per CBIP manual.</i>
36	<i>Procurement of transformer filtration plant</i>	<i>❖ We are having 1(one) no old transformer oil filtration plant (with high vacuum capability) of capacity 4000 LPH supplied by MHI (of make TOKYO SANMI KOGYO CO. LTD. JAPAN) against total 11 no 50MVA Generator Transformer and 15MVA Station Transformer of our plant. Another transformer oil filtration plant of capacity 2400 LPH of make M/S JOHN FLOWER (INDIA) LIMITED against total 20 no</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p>2MVA/630KVA/500KVA auxiliary transformer for filtration of transformer oil in our plant. Both the above Filtration Plant has supplied by MHI/BHEL during commissioning of the project. There are no spare parts for filtration plant of 4000 LPH capacity supplied by MHI since long back and could not be repaired in case of failure due to non-availability of spares. The condition of the other small capacity is also very poor conditions and it has already crossed normal service life periods</p> <p>❖ Moreover, overhauling of 50 MVA and 2 MVA auxiliary transformers are already due and procurement process for necessary spares were completed. As such it is proposed to procure 2(two) no new transformer filtration plant (having capacity 6000 LPH & 1200 LPH) along with 2000-liter storage tank for storage of transformer oil during overhauling.</p>
37	Procurement/installation of disturbance recorder and event logger (DR & EL)	<p>❖ As per CERC regulations "Recording Instruments such as Data Acquisition System/ Disturbance Recorder/Event Logging Facilities/Fault Locator (including time synchronizing equipment) shall be provided and shall always be kept in working condition in the ISTS for recording of dynamic performance of the system. All users, STUs and CTU shall provide all the requisite recording instruments and shall</p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>always keep them in working condition.” As such to comply with the CERC regulations, order has placed for supply, Installation, testing and commissioning of disturbance recorder and event logger.</i>
38	<i>Upgradation of protection of 415 v system (auxiliary panel) with numerical relay</i>	<p>❖ <i>Most of the relays used in 415 V protection system of our power station are conventional Electro Mechanical relay. Electro Mechanical relays are becoming old/obsolete and prone to malfunction with time. Moreover, the aging of electric/electronic components and non-availability of spares is a concern for the protection system with Electro Mechanical Relays. Again, in case of failure of any existing Electro Mechanical protection relay, repairing may not be feasible as repairing can be done subject to availability of spares only. Recently we had sent some of our E/M relays for servicing to OEM workshop at Chennai but they sent back a few relays as it could not be repaired. As such, it is proposed to upgrade the 415V protection system with Numerical relays in phase manner. The chargers are considered for upgradation. It the first phase we will Retrofit Numerical relays in 415 V ODC panel.</i></p>
39	<i>Retrofitting of 2 (two) nos. 245 KV SF6 circuit breaker including mandatory spare parts and</i>	<p>❖ <i>AGBPS, Bokuloni, Dist: Dibrugarh having total 14 nos. of 245KV SF₆ hydraulic operated 3(three) pole Circuit Breaker (Type: 3AV1) of</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	AMC.	
40	Retrofitting 4 (four) nos. 245 KV SF6 circuit breaker including mandatory spare parts and AMC.	<p>BHEL and was installed during commissioning of the plant. The OEM, M/s BHEL, Hyderabad had expressed their difficulty to manufacture & supply of these CBs due to their problem in supply of raw materials. As per CEA guideline vides no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015 that unit above 15 years old qualify for LE works.</p> <p>❖ In the 1st phase Retrofitting of 8 (Eight) nos. 220KV SF6Ckt. Breaker had been already be completed during the period 2020 to 2021. As performance of newly installed circuit breakers are found to be satisfactory and outages of the breakers decreased, it is decided to carry out retrofitting of remaining 6 (Six) nos. 220KV SF6 Ckt. Breaker in phased manner.</p> <p>❖ In the 2nd phase order was placed for retrofitting of 4 (Four) NOS. 245 KV SF6 SPRING OPERATED MECHANISM CIRCUIT BREAKER</p>
41	Procurement of M/S BHEL make generator transformer	<p>❖ 5 (Five) nos BHEL Jhansi make Generator transformers (GTG# 5&6 and STG# 1 to 3) are in service since commissioning of the project and completed more than 22 (Twenty-Two) years without any failure. We have one (1) no single-phase winding available as mandatory spare for the above-mentioned transformers. As such in order to avoid long outage in the event of failure of any transformers, it was proposed to procure</p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>one Generator Transformer for replacement of any of the above-mentioned Transformers.</i>
42	<i>Retrofitting, testing and commissioning of 245 KV current transformer</i>	<i>❖ 14 (Fourteen) sets of BHEL Jhansi make current transformers are in service since commissioning of the project and completed more than 22 (Twenty-Two) years without any failure. To comply the CEA guidelines for comprehensive LE works for life extension and CEA (Installation and operation of meters) regulations, 2006 for required accuracy class for tariff metering core. As such in order to avoid long outage in the event of failure of any current transformers, it was proposed to procure & retrofit 14 sets of new current transformer</i>
43	<i>Retrofitting of static relays by numerical relays (GTG Unit # 1-4):</i>	<i>❖ The old relays are continuously in service for last 25 years and becoming old/obsolete. Moreover, they had completed their expected life period and prone to malfunctioning with time. As such, it is proposed for upgrading of protection system GTG 1-4 to numerical relays in phased manner.</i>
44	<i>Replacement of 24V and 220V DC AFCOSET make battery charger (obsolete) with new upgraded charger – 12 (twelve) sets</i>	<i>❖ There are 12 (twelve) numbers of AFCOSET make battery chargers at AGBPS of rating 220 Volts (DC) and 24 Volt (DC). 220 Volts (DC) chargers (6 Nos) are required for 220 Volt D.C. devices (like EOP, DC JOP) of STGs, Generator Relay Panel of STG- 1,2,3 & GTG # 5 & 6 and also</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		protection system of all 6.6 KV & 415 Volts. Drives. 24 V DC AFCOSET Charger (6 Nos) are required for Pro-control and DDC panels of STG Control system.
45	Major overhauling / servicing of M/S CGL make aux. transformer (2 MVA) (8 nos.)	❖ There are 10 (ten) numbers of M/s CG Power and Industrial Solution Limited (Formerly Crompton Greaves Limited) make 6.6/0.433 KV, 2 MVA Distribution Transformers for auxiliary power distribution inside the Power Plant. The service life of these Transformers have already completed almost 20 years. Depending on the conditions of the Transformers, necessary spares are already procured from M/s CGL vide PO No NEEPCO/AGBPS/PEM/O&M-01/2018-19/39NB1056/168 dated. 04/08/2018 with Financial involvement of Rs. 17,82,732.00.
46	Upgradation / replacement of 220 V DC battery charger for station / switch-yard battery bank (make: HBL); 2 sets	❖ We are having total 2 (two) nos. of HBL make 220 V DC float cum Boost chargers and was installed during commissioning of the plant (i.e. for last 25 years). Servicing of battery chargers are carried out periodically as per instruction manual and the system is running smoothly till date. However, as the aging has certain effect on electric/electronic components, the system is considered for upgradation.
47	Replacement of 125 V battery charger in GTG Unit # 5 & 6 (2 sets)	❖ The HBL Nife make battery chargers are continuously in service since commissioning (i.e. for last 23 years), the system is running



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>smoothly till date. However, as the aging has certain effect on electric/electronic components, the system is considered for upgradation.</i>
48	<i>Replacement of 220 V battery bank for station supply (2 sets)</i>	<i>❖ There are two nos of Exide make 220V, 600AH lead acid battery banks for station DC Supply. First bank is in service since 2012 & other bank is in service since 2015. The performance of the battery bank is satisfactory. However, lead acid battery banks will be replaced after completion of expected life period.</i>
49	<i>Replacement of 125 V battery bank in GTG Unit # 5 & 6 (2 sets)</i>	<i>❖ The Exide make 125 V,400 AH lead acid battery banks are in service since 2009 (i.e. for last 10 years), the system is running smoothly till date. However, as the expected life period of the lead acid battery bank nearing to completion, it is considered to replace the Battery bank with new one.</i>
50	<i>Major overhauling / servicing of M/S MITSUBISHI make generator and exciter (GTG Unit # 1-4).</i>	<i>❖ As per the recommendations/instruction given in the O&M instruction manual, inspection and overhauling of the turbine generators, exciter with accessories are required to ensure for reliable operation of the turbo generators. Inspection and Overhauling provides the opportunity for taking corrective measures if any faults gets detected which otherwise may cause a major failure resulting generation loss, even breakdown and consequently a very high</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p>restoration cost. Initial Major Inspection of Generator & Exciter for Gas Turbine U # 1 to U # 4 had been executed during the period from 2008-2010 and has already due for full scale inspection for each MELCO units. It is to be noted that the Stator and Rotor of Generator have to rewind or replace before reaching design life period, i.e. 25 years as per standards procedures of OEM. Based on guidelines of OEM to enhance life periods, NEEPCO has express the views to carry out servicing/overhauling of Gas Turbine Generator, Exciter, UAT, MCC of Unit # 2 (in 1st phase). The major inspection/overhauling and testing of Generator & Exciter of GTG U # 2 had been done on December, 2009.</p>
51	<p>Major overhauling / servicing of M/S BHEL make generator and exciter (GTG Unit # 5 & 6)</p>	<p>❖ As per the instruction given in the O&M instruction manual for Turbine Generator and accessories (M/s BHEL Make), inspection and overhauling of the turbine generators are required to ensure reliable operation of the turbo generators. Inspection and Overhauling provides the opportunity for taking corrective measures if any faults gets detected which otherwise may cause a major failure resulting generation loss, even breakdown and consequently a very high restoration cost. Initial inspection of the GTG#5 & GTG #6 was carried</p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p>out on Dec 2008 and April 2007 respectively. As per the instruction manual full-scale inspection has to carry out after eight to twelve years. As such, we have planned to be carry out overhauling/servicing of Gas Turbine Generator and Exciter # 5. Accordingly, a purchase order was placed to M/s BHEL for necessary spares with financial involvement of Rs. 49,55,412.00 /- (Rs. Forty-Nine Lakhs Fifty-Five Thousand Four Hundred Twelve) only. Process for overhauling will be started after delivery of the spares.</p>
52	<p>Major overhauling / servicing of M/S BHEL make generator transformer (50 MVA) & station transformer (15 MVA):</p>	<p>❖ As per recommendation in O&M Manual of the OEM (BHEL) overall internal inspection including lifting of core and coil assembly is required to carry out in the interval of 7-10 years. Since, the BHEL makes 50 MVA Generator Transformers and 15 MVA Station Transformers have already crossed more than 20 years. It is proposed to carry out the internal inspection/overhauling of said transformers in phase manner. In the first phase, it is proposed to carry out overhauling/servicing of 2 Nos. 15 MVA Station Transformers and one no. 50 MVA Transformer out of seven nos. BHEL Transformers installed at AGBPS. Accordingly, spares are already procured for these three transformers.</p>
53	<p>Retrofitting of RIP bushing in</p>	<p>❖ The 50 MVA Generator Transformers and</p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	<i>gen. transformer (50 MVA) & station transformer (15 MVA).</i>	<p><i>15 MVA Station Transformers have already crossed more than 24 years' service life. It is proposed retrofit RIP Bushings to replace OIP bushings. Advantages of RIP Bushings are as follows</i></p> <ul style="list-style-type: none"> <i>❖ Slower evolution of fault in its condenser core (because the RIP bushing is constructed with resin, a fault usually does not propagate exactly from the original point of the first short circuit making it safer.)</i> <i>❖ Consequence of explosion are usually much less severe.</i> <i>❖ Less partial discharge.</i> <i>❖ High thermal capacity.</i> <i>❖ Easy Maintenance and lesser outage time for replacement as weight is less due to polymer housing.</i>
54	<i>Retrofitting, testing and commissioning of 11 KV current & potential transformer (MELCO).</i>	<p><i>❖ There are 4 (four) sets of M/s MELCO make Gas Turbine Generator and Exciters in our plant. These Generators were manufactured in the year 1994 and in service since commissioning of this plant. Various types Current and potential Transformer were supplied along with the main equipment. To comply the CEA guidelines for comprehensive LE works for life extension and CEA (Installation and operation of meters) regulations, 2006 for required accuracy class for tariff metering core. As such in order to avoid long outage in the event of failure of any current transformers, it is</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>proposed to procure & retrofit current and potential transformers in 11 KV Bus duct and SPVT cubicle with new transformers.</i>
55	<i>Retrofitting, testing and commissioning of 11 KV current & potential transformer (BHEL).</i>	<p>❖ <i>There are five sets of M/s BHEL make Generator and Exciters in our plant. These Generators were manufactured in the year 1993 and in service since commissioning of this plant. Various types Current & Potential Transformer were supplied along with the main equipment. To comply the CEA guidelines for comprehensive LE works for life extension and CEA (Installation and operation of meters) regulations, 2006 for required accuracy class for tariff metering core. As such in order to avoid long outage in the event of failure of any current transformers, it is proposed to procure & retrofit current and potential transformers in 11 KV Bus duct and SPVT cubicle with new transformers.</i></p>
56	<i>LE of generator & exciter</i>	<p>❖ <i>There are five sets of M/s BHEL make Generator and Exciters in our plant. These Generators were manufactured in the year 1993 and in service since commissioning of this plant. M/s BHEL offered for following Capital spares for reliable operation of the equipment.</i></p>
57	<i>Retrofitting, testing and commissioning of 6.6 KV vacuum circuit breaker.</i>	<p>❖ <i>There are Thirty-five nos. of 6.6 KV vacuum circuit breaker (Make M/s BHEL, Type: VM3AF) in our plant. These VCB's were manufactured in the year 1994 and in service since commissioning of</i></p>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive LE works for Life Extension. As such, we proposed to carry out retrofitting of these breakers in phase manner.</i>
58	<i>Retrofitting, testing and commissioning of 415V air circuit breaker.</i>	<i>❖ There are Seventy-Three nos. of air circuit breaker of different make in our plant. These ACB's were manufactured in the year 1994 and in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA, guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive LE works for Life Extension. As such, we proposed to carry out retrofitting of these breakers in phase manner.</i>
59	<i>Retrofitting, testing and commissioning of capacitive voltage transformer.</i>	<i>❖ There are 2 sets of CVT in our plant. These CVTs were manufactured in the year 1994 and in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive LE works for Life Extension. As such, we proposed to carry out retrofitting of these CVTs in phase manner.</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
60	Retrofitting, testing and commissioning of lightening arrester (LA).	❖ There are 14 sets of LA in our plant. These Las were manufactured in the year 1994 and in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive LE works for Life Extension. As such, we proposed to carry out retrofitting of these Las in phase manner.
61	Retrofitting, testing and commissioning of 245 KV HCB isolator	❖ There are 42 sets of 245 KV HCB ISOLATOR in our plant. These isolators were manufactured in the year 1994 and in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive LE works for Life Extension. As such, we proposed to carry out retrofitting of these isolators in phase manner.
62	Retrofitting, testing and commissioning of wave trap.	❖ There are two (2) sets of WAVE TRAP in our plant. These WAVE TRAPS in service since commissioning of this plant. It had already completed 25 years of service life. As per CEA guidelines issued vide no: 2/3/Misc./TPRM/CEA/2015/965 dtd.27.08.2015, units above 25 years (as on 31.3.2017) qualify for comprehensive LE works for Life Extension. As



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		such, we proposed to carry out retrofitting of these WAVE TRAPs in phase manner.
F	LE of all control and instruments equipment, like, control module, AVR /DAVR, vibration & temperature monitoring of STG and GTG, etc	
1	Up gradation and replacement of old M/s MHI make Gas Turbine Controllers MACTUS 620 sequencer and MEGAC III analog Governor to MEGAC V, Diasys Netmation System (GT controller Unit # 1, 2, 3 & 4)	❖ Detailed scope and quantum of works has already carried out and to be carried out for the LE of various works under Control & Instrumentation System, like upgradation of Governor system of GTG, STG, control system of DM plant, Upgradation of HMI of GTG, upgradation SWAS system etc. of plant based on
2	Up gradation and replacement of old Mark IV Gas Turbine control system of M/s BHEL make Gas Turbine with Mark Vie GT Controller (GT controller Unit # 5)	Obsolescence of the items and therefore non-availability of spare support from the OEM have been worked out for implementation. ❖ Existing system become obsolete as certified by the OEM and no spares and services are available.
3	Up gradation and replacement of old Mark IV Gas Turbine control system of M/s BHEL make Gas Turbine with Mark Vie GT Controller (GT controller Unit # 6)	❖ All 04 (four) MHI-GTs have same AVR supplied by MelCo, Japan. The systems are too old & in Operation since 1997. Systems are running smoothly till date. Some spares are also available. However, as aging has certain effect on electric/electronic components, the system is considered for up gradation. Although, year-wise planning for up gradation has already been fixed in next tariff plan (after 2024).
4	Up gradation of 7200 series Bentley Nevada makes Vibration Monitoring system (GTG Unit # 1 & 2)	
5	Up gradation of 7200 series	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	<i>Bentley Nevada makes Vibration Monitoring system (GTG Unit # 3)</i>	
6	<i>Up gradation of 7200 series Bentley Nevada makes Vibration Monitoring system (GTG Unit # 4)</i>	
7	<i>Up gradation of AVR (Automatic Voltage Regulation) system to DVAR for Steam Turbine Generator Units (STG Unit # 1, 2 & 3)</i>	
8	<i>Up gradation of 3300 series Bentley Nevada makes Vibration and Temperature Monitoring system (STG Unit # 1 & 3)</i>	
9	<i>Up gradation of 3300 series Bentley Nevada makes Vibration and Temperature Monitoring system (STG Unit # 2)</i>	
10	<i>Upgradation of HMI of GT#5 and GT#6 (from Windows XP/windows-7 to windows-10)</i>	
11	<i>Governor with DDC Pro Control System of Module-1</i>	
12	<i>Governor with DDC Pro Control</i>	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	<i>System of Module-2</i>	
13	<i>Governor with DDC Pro Control System of Module-3</i>	
14	<i>Up-gradation of Field Instruments of DM plant</i>	
15	<i>Up-gradation of PLC of DM plant</i>	
16	<i>Upgradation of SWA-system of Module-1</i>	
17	<i>Upgradation of SWA-system of Module-2</i>	
18	<i>Upgradation of SWA-system of Module-3</i>	
19	<i>Upgradation of Governor GTG # 1</i>	
20	<i>Upgradation of Governor GTG # 2</i>	
21	<i>Upgradation of Governor GTG # 3</i>	
22	<i>Upgradation of Governor GTG # 4</i>	
23	<i>Upgradation of AVR of GTG # 1</i>	
24	<i>Upgradation of AVR of GTG # 2</i>	
25	<i>Upgradation of AVR of GTG # 3</i>	
26	<i>Upgradation of AVR of GTG # 4</i>	
27	<i>Upgradation of Governor GTG # 5</i>	
28	<i>Upgradation of Governor GTG</i>	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	# 6	
29	Implementation of Automatic Generation Control (AGC) of MHI GTG Unit # 1-4 and BHEL GTG Unit # 5 & 6	<ul style="list-style-type: none"> ❖ As per CERC's order No.319/RC/2018, dated 28/08/2019, all Thermal Power Plant with installed capacity of > 200MW and > 25MW Hydro Plant and whose tariff is determined or adopted by CERC are directed to install AGC system at the Generator end (control room) to adhere the requirements of NLDC. Since the modification works needs some extra I/Os, wherein the standard delivery period of OEM is more than 6 (six) months, we proposed the works to be carried out in November 2022 (f.y.2022-23)
30	Up gradation of server of ABT management system and license for third party view.	<ul style="list-style-type: none"> ❖ The system -server is windows server-2012 based which is already obsolete. Presently, windows server-2016 and server-2020 is available. ❖ Procurement of 02(two) licenses for remote access (view only) are proposed as desired at HQ, NEEPCO and Delhi office, NTPC.
31	Procurement of high accuracy gas flow meters for Gas Turbines	<ul style="list-style-type: none"> ❖ Existing gas flow meters are installed in 2014 for indicative purpose and have error margin more than 5%. ❖ For the measurement of heat rate of Gas Turbine as per CERC, Energy audit flow meters of high accuracy less than 2% is required.
32	Up gradation of Energy meters of ABT management system	<ul style="list-style-type: none"> ❖ In the existing ABT-system, only transmission line meters are of ABT-compliance meters, Meters of Gas Turbines (6-no), STG (3-no), Station transformers (2-no) are not ABT-



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>compliance meters and hence limitation are there in data extraction. Additionally, no spare meters are available.</i>
G	LE of Fire Fighting system of the plant	
1	<i>LE & Modernization / Upgradation of CO2 flooding system of gas turbine units # 1, 2, 3 & 4</i>	<ul style="list-style-type: none"> ❖ <i>Existing system become obsolete as certified by the OEM and no spares and services are available.</i> ❖ <i>The work to be carried out in view of urgency.</i>
2	<i>Introduction of inert gas-based flooding system at Central Control Room (CCR)</i>	<ul style="list-style-type: none"> ❖ <i>Life of the existing system has already crossed 22 years of operation</i> ❖ <i>In the report of risk assessment of AGBPS, done by Reliance General Insurance in the year 2018, installation of inert gas-based fire suppression system is recommended and listed as priority-1 category. In the latest CEA safety audit check list, fire suppression system at control room is one of the check points for power station. Installation of inert gas-based fire suppression system at CCR is also highlighted in quarterly report of risk assessment for AGBPS.</i>
3	<i>LE of fire detection & protection system (replacement of underground fire hydrant line)</i>	
4	<i>Replacement of jockey pump</i>	
5	<i>Replacement of firefighting panel & detectors</i>	<ul style="list-style-type: none"> ❖ <i>The underground pipe lines are laid during commissioning of power plant hence life of these MS pipe is already expired resulting to development of leakage in pipelines creating problem to maintain the system in charged condition. Replacing the pipelines will help us to</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p>run the hydrant & emulsifier system in pressurized condition. LE of pipe line will enhance the life of fire protection system for another 10-15 years.</p> <p>❖ Replacement of Smoke detector, LHS cables & firefighting panel will ensure the smooth functioning of fire detection & alarm system installed in power plant for early warning in case of any emergency so that necessary steps can be taken at incipient stage.</p>
H	LE of buildings, roads, civil structure etc	
1	Structural stability checking and earth quack resistance of buildings and other structures of the plant	<p>The structure and buildings of the plant has already crossed 25 years of its life and assessment of building and structure is very much essential to enhance its life. Purpose of Structural Audit are</p> <ul style="list-style-type: none"> • To save human life and buildings • To understand the condition of building • To find critical areas to repair immediately • To comply with statutory requirements • To enhance life cycle of building by suggesting preventive and corrective measures like repairs and retrofitting <p>After completion of checking of structure stability and earth quack resistance of building and other</p>
2	LE work for i) CCR Building, ii) Gas Turbine building iii) Steam Turbine building and iv) Gas Booster Station.	
3	LE for i) cooling tower and ii) Compressor house	
4	LE for i) Effluent treatment plant, ii) CW Pump house, iii) Raw water pump house and iv) Firefighting water pump house.	
5	LE works for i) Clarified water pump house, ii) Fire station building, iii) Chemical house	



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
	<i>building and iv) Chlorination plant</i>	<i>structure of the plant, necessary corrective measures like repairing, strengthening of building & other structure, bridges etc and retrofitting shall be done / completed within 2023-24.</i>
6	<i>LE work for i)DM plant building, ii) Raw water reservoir with 3 nos. of desilting basin.</i>	
7	<i>LE works for i) 2 nos. of Clarifloculator with 1 no. Aerator and ii) Clarified water storage tank.</i>	
8	<i>LE work for i) 425.00 m long RCC bridge and ii) Intake well along with pump house building</i>	
9	<i>LE work for i) Raw water SW pipe line (Double line, 500 mm dia., total length is 2 x 10.42 KM =20.86 KM) and ii) RCC outfall drain 3.659 KM</i>	
I	Miscellaneous works	
1	<i>Installation and commissioning STP (Sewage Treatment Plant)</i>	<i>As per instruction of Pollution Control Board of Assam and honourable Supreme Court of India's verdict, all waste water including generated by residential complex, industrial area should be treated in STP to get required parameter prior to discharge in to natural stream. As the Assam Gas Based Power Plant Colony was constructed long before hence no sewage treatment plant is available for liquid domestic waste generated by</i>



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<p><i>the residential colony. However, it has individual septic tank for each residential quarter for collection & treatment of human excreta. Hence to oblige the Pollution Control Board instruction & consequent verdict of honourable Supreme Court, a STP is proposed for treatment of domestic waste water of AGBPS colony.</i></p>
2	<p><i>Installation of additional 1010 / 1250 KVA black start EDG for the plant</i></p>	<p><i>The followings are the basic reasons for considering installation of a new additional higher capacity 1010 KVA EDG in addition to 987 KVA existing EDG:</i></p> <ol style="list-style-type: none"> <i>1. The existing 987 KVA EDG was commissioned in the year 1995 and already crossed 26 years of operation.</i> <i>2. Since the black start EDG plays a vital role during black out for feeding essential power to the equipment like GTG, STG and other emergency pumps etc., the healthiness of the plant Black Start EDG is one of the vital requirements owing to 26 years of operation of the existing EDG.</i> <i>3. The DALE generator set has KTA38G5 Cummins diesel engine driving a Marathon 742RSL4046 alternator. The servicing of Cummins diesel engine is provided by authorised dealer of M/S Cummins India Sales and Services Limited. The Alternator is manufactured by M/S Marathon Electric, USA and no authorised sales and service provider in India. Presently, the alternator is maintained by Plant Electric Maintenance Wing</i>

**Detailed Project report on Life Extension (LE) of AGBPS (291MW)**

SL. NO.	NAME OF THE SYSTEM/EQUIPMENT	REASON FOR REPLACEMENT
		<i>(PEM), as and when required basis. Since, there is no Dealer / Sales and Service provider of MARATHON Alternator in India, it is high time to either replace or install an additional higher capacity EDG.</i>

PART-5

COST ESTIMATE & FINANCIAL ANALYSIS





Detailed Project report on Life Extension (LE) of AGBPS (291MW)

5.0: GENERAL

The cost estimate of Assam Gas Based Power Plant (291MW) has been made on the basis of the estimates of life extension expenditure.

5.01: HISTORICAL COST:

The total Turn-Key Contract value for supply, erection, testing & commissioning of Plant equipment & facilities has been Rs 1096.65 Crores with the following break up:

S. N.	Item Description		Amount (in Rs. Crore)
1	Mitsubishi Corporation (Import Component)		545.98
	a) Equipment & Spares	534.40	
	b) Erection Services	11.58	
2.	BHEL (Indigenous Portion)		550.67
	a) Equipments Ex-works	280.24	
	b) Escalation on equipment cost account of PVC	98.09	
	c) Escalation on account of withdrawal of CCS	32.79	
	d) Escalation on account of withdrawal of exchange rate variation	57.06	
	e) Erection services	58.92	
	f) Escalation on erection cost on account of PVC	23.57	
	Total		1096.65

The associated Plant Civil Works and non-plant civil works were executed by NEEPCO as separate packages. Adding cost of such works beyond the scope the turn key contract and other establishment expenses, the total completed Project Cost, as approved by the Govt. of India Project Cost worked out to **Rs 1532.32 Crores**.

PROJECT FINANCE

The Project was executed in the **debt to equity ratio of 50% : 50%**. The finance covering part of Turn Key Contract, Consultancy Services was mobilized through loan from OECF, Japan



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

(presently named as JBIC, Japan). The OECF loan was availed as per loan agreement between the OECF & the Govt. of India and routed to the Project through Govt. of India Budget. The equity component was released by the Govt. of India as net budgetary support.

5.02: BASIC GUIDELINES FOR COST ESTIMATION:

The basis for working out the hard cost of the LE works is given below:

a) The unit rates or prices for mechanical, electrical and civil works for different works have been considered from the following: -

- i. Schedule of Rates (SOR), Public Works Department, Assam for Roads.
- ii. Rates of some items are taken from earlier similar nature of jobs.
- iii. Rate for various works are taken from the Budgetary Offer provided by OEM or authorised vendors of OEM.
- iv. The rates of various jobs are kept as Lump Sum basis.
- v. Rates of major works, like CRR & CRI of MHI make GTG unit # 1-4 are obtained from OEM i.e. M/S MHI.
- vi. Rates of various works related to BHEL make GTG and STG are obtained from M/S BHEL and its sub vendors.
- vii. Rates for some items are taken from the budgetary quotation obtained from various vendors, sub-vendors and OEMs.
- viii. The cost of the Gas engines and Gas compressors were obtained from M/S CEIPL (sole authorised sales and service representative of INNO-Waukesha in India) and M/S Dresser-Rand, India respectively.

5.03: CATEGORIES OF LE COST OF AGBPSS:

The present-day cost of LE & Modernisation / Life extension of AGBPS (291 MW), NEEPCO, are broadly categorized into the following:

- A. LE of MHI and BHEL GTG and its auxiliaries.
- B. LE of BHEL make STG and its auxiliaries.
- C. LE of Gas booster station,



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

- D. LE of Central AC system etc.
- E. LE of all electrical equipment of the plant, like, Generator, Transformer, Switch yard, battery bank and chargers, CT, PT, Circuit breakers, relays, etc.
- F. LE of all control and instruments equipment, like, control module, AVR /DAVR, vibration & temperature monitoring of STG and GTG, etc.
- G. LE of Fire Fighting system of the plant.
- H. LE of buildings, roads, civil structure etc.
- I. Miscellaneous Works

5.04: PROJECT COST:

Considering on completion of various LE works, RLA study by NTPC, report on structural stability & earthquake resistance of various buildings & structures of the plant, OEM's recommendation, obsolescence of equipment, budgetary offer received etc, the project cost estimation for LE on-job basis / phase manner are categorised as follows:

- A.** Cost for Completed LE works of the plant, which are capitalised but not trued up in CERC with effect from 2019-20 to 2023-24 (upto Dec 2023). Enclosed at **Annexure-A**
- B.** Cost Estimate for proposed LE works of the plant at **Dec. 2023 Price Level**. Enclosed at **Annexure-C**.
- C.** The Gross Block as on 31.03.2024 as per Tariff Order is **Rs. 1570.03 Cr.**
- D.** The actual addition capital expenditure after considering decapitalisation is amounting to **Rs. 158.59 Cr.** has been already incurred since 2019-20 to 2023-24 (January 2023) which have already been capitalised but not trued up in CERC. (Enclosed at **Annexure-A**)
- E.** Total proposed Additional Capitalisation for the period 2024_29 after considering decapitalisation is amounting **Rs. 296.74 Cr.** (Enclosed at **Annexure-D**)

Considering above, **the project cost estimate after decapitalisation for undertaking LE works at Dec 2023 price level** has been worked out as **Rs.20,234.36 Cr. (Annexure-H)** for various works, which will be taken up subsequent approval of the DPR.

5.05: PHASING OF EXPENDITURE:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

Based on the schedule of works as indicated in the abstract of cost estimate, the phasing of hard expenditure has been worked out at **Annexure-E**. The phasing of expenditure has been worked out on the basis of completed works already carried out and anticipated schedule of proposed works.

5.06: EQUITY & DEBT FOR TARIFF CALCULATION:

The total equity for tariff calculation shall be **Rs.610.31 Cr.** and the total debt for tariff calculation is **Rs.207.72 Cr.** The details are enclosed at **Annexure-H**.

5.07: ENERGY BENEFITS

The financial analysis is based on the energy output on contracted quantity of natural gas @ 1.4 MMSCMD per day basis, NAPAF @ 72%, Gross heat rate for Combined cycle @ 2600 Kcal/Kwh & 3578 Kcal/KWh for open cycle operation, auxiliary consumption @ 2.75% has been considered in preliminary financial evaluation of the project. For the purpose of calculation of tariff, the free power has been considered as per provisions of CERC norms.

5.08: SCHEDULE OF COMPLETION:

The works are carried out in phase manner through open tendering / offer from OEM etc. and remaining works shall be carried out in phase manner. Since the major equipment's, like, Gas Engines were replaced, CRI & CRR of 2 nos. of MHI GTG are already completed and remaining 2 numbers are in pipe line, upgradation of control system has already been completed, replacement of SF6 Circuit breakers are going on, and replacement of old & obsolete equipment are in line, major replacement / modification etc. are carried out as per OEM's recommendation, the life of the power plant shall be extended further for about 15 years from the date of commissioning after completion of all LE activities. This programme is as per the CEA guidelines for LE works of thermal power stations described under subclause 6.1 (i) mentioned under "CEA Guideline for LE & Modernisation / Life extension works" enclosed at **Annexure-III (Volume-II)**. The execution work shall be taken up one by one.

5.09: THE ASSUMPTIONS TAKEN FOR WORKING OUT THE TARIFF ARE AS FOLLOWS:

Following parameters are considered for evaluation of tariff:

5.09.01: PROJECT LIFE:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

The project life for Reconstruction, LE & Modernisation of Assam Gas Based Power Plant (291 MW) has been taken as 15 years as per CEA guidelines.

5.09.02: INTEREST RATE:

The interest rate of **8.50%** has been reckoned for working out the financial return. The interest during construction has also been capitalized as 70% loan and 30% equity.

5.09.03: RETURN ON EQUITY AND ROE ON ADD CAP:

For working out the unit cost of energy, the base rate of return on equity has been taken as @ **15.5%** as per prevailing practice of Govt. of India and ROE on Additional Capitalisation is @**12%**.

5.09.04: DEPRECIATION:

Average depreciation rate has been calculated as @**5.28 %** for life of the project i.e. 15 years.

5.09.05: OPERATION AND MAINTENANCE CHARGES:

As per CERC new tariff regulation for the year 2024-29, the O&M charge is considered as **Rs.47.86 Lakh / MW**

5.09.06: INTEREST ON WORKING CAPITAL

Interest on Working Capital has been calculated as given below:

- i. Receivables equivalent to 1 ½ months of annual fixed cost;
- ii. Maintenance spares @ 30% of operation and maintenance expenses
- iii. Operation and maintenance expenses for one month.
- iv. 15 days fuel cost
- v. Security Charges

5.10.07: OTHER MISCELLANEOUS ASSUMPTIONS

- Interest rate on Working Capital = 11.65%
- Discounting Rate = 8.83%
- Depreciation Year = 15 Years



Detailed Project report on Life Extension (LE) of AGBPS (291MW)

- Corporate tax is taken as 34.94%
- Fuel Cost: The fuel cost is calculated based on the actual payment made for the month of Jan-Dec 2023 (last 12 months). The average fuel cost per SCM is calculated as **Rs.16.13 / SCM** and average fuel cost per month is calculated as **RS.68.96 Cr**. The detail calculation sheet is enclosed at **Annexure-F**.

The details of parameters considered for evaluation of tariff are listed at **Annexure-G**.

5.11: TARIFF COMPUTATION

With above assumptions the tariff of the plant after LE has been worked out as follows: -

1ST YEAR TARIFF	1.80
LEVELIZED TARIFF	2.13

Tariff calculation sheet is shown in Annexure-H. All assumptions in the above analysis are as per prevailing guidelines / notification of CERC.

PART-6

ANNEXURES & ENCLOSURES





ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)												
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS	
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)			
A	LE of MHI and BHEL GTG and its auxiliaries											
A1	Technical Advisory Services for Turbine Inspection of GT-4	10.02.2019	74.38	-	74.38						NEEPCO/AGBP/ HOP/2018-19/W-8(A)/66 DTD.30/04/2018	Vol-III, DOCUMENT/02
A2	Technical Advisory Services for Major Inspection of GT # 5	13.05.2020	82.41	-		82.41					NEEPCO/AGBP/ HOP/2019-20/W-8(B)/367 DTD.23/10/2019	Vol-III, DOCUMENT/03
A3	Technical Advisory Services for Major Inspection along with replacement of Exhaust plenum of GT U # 6	25.01.2021	148.49	-		148.49					NEEPCO/ AGBP/HOP/ 2020-21/W-8(B)/197 DTD. 24/08/2020	Vol-III, DOCUMENT/04
A4	New Starting Diesel Engine for BHEL Gas Turbine Unit # 5	28-02-2022	85.90	-					85.90		PO No. NEEPCO/AGBP/ GT&Aux./W-38/2021-22/95 dtd. 23/08/2021 & PO no. NEEPCO/AGBP/ GT&Aux/W- 38/2021-22/100 dtd. 28/08/2021	Vol-III, DOCUMENT/05 & 06



ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
A5	CRR & CRI of MHI GTG Unit # 3 (After CRR /CRI of GT rotor Unit # 3 at MHI Works at Japan, the rotor was installed at GT unit # 2)	14-04-2022	2,606.76	-				2,606.76		1. P.O. No. NEEPCO/AGBP/HOP/13-14/W-8(A)/205 dated 28.05.13. 2. P.O. No. NEEPCO/AGBP/HOP/2018-19/W-8(A)/528 dtd. 17/12/2018 3. P.O. no. NEEPCO/AGBP/HOP/2018-19/W-23/03 dtd. 05/04/2019 4. PO no. NEEPCO/AGBP/HOP/2019-20/W-8(A)/575 dtd. 28/2/2020	Vol-III, DOCUMENT/07, DOCUMENT/08, DOCUMENT/09 & DOCUMENT/10
A6	Technical Advisory Services for Turbine Inspection of GT-2	14-04-2022	217.01	-				217.01		WO to MHI vide ref. no. NEEPCO/AGBP/HOP/2019-20/W-8(A)/537 dtd. 12/02/2020	Vol-VIII, DOCUMENT/11
B LE of BHEL make STG and its auxiliaries				-							
B1	LE of Cooling Tower (PVC fill pack replacement of Cooling Towers)	23.12.2020	91.54	-		91.54				NEEPCO/AGBP/ ST&AUX/W-33(A)-09/ 2020-21/240 DTD.03/08/2020	Vol-III, DOCUMENT/16



ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
C1	Replacement of Gas Engines and its auxiliaries of GBS Unit # 4	19-02-2020	1,961.29	989.40	1,961.29					NEEPCO/AGBP/ HOP/2018-19/W-10(A)/635 DTD. 24/10/2019 & NEEPCO/AGBP/HOP/2018-19/W-10(A)/642 DTD. 24/01/2019	Vol-III, DOCUMENT/25
C2	LE of Dresser-Rand Gas Compressors Unit # 4. (Capacity enhancement)	19-02-2020	884.07		884.07					NEEPCO/AGBP/ HOP/2018-19/W-10(A)/332 DTD. 21/08/2018 & NEEPCO/AGBP/HOP/2018-19/W-10(A)/451 DTD. 03/11/2018	Vol-III, SDOCUMENT/26
C3	Piston & Rod Assembly 23 " HOS	19.07.2019	29.19	11.99	29.19					NEEPCO/AGBP/ SFC/GBS-3/2018-19 /296 DTD. 26/07/2018	Vol-III, DOCUMENT/27
D	R&M / LE of Central AC system etc		-								
D1	Installation for 5 nos. of Floor standing AC (8TR capacity each) at DDC room of CCR building)	29.01.2021	12.26	-		12.26				NEEPCO/AGBP/ SFC/O&M-13/2020-21 /500 DTD. 29/10/2020	Vol-III, DOCUMENT/28
D2	Replacement of old split AC by new one at DM plant and other area of the plant (10 nos. of 2 Tr. Split AC)	Aug-21	6.62	-			6.62			NEEPCO/AGBP/ SFC/O&M-13/2021-22 /254 DTD. 27/07/2021	Vol-III, DOCUMENT/29



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
D3	Replacement of 3 nos. of 70 Tr. Existing Chiller unit by 3 nos. 80 Tr. Water cooled Screw Compressors at Central AC plant along with other accessories	24/11/2021 & 26/03/2022	88.17	29.39			88.17			NEEPCO/AGBP/ SFC/O&M-13/2021-22 /197 DTD. 28/06/2021 & NEEPCO/AGBP/ SFC/O&M-13/2021-22 /526 DTD. 21/12/2021	Vol-III, DOCUMENT/30
E	LE of all electrical equipment of the plant, like, Generator, Transformer, Switch yard, battery bank and chargers, CT, PT, Circuit breakers, relays, etc.										
E1	20 MVAR Line Reactor	Completed on 24.10.2017	122.72	-	122.72					NESH/OS/ F-1008/406 DTD. 15/01/2018	Vol-III, DOCUMENT/31
E2	Replacement of 2 sets 48 V PLCC Battery Bank (48 V, TBS (Opz) 500 AH Exide make Tubular Lead Acid Stationary Battery Bank through Exide Industries Ltd. (the OEM))	Completed on 10.06.2019	30.21	-	30.21					NEEPCO/AGBP/PEM/O&M-07/2017-18/39NBH122/580(A) DTD.09/03/2018	Vol-III, DOCUMENT/32
E3	Supply, Installation & Commissioning of External GPS system for synchronization of RTU at AGBP through the OEM of RTU	Completed on 19.06.2019	2.81	-	2.81					NEEPCO/AGBP/PEM/O&M-02/39NBH47/18-19/623 DTD. 28/03/2019	Vol-III, DOCUMENT/33



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023)
(CAPITALISED BUT NOT TRUED UP)

JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENT NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
E4	Retrofitting, Installation, testing & Commissioning of 2x100 KVA UPS along with 180 Nos. plante Batteries, 1 No. SCVS, 3 Nos. output ACDBs etc.by replacing old obsolete UPS System through open tender (M/s Consul Neowatt Power Solutions Pvt. Ltd.)	Completed on 28.08.2019	119.78	-	119.78					NEEPCO/AGBP/PEM/O&M-07/18-19/432 DTD. 14/12/2018	Vol-III, DOCUMENT/34
E5	Retrofitting of Numerical Relay at 6.6 KV OCC Panel & 415 V fire Fighting Panel (P241=7 nos. ; P14N=4 nos. ; P94V=2 nos.)	Completed on 16.10.2019	18.78	-	18.78					NEEPCO/AGBP/PEM/O&M-12/18-19/187 DTD. 13/08/2018	Vol-III, DOCUMENT/35
E6	Retrofitting, Testing and Commissioning of 8(eight) nos. 245 KV SF6 Spring Operated Mechanism Circuit Breaker as per Breaker Standard IEC 62271-100 by dismantling old existing BHEL make 245 KV SF6 CB including Mandatory Spare Parts	2020-21	162.78	55.58		162.78				NEEPCO/AGBP /PEM/O&M-01/2019-20/355 DTD. 12/09/2019	Vol-III, DOCUMENT/36



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
E7	Procurement of transformer filtration plant	Completed on 25/06/2021	29.66	-			29.66			NEEPCO/AGBP/PEM/O&M-01/2020-21/136 DTD. 03/08/2020	Vol-III, DOCUMENT/37
E8	Retrofitting 7 (Seven) nos. 245 KV SF6 circuit breaker including mandatory spare parts and AMC.	2021-22	145.11	42.69			145.11			Order placed to M/S ABB Power Products & System India Limited and PO ref. no. NEEPCO/AGBP/PEM/O&M-01/2020-21/373 dtd. 30/12/2020. & NEEPCO/AGBP/PEM/O&M-01/2021-22/125 dtd. 03/07/2021	Vol-III, DOCUMENT/38
E9	Major overhauling / servicing of M/S CGL make aux. transformer (2 MVA) (8 nos.)		12.74					12.74		Order placed to M/S GLOCAN vide WO ref. no. NEEPCO/AGBP/PEM/O&M-01/2021-22/302 dtd. 18/11/2021	Vol-III, DOCUMENT/39
E10	Upgradation of protection of 415 v system (auxiliary panel) with numerical relay		34.95					34.95		Purchase Order Placed to M/s Everlite engineering Industries an authorised dealer of the OEM M/s GE T&D India Ltd. PO ref. no. NEEPCO/AGBP/PEM/O&M-12/2021-22/190 dtd. 21/08/2021	Vol-III, DOCUMENT/40



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
E11	Procurement of M/S BHEL make 50 MVA generator transformer		525.10	-					525.1	Order placed to M/S BHEL and ref. no. NEEPCO/AGBP/PEM/O&M-01/2020-21/477 dtd. 15/03/2021	Vol-III, DOCUMENT/41
E12	Major overhauling / servicing of M/S MITSUBISHI make generator and exciter (GTG Unit # 2).	2022-23	78.18						78.18	WO TO M/S MHI REF. NO. NEEPCO/AGBP/PEM/2020-21/O&M-05/268 DTD. 23/10/2021	Vol-II, DOCUMENT/42
E13	Retrofitting, testing and commissioning of 245 KV current transformer	28-06-2023	222.94	72.64					222.94	Order placed vide ref. no. NEEPCO/AGBP/PEM/O&M-01/2021-2022/495 dated 31/03/2022 & NEEPCO/AGBP/PEM/O&M-01/2022-2023/502 dated 31/03/2022	Vol-III, DOCUMENT/43



ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
F1	Up gradation of 7200 series Bentley Nevada makes Vibration Monitoring system (GTG Unit # 1 & 2)	Completed on GTG Unit # 1 on 19/06/2019 & GTG Unit # 2 on 20/06/2019	103.00		103.00					NEEPCO/AGBP /C&I/T-13@/2018-19/90NBI155/ 410 DTD. 28/02/2019	Vol-III, DOCUMENT/47
F2	Up gradation of AVR (Automatic Voltage Regulation) system to DVAR for Steam Turbine Generator Units (STG Unit # 2)	Apr-19	18.34	-	18.34					NEEPCO/AGBP /C&I/T-52/2018-19/90NBI115/293 DTD. 23/11/2018	Vol-III, DOCUMENT/48
F3	Up gradation of 3300 series Bentley Nevada makes Vibration and Temperature Monitoring system (STG Unit # 1 & 3)	Completed on Sept & Oct. 2019	129.17	-	129.17					NEEPCO/AGBP/ C&I/T-52/2018-19/ 90NBI129/285 DTD. 22/11/2018	Vol-III, DOCUMENT/49
F4	Up gradation of 3300 series Bentley Nevada makes Vibration and Temperature Monitoring system (STG Unit # 2)	Completed on 12.12.2020	65.30	-		65.30				NEEPCO/AGBP/ C&I/T-52/2019-20/ 293 DTD. 13/03/2020	Vol-III, DOCUMENT/50
F5	Upgradation of HMI of GT#5 and GT#6 (from Windows XP/windows-7 to windows-10)	Completed 2020-21	124.37	-		124.37				NEEPCO/AGBP /HOP/2020-21 /W-11(B)/204 DTD. 29/08/2020	Vol-III, DOCUMENT/51



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
F6	Upgradation of AVR to DAVR of GTG Unit -6	18.09.2021	19.41	6.93			19.41			NEEPCO/AGBP /C&I/T-55/2020-21/90NBC110 /161 DTD. 19/11/2020	Vol-III, DOCUMENT/52
F7	Upgradation of AVR to DAVR of GTG Unit -5	25-03-2022	20.59	7.57			20.59				
F8	Up gradation of server of ABT management system and license for third party view.	17-01-2023	29.73	-				29.73		Order placed to M/S Energia system Pvt. Ltd. vide PO ref. no. NEEPCO/AGBPS/C&I/T-09/2022-23/360000 dtd. 28/03/2022	Vol-III, DOCUMENT/53
F9	Governor with DDC Pro Control System of Module-1	31-05-2022	698.20	208.31				698.20		Order placed to M/S ABB India Limited vide PO ref. no. NEEPCO/AGBP/HOP/2021-22/W-11(B)/3600000/133 dtd. 23/07/2021 for Module-1	Vol-III, DOCUMENT/54
F10	Up-gradation of PLC of DM plant	11-02-2023	26.55	7.84				26.55		Order placed to M/S Sonepar India Private Limited vide PO ref. no. NEEPCO/AGBP/C&I/T-13/2021-22/360000/366 dtd. 28/06/2021	Vol-III, DOCUMENT/55



ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)												
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS	
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)			
F11	Upgradation of SWA-system of Module-1	25-07-2023	201.73	65.74						201.73	Order placed to M/S TJA Engineering & Trading Company, vide PO ref. no. NEEPCO/AGBPS/C&I/T-48/2022-23/96 dtd. 05/07/2022	Vol-III, DOCUMENT/56
G	LE of Fire Fighting system of the plant		-									
G1	LE / Upgradation of CO2 flooding system of gas turbine unit # 3	12-01-2023	27.70	-				27.70			PO placed to M/S Pranjana & Associates. Order ref. no. NEEPCO/AGBP/O&AWC/T-11(Vol-IV)/2021-22/739 dtd. 31/03/2022	Vol-III, DOCUMENT/57
G2	LE / Upgradation of CO2 flooding system of gas turbine unit # 4	29-03-2023	27.70	-				27.70				
G3	LE / Upgradation of CO2 flooding system of gas turbine unit # 2	25-07-2023	27.70	-					27.70			
G4	LE / Upgradation of CO2 flooding system of gas turbine unit # 1	28-12-2023	27.70	-					27.70			



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENTS NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
H	LE of buildings, roads, civil structure etc										
			-								
H1	LE works of 2 nos. of Clarifloculator	31-01-2023	8.03	-				8.03		NEEPCO/AGBPS/CWC/2022-23/T-02/MSME/797 DTD. 17/11/2022	Vol-III, DOCUMENT/58
H2	LE works of Aerator	11-03-2023	4.64	-				4.64		NEEPCO/AGBPS/CWC/2022-23/T-02/MSME/1092 DTD. 11/01/2023	Vol-III, DOCUMENT/59
H3	LE works of Intake Well Pump House	24-03-2023	4.89	-				4.89		NEEPCO/AGBPS/CWC/2022-23/T-02/MSME/1099 DTD. 11/01/2023	Vol-III, DOCUMENT/60
I	Miscellaneous Works										
			-								
I1	Medium Voltage covered conductor (MVCC) for intake water pump house 11 KV line	30-10-2021	15.39	-				15.39		Order was placed to M/S Glocon Enterprise, ref. no. NEEPCO/AGBP/U&WC/T-6/2020-21/277 dtd. 04/01/2021	Vol-III, DOCUMENT/61



ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-A

DETAILS OF COMPLETED LE WORKS FOR THE FY 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (UPTO DEC 2023) (CAPITALISED BUT NOT TRUED UP)											
JOB NO.	DESCRIPTION	COMPLETED ON	Total amount in Lakhs	Decap	Cost of Work which are already capitalized but not trued up					ORDER REF.	REF. DOCUMENT NUMBERS
					2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 23)		
12	Purchase of Forklift	24.04.2021	15.95	-			15.95			GEMC-511687767765842 DTD. 08/02/2021	Vol-III, DOCUMENT/62
13	12 Ton Hydraulic mobile crane	04-02-2022	16.75	-			16.75			The order was placed to M/S Uttam Construction Equipment, vide order ref. no. GEMC-51168775863639 dtd. 18/09/2021.	Vol-III, DOCUMENT/63
14	Installation and commissioning STP (sewage treatment plant)	12-12-2023	40.77	-					40.77	The PO was placed to M/S Eco Clean vide GeM contract no GEMC-511687749634350 dtd. 09/06/2023	Vol-III, DOCUMENT/64
15	Major Spares Capitalization		7,665.33	532.82	3,377.68	2,478.08	359.33	1,272.73	177.51	Details are enclosed at Annexure-B	
YEARWISE PHASING OF COST (COMPLETED JOB)			17,890.03	2,030.90	6,871.42	3,165.23	840.68	5,697.14	1,315.56		
Decapitalised amount in Lakhs			2,030.90								
Actual Additon after considering Decapitalization (In Lakhs)			15,859.13								
Actual Additon after considering Decapitalization (In Cr.)			158.59								



ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

EXPENDITURE TOWARDS MAJOR CAPITAL SPARES FOR THE PERIOD OF 2019-20 TO 2023-24 (UPTO DEC 2023)								ANNEXURE-B
SL. NO.	DETAILS OF SPARES	TOTAL AMOUNT (IN RS)	Decap	2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 2023)
1	Actuator ASM Gas Regulating	8,27,967.07		8,27,967.07				
2	NBL Piston - 275 Diameter	8,37,431.68		8,37,431.68				
3	NBL HEAD CYNLINDER ASSM	13,28,900.32		13,28,900.32				
4	Seal Assy. With Seal Support Bars	16,19,204.94		16,19,204.94				
5	Gear Box: GS315/GZ30	15,91,655.00		15,91,655.00				
6	Gas Leakage Detection System	11,23,767.00		11,23,767.00				
7	Capacity Control VLV Actuator	15,50,177.36		15,50,177.36				
8	Nozzle Ring	9,46,480.36		9,46,480.36				
9	Piston Rod	21,15,769.00	11,99,367.05	21,15,769.00				
10	Blade Kit- Turbine Rotor Stage-i	5,90,00,000.54	2,04,82,741.88	5,90,00,000.54				
11	Nozzle Assembly Turbine Stage-III	4,58,15,251.54	1,59,05,457.00	4,58,15,251.54				
12	Shroud Set Turbine Stage # 3	40,12,000.04	13,92,826.45	40,12,000.04				
13	245 KV HV Bushing +15MVA Stationery Transformer	8,85,000.00		8,85,000.00				
14	HV Bushing+50MVA Generator Transformer	8,85,000.00		8,85,000.00				
15	Bearing Thrust/ Bearing Thrust Tilting Pad	6,19,509.00		6,19,509.00				
16	P-N: 43969-00001Flame Detector Ignition System	31,11,026.00		31,11,026.00				
17	Charmatograph Natural Gas With Accessories	65,85,851.00		65,85,851.00				
18	Complete Set of control VLV, CV-20//21	10,78,720.04		10,78,720.04				
19	Complete Cyclo Gear Model ZS6-616	7,28,650.00		7,28,650.00				
20	Thrust Bearing Assy/Thrust BRG (Complete Set)	56,19,600.00		56,19,600.00				
21	Instrument Air Compressor/Instrument Air Drier Exhaust Valve, Cyl Model	5,11,294.00		5,11,294.00				
22	Nozzle Arrgt Turbine Stage I, Nozzle Arrgmt Stage 1 (PGMA-35118)	3,67,60,892.05		3,67,60,892.05				
23	Nozzle Arrgt Turbine Stage 2, 2nd stage nozz, Assy FR6B	5,63,05,848.00		5,63,05,848.00				
24	Nozzle Arrgt Turbine Stage 3, NIL	4,58,15,251.63		4,58,15,251.63				



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

EXPENDITURE TOWARDS MAJOR CAPITAL SPARES FOR THE PERIOD OF 2019-20 TO 2023-24 (UPTO DEC 2023)								ANNEXURE-B
SL. NO.	DETAILS OF SPARES	TOTAL AMOUNT (IN RS)	Decap	2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 2023)
25	Blade Kit Turbine Rotor Stage 3, NIL	3,83,09,837.94		3,83,09,837.94				
26	Shroud Set Turbine Stage #3	40,12,000.04		40,12,000.04				
27	Quill Shaft for MOP	6,66,417.69		6,66,417.69				
28	16.25 Inch Cylinder Assy	1,37,10,836.00		1,37,10,836.00				
29	90AF 30A, Complete Actuator, GTG#1'4, Rotork Make (WD-2220-00-02)	13,94,140.00	4,83,996.00	13,94,140.00				
30	Bearing Set for LGB	97,64,607.00			97,64,607.00			
31	Set of Bearing for MOP (1SET=4NOS)	16,26,126.00			16,26,126.00			
32	Blade Kit Turbine Rotor Stage-I Blade Kit Turbine Rotors	5,90,00,000.00			5,90,00,000.00			
33	CMR 925 Rexnord Make Thomash Coupling	6,05,871.00			6,05,871.00			
34	CMR 925 Rexnord Make Thomash Coupling	12,90,920.00			12,90,920.00			
35	Diaphargm Row-16	55,23,773.63			55,23,773.63			
36	Combustor Basket Assy ,Combustor Basket Unit 1-2-5-6	95,62,580.00			95,62,580.00			
37	Combustor Basket Assy ,Combustor Basket Unit 3-4	47,81,290.00			47,81,290.00			
38	Combustor Basket Assy ,Combustor Basket Unit 7-8	47,81,290.00			47,81,290.00			
39	Combustor Basket Assy ,Transition Piece	2,06,13,171.00			2,06,13,171.00			
40	Turbine Blade Ring & Static Row unit 1-2-3	2,67,58,336.00			2,67,58,336.00			
41	Turbine Blade Ring & Blade Static Row unit 1-2-3	24,15,261.00			24,15,261.00			
42	Turbine Blade Ring & Blade Static Row unit 1-2-3	2,56,94,230.00			2,56,94,230.00			
43	Turbine Blade Ring & Blade Static Row unit 1-2-3 ,turbine Vane Unit-2 (RU)	12,84,712.00			12,84,712.00			
44	Turbine Blade Ring & Blade Static Row unit 1-2-3 ,turbine Vane Unit-2 (BS)	12,84,712.00			12,84,712.00			
45	Turbine Blade Ring & Blade Static Row unit 1-2-3 ,turbine Vane Unit-2 (LU)	12,84,712.00			12,84,712.00			



ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

EXPENDITURE TOWARDS MAJOR CAPITAL SPARES FOR THE PERIOD OF 2019-20 TO 2023-24 (UPTO DEC 2023)								ANNEXURE-B
SL. NO.	DETAILS OF SPARES	TOTAL AMOUNT (IN RS)	Decap	2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 2023)
46	Turbine Blade Ring & Blade Static Row unit 1-2-3 ,turbine Vane Unit-2 (RL)	12,84,712.00			12,84,712.00			
47	Turbine Blade Ring & Blade Static Row unit 1-2-3 ,supporter #1(Horizontal)	60,72,274.00			60,72,274.00			
48	Byypass Valve Actuator	6,17,217.00			6,17,217.00			
49	Discharge Valve Actuator	7,58,260.00			7,58,260.00			
50	Bearing Insulation	7,63,224.00			7,63,224.00			
51	Cap & Liner Arrgt-Combustion ,Comb Linear Assy(G-24)	42,25,344.00			42,25,344.00			
52	Cap & Liner Arrgt-Combustion , Linear AssyComb(pgma-35111)(G-25)	21,12,672.00			21,12,672.00			
53	Case & Shroud Arrgt ,Turbine ,Kit of 36 Shrouds Stage 1	88,96,029.44			88,96,029.44			
54	Compressor wheel	22,35,127.00	16,34,145.00		22,35,127.00			
55	Ratchet Mechanish/ Cam. Freewheel Assy.	11,49,658.00			11,49,658.00			
56	Module-DIAG , IGN PWR (IPM-D)	5,11,424.22			5,11,424.22			
57	Housing Assy Wastegate, 3 IN R.B	9,43,443.00	2,89,619.00		9,43,443.00			
58	Housing Assy Wastegate, 3 IN R.B	9,43,443.00			9,43,443.00			
59	LGB Coupling Hardware (Nut, Bolt washer) between GEN and Gear Box	19,08,638.20			19,08,638.20			
60	Diverter Damper, Air barrier Fan & Motor assy	7,37,884.94	2,51,961.00		7,37,884.94			
61	Bearing, Thrust/Bearing Thrust Tilting Pad	6,19,509.44			6,19,509.44			
62	Flame Detector (28FD) Miscellaneous	16,03,742.58			16,03,742.58			
63	Pressure Indicator Controller (PIC) GBS MHI Make	9,71,880.00			9,71,880.00			
64	Load Coupling & Hardware	22,77,122.00			22,77,122.00			
65	Actuator, Heinzmann	22,61,825.07	22,61,825.07		22,61,825.07			
66	Air Staatar Motor TDI	6,89,844.52			6,89,844.52			
67	Bulk Acid Storage Tank, MOC; MSRL	8,04,507.00	3,34,597.00		8,04,507.00			
68	Housing Assy Wastegate, 3 IN R.B	20,18,827.26	9,43,443.00		20,18,827.26			
69	Housing Assy Wastegate, 3 IN R.B	20,18,827.26	9,43,443.00		20,18,827.26			



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

EXPENDITURE TOWARDS MAJOR CAPITAL SPARES FOR THE PERIOD OF 2019-20 TO 2023-24 (UPTO DEC 2023)								ANNEXURE-B
SL. NO.	DETAILS OF SPARES	TOTAL AMOUNT (IN RS)	Decap	2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 2023)
70	Housing Assy Wastegate, 3 IN R.B	10,33,163.59	10,23,670.00		10,33,163.59			
71	Housing Assy Wastegate, 3 IN R.B	10,33,163.59			10,33,163.59			
72	Cap & Liner Arrgt-Combustion , Linear AssyComb(pgma-35111)(G-26)	31,69,008.00			31,69,008.00			
73	Cross Head	16,15,212.00			16,15,212.00			
74	Piston Rod	24,02,094.00	7,34,521.00		24,02,094.00			
75	Piston and rod assembly 23 Inch HOS	33,14,123.60	4,69,541.48		33,14,123.60			
76	Water Pump Kit	5,12,673.14			5,12,673.14			
77	Overhaul Kit, JWPump	5,58,069.06			5,58,069.06			
78	Mandatory Spares for VMS, Metrix Setpoint	52,22,125.00			52,22,125.00			
79	Suction Control Valve with Actuator, Full Set	36,94,580.00			36,94,580.00			
80	NBL Piston,9:1 275 Diameter	9,33,866.41			9,33,866.41			
81	EXT N/WORK PROT S'RTY OF ABT MONIT SYS FOR INTEGRATION OF OTHER SYSTEM	8,96,800.00			8,96,800.00			
82	SILICA ANALYZER WITH PANEL	7,25,700.00			7,25,700.00			
83	ACTUATOR,HEINZMANN:GAS ENGINE-WAUKESHA:1	47,42,968.06	17,88,963.00			47,42,968.06		
84	MODULE-DIAG,IGN PWR(IPM-D):GAS ENGINE	5,65,765.94				5,65,765.94		
85	1ST STG NOZZLE BODY&DIFUS-MAIN EJEC (Spares for Steam Air Jet Ejector : Condenser air	19,73,479.20				19,73,479.20		
86	2ND STG NOZZLE BODY&DIFUS-MAIN EJECTOR (Spares for Steam Air Jet Ejector : Condenser air)	15,47,994.80				15,47,994.80		
87	BASIC TURBO CHARGER WAUKESHA 12V 275GL+	82,56,236.98	16,29,448.03			82,56,236.98		
88	Cylinder Head Assembly	17,36,217.60				17,36,217.60		
89	Assembly NCM	5,16,510.78				5,16,510.78		



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

EXPENDITURE TOWARDS MAJOR CAPITAL SPARES FOR THE PERIOD OF 2019-20 TO 2023-24 (UPTO DEC 2023)							ANNEXURE-B	
SL. NO.	DETAILS OF SPARES	TOTAL AMOUNT (IN RS)	Decap	2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 2023)
90	MODULE-DIAG,IGN PWR(IPM-D):GAS ENGINE	5,87,672.32				5,87,672.32		
91	Actuator,HEINZMANN:GAS ENGINE-WAUKESHA:1	10,33,465.23				10,33,465.23		
92	Nozzle Ring	9,64,212.15				9,64,212.15		
93	Compressor Wheel	24,08,644.13				24,08,644.13		
94	Compressor Casing Complete-72	6,93,376.26				6,93,376.26		
95	Wall Insert-77000	5,44,570.00				5,44,570.00		
96	Turbine Casing-51000	10,40,259.68				10,40,259.68		
97	Nozzle Ring(Spares)	9,64,212.22				9,64,212.22		
98	Spares for GBS Wouksa	22,08,148.16				22,08,148.16		
99	Gas Compressor Piston Rod Assembly for Gas Boster	35,12,071.00	7,21,054.54			35,12,071.00		
100	Spares of Steam Turbines Model HNK-71/2.8/32-4, 30 MW	18,55,620.80				18,55,620.80		
101	Mandatory Spares for Circuit Breaker	7,81,500.00				7,81,500.00		
102	Head Cylinder - WAUKESHA 12 V275GL+	21,08,764.16					21,08,764.16	
103	NBL PISTON 9:1 275 ENGINE/12V 275 GL+	23,61,676.80	1,01,341.00				23,61,676.80	
104	NBL LINER CYL ENGINE ENGINE-12V 275GL+	10,75,399.68					10,75,399.68	
105	Module, Ignition Control(NCM), Gas Engin	10,35,477.14					10,35,477.14	
106	ACTUATOR ASM, GAS REGULATING:GAS ENGINE	5,55,155.78					5,55,155.78	
107	Gas Compressor, 23 inch Piston & Rod ass	35,12,543.00					35,12,543.00	
108	CYLINDER 23 INCH FOR GBS	2,05,62,290.00					2,05,62,290.00	
109	PISTON & ROD:GBS:GAS COMP:16.25" CYL	25,45,611.00					25,45,611.00	
110	ACTUATOR	11,22,105.66					11,22,105.66	
111	AIR STARTER MOTOR 293435L 12V 275GL+	8,32,118.45	6,89,844.00				8,32,118.45	
112		-						
113	UPPER PART OF BEARING SHELL:STG 30MW	9,21,320.40					9,21,320.40	
114	3Ph-MOTOR IS:325 4POLE-1500RPM 75kW-280S	5,60,046.35					5,60,046.35	
115	STEAM TURBINE ROTOR	4,78,26,193.00					4,78,26,193.00	



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

EXPENDITURE TOWARDS MAJOR CAPITAL SPARES FOR THE PERIOD OF 2019-20 TO 2023-24 (UPTO DEC 2023)								ANNEXURE-B
SL. NO.	DETAILS OF SPARES	TOTAL AMOUNT (IN RS)	Decap	2019-20	2020-21	2021-22	2022-23	2023-24 (UPTO DEC 2023)
116	6.6 KV, 550 KW Vertical CW Pump Motor	77,40,328.00					77,40,328.00	
117	COMP. CG MODEL ZS6-25:HUMBOLDT WEDAG	7,61,159.00					7,61,159.00	
118	SCROLL CONVEYOR ASSEMBLY: CETRIFUGE	12,26,256.00					12,26,256.00	
119	KIRLOSKER PUMP	8,21,491.92					8,21,491.92	
120	PROPELLER SHAFT TRANSVERSE DRIVE	21,92,772.00					21,92,772.00	
121	FLAME DETECTOR 315A2708P001 (28FD)	18,76,335.72					18,76,335.72	
122	ROTORK GEAR BOX RH SIDE	42,95,325.00					42,95,325.00	
123	ROTORK GEAR BOX LH SIDE	42,95,325.00					42,95,325.00	
124	ACTUATOR,HEINZMANN:GAS ENGINE-WAUKESHA:1	59,96,136.00					59,96,136.00	
125	TORQUE CONVERTER TWINDISC: 4-SGE-2015-1	1,30,49,620.00					1,30,49,620.00	
126	ACTUATOR,HEINZMANN:GAS ENGINE-WAUKESHA:1	59,96,136.20						59,96,136.20
127	REDUCTION GEAR UNIT(SR 36 GRDR)	22,90,000.00						22,90,000.00
128	ACTUATOR,HEINZMANN:GAS ENGINE-WAUKESHA:1	12,47,829.00						1247829.00
129	Module, Ignition Control (NCM), Gas Engine	6,70,308.00						670308.00
130	CapitalSparesforFY2023-24_GT PO 117	23,51,468.71						23,51,468.71
131	HOUSHING ASSEMBLY, GBS	25,95,250.00						2595250.00
132	HOUSHING ASSEMBLY, GBS	25,99,516.00						2599516.00
A	TOTAL IN RS.	76,65,32,967.47	5,32,81,804.49	33,77,68,478.24	24,78,07,605.95	3,59,32,925.31	12,72,73,450.06	1,77,50,507.91
B	TOTAL IN LAKHS	7,665.33	532.82	3,377.68	2,478.08	359.33	1,272.73	177.51

AVERAGE CAPITAL EXPENDITURE IN LAKHS / YEAR	1,533.07
--	-----------------

ANNEXURE-C

TO BE COMPLETED W.E.F. 2023-24 (JANUARY 2024) TO 2029-30										
REVISED ESTIMATED PROJECT COST (PRICE LEVEL DEC 2023, PROVISIONAL), REF. OF BUDGETARY OFFER / PO / WO ETC. FOR PROPOSED LE OF AGBP (W.E.F JAN. 2024)										
JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
A	LE of MHI and BHEL GTG and its auxiliaries									
A1	CRR & CRI of rotor of MHI GTG Unit # 2 (To be installed at GT Unit # 1)	2023-24 (TO BE COMPLETED WITHIN MAR '24)	2,527.42	1. CALCULATION SHEET 2. P.O. No. NEEPCO/AGBP/HOP/13-14/W-8(A)/205 dated 28.05.13. 3. P.O. No. NEEPCO/AGBP/HOP/2018-19/W-8(A)/575 dtd. 28/02/2020	Vol-III, DOCUMENT/07, DOCUMENT/08, DOCUMENT/09 & DOCUMENT/10	Order placed and payment shall be as per variation of exchange rate at the time of completion of job		151.6		2,527.42
A2	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 1	2023-24 (TO BE COMPLETED WITHIN MAR '24)	1,198.00	Order placed to M/S MHI & PO ref. no. NEEPCO/AGBP/HOP/2021-22/W-8(A)/154 dtd. 02/08/2021	Vol-III, DOCUMENT/11	Order placed and payment shall be as per variation of exchange rate at the time of completion of job				1,198.00
A3	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 4	2024-25	867.00	Order placed to M/S MHI & PO ref. no. NEEPCO/AGBPS/HOP/2022-23/W-8(A)/280 dtd. 01/11/2022	Vol-III, DOCUMENT/12					867.00
A4	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 3	2026-27	867.00	Based on the Order placed to M/S MHI & PO ref. no. NEEPCO/AGBPS/HOP/2022-	Vol-III, DOCUMENT/12	Nov-22	152.1	151.6	-0.3	864.15

ISO 9001, 14001, 27001, 45001, 50001
 Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
								151.6		
A5	Turbine Blade Ring & Torque Tube cover of MHI GTG Unit # 2	2027-28	867.00	NEEPCO/AGBPS/1107/2022-23/W-8(A)/280 dtd. 01/11/2022		Nov-22	152.1	151.6	-0.3	864.15
A6	Exhaust cylinder & exhaust manifold of MHI GTG Unit # 3	2026-27	2,564.57	Based on offer received from M/S MHI, Japan, ref. no. XAF-NEEPCO-825PFMT DTD. 22/07/2022	Vol-III, DOCUMENT/13	Jul-22	154.0	151.6	-1.6	2,524.60
A7	Exhaust cylinder & exhaust manifold of MHI GTG Unit # 2	2027-28	2,564.57	Based on offer received from M/S MHI, Japan, ref. no. XAF-NEEPCO-825PFMU DTD. 22/07/2022	Vol-III, DOCUMENT/14	Jul-22	154.0	151.6	-1.6	2,524.60
A8	Exhaust cylinder & exhaust manifold of MHI GTG Unit # 1	2029-30	2,564.57	Based on offer received from M/S MHI, Japan, ref. no. XAF-NEEPCO-825PFMU DTD. 22/07/2022	Vol-III, DOCUMENT/14	Jul-22	154.0	151.6	-1.6	2,524.60
A9	Exhaust cylinder & exhaust manifold of MHI GTG Unit # 2	2029-30	2,564.57			Jul-22	154.0	151.6	-1.6	2,524.60
A10	New unbucketed GT Rotor of BHEL GTG Unit # 5	2028-29	2,804.40	Based on budgetary quotation received from M/S BGGTS vide quotation ref. no. Q20-0101-Rev02 dtd. 27/06/2022	Vol-III, DOCUMENT/15	27-06-2022	154.0	151.6	-1.6	2,760.70
A11	New unbucketed GT Rotor of BHEL GTG Unit # 6	2029-30	2,804.40			27-06-2022	154.0	151.6	-1.6	2,760.70

ISO 9001, 14001, 27001, 45001, 50001
 Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
								151.6		
A12	New Starting Diesel Engine for BHEL Gas Turbine Unit # 6	2025-26	85.90	Based on last PO No. NEEPCO/AGBP/GT&Aux./W-38/2021-22/95 dtd. 23/08/2021 for supply of Cummins make Starting Diesel Engine, Model: KTA-1150C & PO no. NEEPCO/AGBP/GT&Aux./W-38/2021-22/100 dtd. 28/08/2021 for supply of spares for Air intake system, cooling & Exhaust System for new Cummins make Starting Diesel.	Vol-III, DOCUMENT/05 & DOCUMENT/06	Aug-21	135.9	151.6	11.6	95.82
B	LE of BHEL make STG and its auxiliaries									
B1	LE of Cooling Tower- Replacement of Drive mechanism of Cooling tower (4 Set of Drive mechanism)	2025-26 2028-29	45.80	Based on the PO. Ref. no. GEMC-511687723180318 dtd. 10/03/2023 to M/S Paharpur Cooling Towers Limited	Vol-III, DOCUMENT/21	01-03-2023	150.9	151.6	0.5	46.01
B2	Replacement of 2 numbers of ACW pumps for replacement for life enhancement	2024-25	54.39	Based on budgetary offer of M/S Kirloskar Brother Limited ref. no. KBL/ESD/NEEPCO/AGBP/ACW/21-12-1A dtd. 20/12/2021	Vol-III, DOCUMENT/22	Dec-21	142.4	151.6	6.5	57.90

ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
								151.6		
B3	Replacement of Boiler feed pump FRH 27	2024-25	606.52	Estimation is based on the offer received from M/S BHEL vide offer ref. no. PS/SSBG-KOL/SB22K0471/HYU/GKD/0 110 DTD. 12/10/2022	Vol-III, DOCUMENT/23	Oct-22	152.5	151.6	-0.6	602.94
B4	Rotor refurbishment of Steam Turbine-2	2026-27	478.26	Based on the PO ref. no. NEEPCO/AGBP/HOP/W-15/2022-23/50 dtd. 09/05/2022 to M/S BHEL.	Vol-III, DOCUMENT/20	May-22	154.0	151.6	-1.6	470.81
B5	Rotor refurbishment of Steam Turbine-3	2028-29	478.26			May-22	154.0	151.6	-1.6	470.81
B6	Replacement of Main lube oil cooler (2 numbers)	2024-25	306.80	Based on budgetary offer received from M/S BHEL vide offer ref. no. PS/SSBG-KOL/HYU/SB22K0383/GKD/0 109 dtd. 10/10/2022	Vol-III, DOCUMENT/24	Oct-22	152.5	151.6	-0.6	304.99
B7	Replacement of generator coolers (1 unit)	2026-27	191.16			Oct-22	152.5	151.6	-0.6	190.03
C	LE of Gas booster station									
	NO WORKS		-							
D	R&M / LE of Central AC system etc									
	NO WORKS		-							
E	LE of all electrical equipment of the plant, like, Generator, Transformer, Switch yard, battery bank and chargers, CT, PT, Circuit breakers, relays, etc.									

ISO 9001, 14001, 27001, 45001, 50001
 Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
								151.6		
E1	Retrofitting of static relays by numerical relays (MELCO, GTG Unit # 1-4):	2024-25 2025-26 2026-27 2027-28	1,343.72	Ref. no. XAF-NEEPCO-M4616U265-SP-R1 DTD. 11/06/2018 & XAF-NEEPCO-M4616U265-0-VS-TA-R1 DTD. 11/06/2018	Vol-III, DOCUMENT/65	Apr-18	116.8	151.6	29.8	1,744.07
E2	Replacement of 24V and 220V DC AFCOSET make battery charger (obsolete) with new upgraded charger – 12 (twelve) sets	2024-25	170.40	Based on last PO rate. i.e. Rs 14.2 Lakh/set, As per last Order (07/06/2017) for GTG#1/2, the price of Battery Charger Rs.12.4 lakh/set. Considering +10% to 15% margin for probable increase of price in subsequent years, the estimated Price may be considered around Rs.14.2 lakhs/set.)	Vol-III, DOCUMENT/66, DOCUMENT/67 & DOCUMENT/68	Jun-17	112.7	151.6	34.5	229.22
E3	Major overhauling / servicing of M/S MITSUBISHI make generator and exciter (GTG Unit # 1, 3 & 4).	2024-25 2025-26 2026-27	495.99	Based on last PO TO M/S MHI REF. NO. NEEPCO/AGBP/PEM/2020-21/O&M-05/260 DTD. 17/10/2020, PO TO M/S MHI REF. NO. NEEPCO/AGBP/PEM/2020-21/O&M-05/229 DTD. 10/09/2021 & WO TO M/S MHI REF. NO. NEEPCO/AGBP/PEM/2020-21/O&M-05/268 DTD. 23/10/2021	Vol-III, DOCUMENT/69	Oct-21	139.1	151.6	9.0	540.56

ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
								151.6		
E4	Procurement of Overhauling / Servicing spares for M/S BHEL make Generator and Exciter (Unit # 6, 7, 8 & 9)	2024-25, 2026-27, 2027-28, 2028-29	333.67	Based on earlier PO placed to M/S BHEL, vide ref. no. NEEPCO/AGBP/PEM/O&M-05/19-20/494 dtd. 06/02/2020 & NEEPCO/AGBP/PEM/O&M-05/20-21/39NCA153/449 dtd. 10/02/2021 for supply of overhauling spares for 1 unit.	Vol-III, DOCUMENT/70	Feb-20	122.2	151.6	24.1	413.95
E5	Major overhauling / servicing of M/S BHEL make generator and exciter (Unit # 6, 7, 8 & 9)	2024-25, 2026-27, 2028-29, 2029-30	383.50	Based on the last Order placed to M/S BHEL vide ref. no. NEEPCO/AGBP/PEM/O&M-05/2021-22/483 dtd. 25/03/2022 for overhauling of GT # 5	Vol-III, DOCUMENT/71	Mar-22	148.8	151.6	1.9	390.72
E6	Retrofitting, testing and commissioning of CVTs, Bus PT	2024-25	74.47	PO placed to M/S Everlite Engineering Industries vide PO ref. no. GEMC-511687721777118 dtd. 08/02/20f23	Vol-III, DOCUMENT/72					74.47
E7	Retrofitting, Testing and Commissioning of Lightening Arrestor (LA)	2024-25	66.24	Based on budgetary offer received from M/S OBLUM Electrical Industries Private Limited, vide ref. no. AST/Oblum/NEEPCO/216KV/2021 dtd. 07/12/2021	Vol-III, DOCUMENT/73	Dec-21	142.4	151.6	6.5	70.52

ISO 9001, 14001, 27001, 45001, 50001
 Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
								151.6		
E8	Retrofitting, testing and commissioning of 245 KV HCB Isolator	2026-27 2027-28 2028-29	613.60	Based on the budgetary offer received from M/S Hitachi ABB vide ref. no. CPP-21-673363 dtd. 30/03/2021	Vol-III, DOCUMENT/74	Mar-21	129.3	151.6	17.2	719.43
R&M / LE of all control and instruments equipment, like, control module, AVR /DAVR, vibration & temperature monitoring of STG and GTG, etc										
F1	Governor with DDC Pro Control System of Module-2 & 3	2024-25	1,983.45	Based on the offer received from M/S ABB Vide offer ref. no. PAEN.PG.RE.22.00190.R3 dtd. 18th May 2023	Vol-III, DOCUMENT/75	May-23	149.6	151.6	1.3	2,009.97
F2	Upgradation of SWA-system of Module-2	2024-25	204.87	Order placed to M/S TJA Engineering & Trading Company, vide PO ref. no. NEEPCO/AGBPS/C&I/T-48/2023-24/129 dtd. 17/11/2023	Vol-III, DOCUMENT/76					204.87
F3	Upgradation of SWA-system of Module-3	2025-26	201.72	Based on the Order placed to M/S TJA Engineering & Trading Company, vide PO ref. no. NEEPCO/AGBPS/C&I/T-48/2023-24/129 dtd. 17/11/2023 for Module-2		Nov-23	152.9	151.6	-0.9	200.00

ISO 9001, 14001, 27001, 45001, 50001
Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
								151.6		
F4	Upgradation of Governor GTG # 1 & 2 (1 set)	2024-25	88.46	PO placed to M/S MHI vide ref. no. NEEPCO/AGBPS/C&I/T-54/2022-23/273 dtd. 15/02/2023	Vol-III, DOCUMENT/77					88.46
F5	Upgradation of Governor GTG # 3 & 4 (1 set)	2025-26	88.46	Based on the PO placed to M/S MHI vide ref. no. NEEPCO/AGBPS/C&I/T-54/2022-23/273 dtd. 15/02/2023 for GTG # 1 & 2		Feb-23	150.9	151.6	0.5	88.87
F6	Upgradation of Governor GTG # 5 & 6 (1 set)	2024-25	75.00	Estimation based on the Order placed to M/S Sherman Sales & Services (P) Limited for supply of part spares vide PO ref. no. NEEPCO/AGBP/C&I/T-39/2016-17/38N BG092/239 dtd. 12/09/2016	Vol-III, DOCUMENT/78	Sep-16	154.0	151.6	-1.6	73.83
F7	Reconfiguration / modification of control system of Gas Turbines for AGC (Automatic Generation Control) for GTG # 1-4	2024-25	102.33	Order placed to M/S Power System Export Unit, Mitsubishi Corporation, Japan vide PO ref. no. NEEPCO/AGBPS/C&I/T-54/2022-23/3700000/30 dtd. 28/04/2022	Vol-III, DOCUMENT/79	ORDER PLACED				102.33
F8	Reconfiguration / modification of control system of Gas Turbines for AGC (Automatic Generation Control) for GTG # 5-6	2024-25	102.07	Order placed to M/S BHEL vide PO ref. no. NEEPCO/AGBPS/C&I/T-55/2022-23/3700000/38 dtd. 28/04/2022	Vol-III, DOCUMENT/80	ORDER PLACED				102.07

ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023
								151.6		
F9	Implementation of Automatic Generation Control (AGC) system	2024-25	70.80	Based on similar type of order of M/S Prayagraj Power Ge. Co. Ltd. Ref. no. 7500000031 dtd.01/10/2021	Vol-III, DOCUMENT/81	Oct-21	139.1	151.6	9.0	77.16
G	R&M / LE of Fire Fighting system of the plant									
G1	Replacement of Emergency Diesel Engine of Fire Fighting Pump House	2024-25	21.77	Budgetary offer for replacement of Deisel Engine has been collected from M/S Cummins (OEM) vide quotation no. 0400000023260 dtd. 06/05/2022	Vol-III, DOCUMENT/82	May-22	154.0	151.6	-1.6	21.43
G2	Replacemnt of pump of Diesel Engine Fire Fighting Pump House	2024-25	15.84	Offer for replacement of Pump has aAlready been collected from OEM i.e. M/S KBL vide ref. no. KBL-CSS/EZ/11/23-24 dtd. 15/12/2023	Vol-III, DOCUMENT/83	Dec-23	151.6	151.6	0.0	15.84
G3	Renovation, modernization & automation of fire fighting system	2024-25	64.90	Budgetary offer received from M/S Safety & Security Engineering, vide Ref. no. SSE/029/21-22 dtd. 18/01/2022	Vol-III, DOCUMENT/84	18-01-2022	142.9	151.6	6.1	68.85
H	R&M / LE of buildings, roads, civil structure etc									

ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	REF. PO / BUDGETARY OFFER/ PRICE JUSTIFICATION ETC.	REF.	DATE OF BUDGETARY OFFER / LAST PO / WO / ESTIMATION ETC.	WPI INDEX AS ON DATE OF BUDGETARY OFFER / LAST PO / WO ETC.	WPI INDEX DEC 2023 (P)	% ESCALLATION	REVISED ESTIMATED AMOUNT AT PRICE LEVEL DEC 2023	
								151.6			
H1	R&M / LE work for steam turbine building	2024-25	179.59	WO. No. NEEPCO/QP/ED/C&P/F/C/AG BPS(STB)/591/2023-24/967 dtd. 21/12/2023 to M/S Buildrite Constructions	Vol-II, DOCUMENT/85	Order Placed				179.59	
H2	R&M / LE work of Cooling Towers at AGBPS	2024-25	54.15	WO. No. NEEPCO/QP/ED/C&P/F/C/AG BPS(CT)/590/2023-24/976 dtd. 21/12/2023 to M/S Loknath & Co.	Vol-II, DOCUMENT/86	Order Placed				54.15	
H3	R&M of Clarified water storage Tank	2025-26	103.00	Based on the estimate prepared by Civil wing	Vol-II, DOCUMENT/87	Aug-23	152.4	151.6	-0.5	102.46	
I	Miscellaneous Works									-	
I1	Installation of additional 1010 / 1250 KVA Black Start EDG for the plant	2024-25	150.00	Based on budgetary offer received from M/S Garuda Power Private Limited vide offer ref. no. P04000000221871 dtd. 22/11/2021	Vol-III, DOCUMENT/88	22-11-2021	142.9	151.6	6.1	159.13	
I2	Estimated Capital Spares	2023-24 (Jan 2024) to 2029-30	12,304.73	Estimation is based on the average expenditure for major spares for the year 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24 (upto Dec 2023). The per yaer escallation is considered @5% (Please refer Annexure-D(R1))							12,304.73
A	TOTAL WORKS COST IN LAKHS									44,216.51	
B	Decapitalization									14,542.70	
J	TOTAL PROJECT COST IN LAKHS									29,673.82	



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-D

YEAR WISE PROPOSED LE WORKS OF AGBP FOR THE PERIOD W.E.F. 2023-24 (JANUARY 2024) TO 2029-30

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	2023-24 (W.E.F Jan 2024)	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
A12	New Starting Diesel Engine for BHEL Gas Turbine Unit # 6	2025-26	95.82			95.82				
B	LE of BHEL make STG and its auxiliaries		-							
B1	LE of Cooling Tower- Replacement of Drive mechanism of Cooling tower (4 Set of Drive mechanism)	2025-26 2028-29	46.01			23.01			23.01	
B2	Replacement of 2 numbers of ACW pumps for replacement for life enhancement	2024-25	57.90		57.90					
B3	Replacement of Boiler feed pump FRH 27	2024-25	602.94		602.94					
B4	Rotor refurbishment of Steam Turbine-2	2026-27	470.81				470.81			
B5	Rotor refurbishment of Steam Turbine-3	2028-29	470.81						470.81	
B6	Replacement of Main lube oil cooler (2 numbers)	2024-25	304.99		304.99					
B7	Replacement of generator coolers (1 unit)	2026-27	190.03				190.03			
C	LE of Gas booster station		-							
	NO WORKS		-							
D	LE of Central AC system etc		-							
	NO WORKS		-							



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-D

YEAR WISE PROPOSED LE WORKS OF AGBP FOR THE PERIOD W.E.F. 2023-24 (JANUARY 2024) TO 2029-30

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	2023-24 (W.E.F Jan 2024)	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
E	LE of all electrical equipment of the plant, like, Generator, Transformer, Switch yard, battery bank and chargers, CT, PT, Circuit breakers, relays, etc.		-							
E1	Retrofitting of static relays by numerical relays (MELCO, GTG Unit # 1-4):	2024-25 2025-26 2026-27 2027-28	1,744.07		436.02	436.02	436.02	436.02		
E2	Replacement of 24V and 220V DC AFCOSET make battery charger (obsolete) with new upgraded charger – 12 (twelve) sets	2024-25	229.22		229.22					
E3	Major overhauling / servicing of M/S MITSUBISHI make generator and exciter (GTG Unit # 1, 3 & 4).	2024-25 2025-26 2026-27	540.56		180.19	180.19	180.19			
E4	Procurement of Overhauling / Servicing spares for M/S BHEL make Generator and Exciter (Unit # 6, 7, 8 & 9)	2024-25, 2026-27, 2027-28, 2028-29	413.95		103.49		103.49	103.49	103.49	
E5	Major overhauling / servicing of M/S BHEL make generator and exciter (Unit # 6, 7, 8 & 9)	2024-25, 2026-27, 2028-29, 2029-30	390.72		97.68		97.68		97.68	97.68



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-D

YEAR WISE PROPOSED LE WORKS OF AGBP FOR THE PERIOD W.E.F. 2023-24 (JANUARY 2024) TO 2029-30

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	2023-24 (W.E.F Jan 2024)	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
E6	Retrofitting, testing and commissioning of CVTs, Bus PT	2024-25	74.47		74.47					
E7	Retrofitting, Testing and Commissioning of Lightening Arrestor (LA)	2024-25	70.52		70.52					
E8	Retrofitting, testing and commissioning of 245 KV HCB Isolator	2026-27 2027-28 2028-29	719.43		359.71	359.71				
F	LE of all control and instruments equipment, like, control module, AVR /DAVR, vibration & temperature monitoring of STG and GTG, etc		-							
F1	Governor with DDC Pro Control System of Module-2 & 3	2024-25	2,009.97		2,009.97					
F2	Upgradation of SWA-system of Module-2	2024-25	204.87		204.87					
F3	Upgradation of SWA-system of Module-3	2025-26	200.00			200.00				
F4	Upgradation of Governor GTG # 1 & 2	2024-25	88.46		88.46					
F5	Upgradation of Governor GTG # 3 & 4	2025-26	88.87			88.87				
F6	Upgradation of Governor GTG # 5 & 6	2024-25	73.83		73.83					



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-D

YEAR WISE PROPOSED LE WORKS OF AGBP FOR THE PERIOD W.E.F. 2023-24 (JANUARY 2024) TO 2029-30										
JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	2023-24 (W.E.F Jan 2024)	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
F7	Reconfiguration / modification of control system of Gas Turbines for AGC (Automatic Generation Control) for GTG # 1-4	2024-25	102.33		102.33					
F8	Reconfiguration / modification of control system of Gas Turbines for AGC (Automatic Generation Control) for GTG # 5-6	2024-25	102.07		102.07					
F9	Implementation of Automatic Generation Control (AGC) system	2024-25	77.16		77.16					
G	LE of Fire Fighting system of the plant		-							
G1	Replacement of Emergency Diesel Engine of Fire Fighting Pump House	2024-25	21.43		21.43					
G2	Replacement of pump of Diesel Engine Fire Fighting Pump House	2024-25	15.84		15.84					
G3	LE & automation of fire fighting system	2024-25	68.85		68.85					
H	LE of buildings, roads, civil structure etc		-							
H1	LE work for steam turbine building	2024-25	179.59		179.59					
H2	LE work of Cooling Towers at AGBPS	2024-25	54.15		54.15					
H3	LE of Clarified water storage Tank	2025-26	102.46			102.46				



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-D

YEAR WISE PROPOSED LE WORKS OF AGBP FOR THE PERIOD W.E.F. 2023-24 (JANUARY 2024) TO 2029-30

JOB NO.	DESCRIPTION	PROPOSED SCHEDULE	Total amount (in Lakhs)	2023-24 (W.E.F Jan 2024)	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
I	Miscellaneous Works		-							
I1	Installation of additional 1010 / 1250 KVA Black Start EDG for the plant	2024-25	159.13		159.13					
I2	Estimated Major Spares Capitalization. Estimation is based on the average expenditure for major spares for the year 2019-20, 2020-21, 2021-22, 2022-23, 2023-24. The per yaer escalation is considered @5% (Please refer Annexure-D(R1))	2023-24 (Jan 2024) to 2029-30	12,304.73	1,355.56	1,609.72	1,690.21	1,774.72	1,863.45	1,956.62	2,054.45
A	TOTAL WORKS COST IN LAKHS		44,216.51	1,355.56	11,876.95	3,176.29	6,641.68	5,791.71	5,412.30	9,962.03
B	Decapitalization of the proposed Assets		14,542.70	578.14	4,073.31	948.60	2,178.87	1,870.14	1,714.70	3,178.92
C	Actual Addition		29,673.82	777.42	7,803.63	2,227.69	4,462.80	3,921.57	3,697.59	6,783.11



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-E

YEARWISE PHASING OF COST

291MW Assam Gas Based Power Plant

Phasing of Hard Cost

Zero Date : 1st January 2024

All amount are in Rs. In Lakhs

PERIOD	2019 -20, 2020-21, 2021-22, 2022-23 & 2023-24 (upto Dec 2023)	2023-24 (w.e.f Jan 2024)	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Items	Expenditure before "Zero Date"	1ST YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR	6th YEAR	7th YEAR
	YEARS	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR
TOTAL WORKS COST	1,579.03	777.42	7,803.63	2,227.69	4,462.80	3,921.57	3,697.59	6,783.11
Total	1,579.03	777.42	7,803.63	2,227.69	4,462.80	3,921.57	3,697.59	6,783.11



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

						ANNEXURE-F
FUEL COST CALCULATION						
Jan-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON JAN 2023 BILL OF OIL AND AGCL
	OIL		9109.00	38819.312	77,98,00,861.00	
	AGCL				60,32,663.00	TRANSPORTATION COST
				38819.312	78,58,33,524.00	
						20.24 FUEL COST/SCM
Feb-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON FEB 2023 BILL OF OIL AGCL
	OIL		9169.00	37124.752	76,48,95,771.09	
	AGCL				57,65,027.00	TRANSPORTATION COST
				37124.752	77,06,60,798.09	
						20.76 FUEL COST/SCM
Mar-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON MAR 2023 BILL OF OIL AND AGCL
	OIL		9155.00	43779.857	93,21,74,743.00	
	AGCL				68,01,925.00	TRANSPORTATION COST
				43779.857	93,89,76,668.00	
						21.45 FUEL COST/SCM
Apr-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON APR 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9435	9194.33	32269.069	51,87,55,395.00	
	OIL (NON-SUB)	9087				
	OIL (NON-NOMINATED)	9061				
	AGCL				65,64,865.00	TRANSPORTATION COST
			32269.069	52,53,20,260.00		
						16.28 FUEL COST/SCM
May-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON MAY 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9553	9668.70	42095.870	69,97,29,911.00	
	OIL (NON-SUB)	9530.1				
	OIL (NON-NOMINATED)	9923				
	AGCL				66,66,167.00	TRANSPORTATION COST
			42095.870	70,63,96,078.00		
						16.78 FUEL COST/SCM
Jun-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON JUNE 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9472	9583.37	37084.498	58,60,60,718.00	
	OIL (NON-SUB)	9459.1				
	OIL (NON-NOMINATED)	9819				
	AGCL				58,72,583.00	TRANSPORTATION COST
			37084.498	59,19,33,301.00		
						15.96 FUEL COST/SCM
Jul-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON JULY 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9102	9213.04	40968.750	64,12,80,290.00	
	OIL (NON-SUB)	9079.13				
	OIL (NON-NOMINATED)	9458				
AGCL				64,87,680.00	TRANSPORTATION COST	



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

						ANNEXURE-F
FUEL COST CALCULATION						
				40968.750	64,77,67,970.00	
					15.81	FUEL COST/SCM
Aug-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON AUG 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9168	9282.71	41036.731	65,00,02,447.00	
	OIL (NON-SUB)	9120.13				
	OIL (NON-NOMINATED)	9560				
	AGCL				64,98,445.00	TRANSPORTATION COST
			41036.731	65,65,00,892.00		
					16.00	FUEL COST/SCM
Sep-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON SEPT 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9087	9249.02	39210.518	61,89,87,531.34	
	OIL (NON-SUB)	9026.07				
	OIL (NON-NOMINATED)	9634				
	AGCL				62,09,253.00	TRANSPORTATION COST
			39210.518	62,51,96,784.34		
					15.94	FUEL COST/SCM
Oct-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON OCT 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9185	9275.62	40124.232	64,28,36,109.80	
	OIL (NON-SUB)	9141.86				
	OIL (NON-NOMINATED)	9500				
	AGCL				63,53,945.00	TRANSPORTATION COST
			40124.232	64,91,90,054.80		
					16.18	FUEL COST/SCM
Nov-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON NOV 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9177	9316.65	38574.007	61,79,87,189.67	
	OIL (NON-SUB)	9098.95				
	OIL (NON-NOMINATED)	9674				
	AGCL				61,08,457.00	TRANSPORTATION COST
			38574.007	62,40,95,646.67		
					16.18	FUEL COST/SCM
Dec-23	SUPPLIER	GCV	AV. GCV	GAS VOL IN MSCM	INVOICE AMOUNT IN RS	BASED ON DEC 2023 BILL OF OIL AND AGCL
	OIL (SUBSIDIZED)	9117	9375.36	40055.209	63,54,42,740.00	
	OIL (NON-SUB)	9004.08				
	OIL (NON-NOMINATED)	10005				
	AGCL				63,43,027.00	TRANSPORTATION COST
			40055.209	64,17,85,767.00		
					16.02	FUEL COST/SCM
AV. FUEL COST CONSIDERING 12 MONTH (JAN- DEC 2023) BILLS FOR FUEL COST					16.13	RS. /SCM
AV. GCV					9299.32	KCAL/SCM
NOTE						
INVOICES OF M/S OIL AND AGCL ARE ENCLOSED AT VOL-III, DOCUMENT/01						



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-F

FUEL COST CALCULATION

INSTALLED CAPACITY	291	MW
NORMATIVE PAF (%)	72	%
	209.52	MW
PER YEAR TARGET MU	1835.3952	MU
PER MONTH TARGET MU	152.9496	MU
PER DAY TARGET MU	5.02848	MU
AV. GCV	9299.32	Kcal / SCM
NORMATIVE HEAT RATE	2600	Kcal / KWH
1 KWH	2600	Kcal
FOR GENERATION OF 1 MU	13074048000	Kcal
FOR GENERATION OF 5.02848 MU	65742588887	KCAL
FOR GENERATION OF 5.02848 MU	1.405914827	MMSCM / DAY
	513.1589117	MMSCM / YEAR
	42.76324265	MMSCM / MONTH
PER MONTH GAS IN SCM (APPROX)	42763242.65	SCM / MONTH
PER MONTH GAS IN 1000 SCM (APPROX)	42763.24265	1000 SCM / MONTH
WEIGHTED AVERAGE LANDED PRICE OF FUEL (RS./100 SCM)	16,127.07	RS / 1000 SCM
PER MONTH GAS COST (IN RS /1000 SCM)	68,96,45,760.72	RS/ 1000 SCM
PER MONTH GAS COST (IN RS. CR./1000 SCM)	68.96	RS. CR / 1000 SCM



ISO 9001, 14001, 27001, 45001, 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)

ANNEXURE-H

VARIOUS PARAMETERS CONSIDERED FOR CALCULATION OF TARRIFF

SL. NO.	DESCRIPTION	DATA	UNIT	REFERANCES / REMMARKS
1	Installed Capacity (MW)	291	MW	
2	Auxiliary Consumption	2.75%	%	As par CERC guidelines
3	Normative PAF(%)	70.00%	%	As par CERC guidelines
4	Annual Salable Energy (MU)	1735.34	MU	
5	Heat Rate (Kcal/Kwh)	2600	Kcal/Kwh	As par CERC guidelines
6	Calorific Value (Kcal/SCM)	9299.32	Kcal/SCM	GCV as per Jan-Dec 2023 bills of OIL, AGCL (Enclosed at Vol-V, DOC/34)

ANNEXURE-H

AS PER CERC

COST OF GENERATION (YEAR-WISE) AND LEVELISED TARIFF CALCULATION ON CURRENT COST

Rs. in crore

Installed capacity MW	291.00	Cost Included	2034.36	O&M Charges (Rs.Lakh/Mw)	47.86
Losses (%)		Equity (Rs. crore)	610.31	O&M Charges escalation	5.90%
Free Power (%)		Debt (Rs. crore)	207.72	Return on Equity (RoE)	15.50%
Net Saleable Energy (MU)	1735.34	Interest on Working Capital	11.65%	Rate of MAT	17.472%
Fuel cost / 15 days (in Cr.)	33.52	Rate of depreciation	5.28%	Rate of Corporate Tax	34.94%
Fuel cost (Rs/SCM)	16.13	Rate of Interest	8.50%	Pre-Tax ROE Normal Rate	23.826%
Discounting factor	8.83%	ROE on Add cap	12.00%	Pre-Tax ROE with Mat	18.782%

Year	Loan	Rs. in crore								Interest on Working Capital (Rs. crore)						Annual Fixed Charges (Rs. crore)	Tariff (Rs / unit)	Annual Energy (MU)
		Loan Repayment	Interest on Loan	Depreciation	RoE	ROE on add cap	Tax	Tax on ROE add cap	O&M Charges	O&M for one month	1½ months Receivables	Maintenance Spares	15 Days fuel cost	Security	Interest			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
1	207.72	17.80	16.90	17.80	80.80	10.68	43.40	5.74	139.27	11.90	139.54	42.83	33.52	3.50	26.95	311.77	1.80	1735.34
2	189.91	17.80	15.39	17.80	80.80	10.68	43.40	5.74	147.49	12.58	140.39	45.30	33.52	3.50	27.01	318.54	1.84	1735.34
3	172.11	17.80	13.87	17.80	80.80	10.68	43.40	5.74	156.19	13.31	141.35	47.91	33.52	3.50	27.52	326.24	1.88	1735.34
4	154.30	17.80	12.36	17.80	80.80	10.68	43.40	5.74	165.41	14.08	142.38	50.67	33.52	3.50	28.06	334.48	1.93	1735.34
5	136.50	17.80	10.85	17.80	80.80	10.68	43.40	5.74	175.17	14.89	143.49	53.60	33.52	3.50	28.63	343.30	1.98	1735.34
6	118.70	17.80	9.33	17.80	80.80	10.68	43.40	5.74	185.50	15.75	144.66	56.70	33.52	3.50	29.24	352.73	2.03	1735.34
7	100.89	17.80	7.82	17.80	80.80	10.68	43.40	5.74	196.45	16.66	145.92	59.98	33.52	3.50	29.89	362.81	2.09	1735.34
8	83.09	17.80	6.31	17.80	80.80	10.68	43.40	5.74	208.04	17.63	147.27	63.46	33.52	3.50	30.57	373.57	2.15	1735.34
9	65.28	17.80	4.79	17.80	80.80	10.68	43.40	5.74	220.31	18.65	148.71	67.14	33.52	3.50	31.30	385.06	2.22	1735.34
10	47.48	17.80	3.28	17.80	80.80	10.68	43.40	5.74	233.31	19.73	150.24	71.04	33.52	3.50	32.07	397.31	2.29	1735.34
11	29.67	17.80	1.77	17.80	80.80	10.68	43.40	5.74	247.07	20.88	155.65	75.17	33.52	3.50	33.33	440.59	2.54	1735.34
12	11.87	11.87	0.50	17.80	80.80	10.68	43.40	5.74	261.65	22.10	157.42	79.55	33.52	3.50	34.20	454.78	2.62	1735.34
13	0.00	0.00	0.00	17.80	80.80	10.68	43.40	5.74	277.09	23.38	159.40	84.18	33.52	3.50	35.13	470.64	2.71	1735.34
14	0.00	0.00		17.80	80.80	10.68	43.40	5.74	293.44	24.74	161.57	89.08	33.52	3.50	36.13	487.99	2.81	1735.34
	0.00	0.00																
		207.72		267.06														

NPV of Annual Fixed Charges (Rs. crore) =

3011.55

NPV energy (MU) = 14129.53

Levellised Tariff = 2.13

Note:

Project Cost	Rs. In Lakh
Gross Block as on 31.03.2024 as per Tariif Order	1,579.03
Add Cap already completed during 2019-24	158.59
Total Closing Gross Block	1,737.62
Add Cap for the period 2024_29	296.74
Total	2,034.36

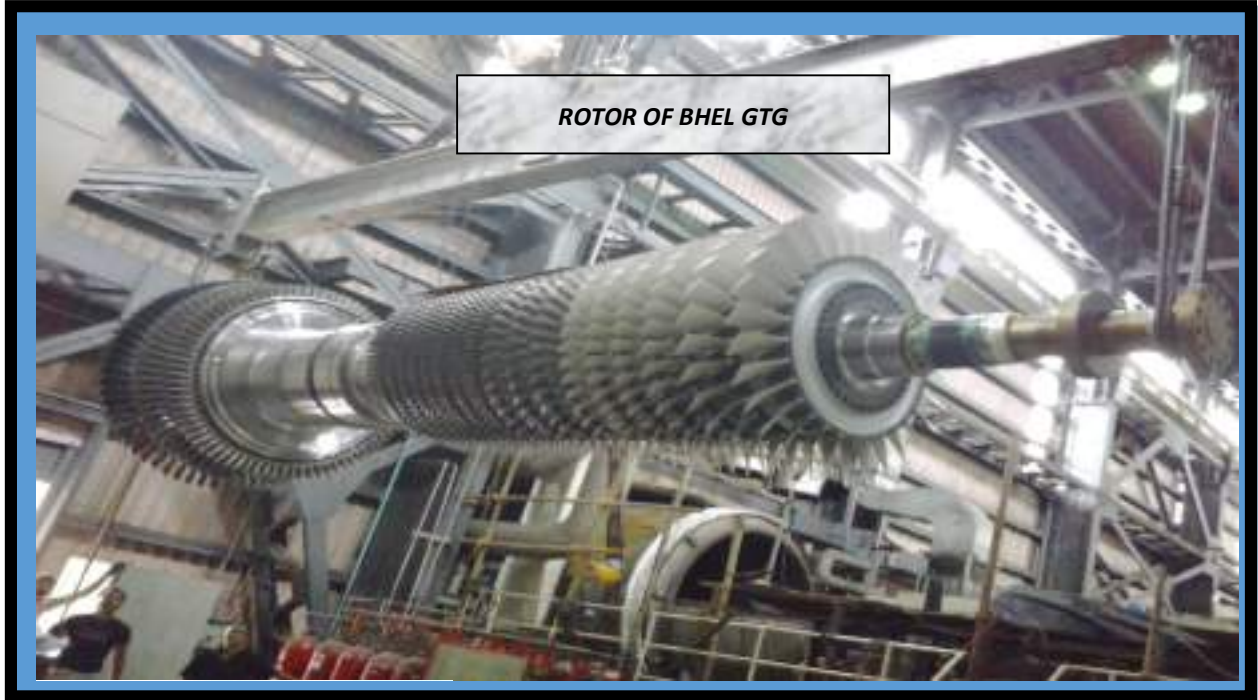
Equity Calculation (Rs. In Lakh)	
Gross Block	1,737.62
Equity @ 30%	521.29
Equity from Add Cap @30%	89.02
Total Equity	610.31

Loan Calculation (Rs. In Lakh)	
Debt @ 70% during 2024-29	207.72
Total Equity	207.72

PART-7

***PHOTOGRAPHS OF VARIOUS
WORKS / PARTS / EQUIPMENTS
OF THE PLANT***



7.0: PHOTOGRAPHS OF VARIOUS WORKS / PARTS / EQUIPMENTS OF THE PLANT:



Detailed Project report on Life Extension (LE) of AGBPS (291MW)





Detailed Project report on Life Extension (LE) of AGBPS (291MW)





Detailed Project report on Life Extension (LE) of AGBPS (291MW)





ISO 9001, 14001, 27001, 45001 & 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)





Detailed Project report on Life Extension (LE) of AGBPS (291MW)



CT DRIVE ASSY. OF COOLING TOWER



NEW RTU PANEL



ISO 9001, 14001, 27001, 45001 & 50001

Detailed Project report on Life Extension (LE) of AGBPS (291MW)





Detailed Project report on Life Extension (LE) of AGBPS (291MW)





REPLACEMENT OF OLD WUKESHA GAS ENGINE AT GBS



COMMISSIONING OF NEW WUKESHA AT275GL+ GAS ENGINE



DETAIL PROJECT REPORT



LIFE EXTENSION OF **291 MW ASSAM GAS BASED POWER STATION (AGBPS)**

MARCH 2023

(VOLUME-II)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD. (NEEPCO)

Detailed Project report on Life Extension (LE) of AGBPS (291MW)**TABLE OF CONTENTS:**

SL. NO.	DESCRIPTION	PAGES
	TABLE OF CONTENT	1
ANNEXURE-I	CEA GUIDELINES FOR RENOVATION & MODERNISATION / LIFE EXTENSION WORKS	2-20
ANNEXURE-II	RLA REPORT OF AGBPS BY NTPC CONSULTANT	21-47
ANNEXURE-III	REPORT ON CIVIL STRUCTURE STABILITY OF AGBPS BY JADAVPUR UNIVERSITY	48-492
ANNEXURE-IV	LETTERS FROM OEM OF MAJOR EQUIPMENT AND M/S OIL	493-499



ANNEXURE-I
***(CEA GUIDELINES FOR LIFE
EXTENSION WORKS)***



Government of India
Ministry of Power
Central Electricity Authority

GUIDELINES FOR RENOVATION & MODERNISATION/LIFE EXTENSION WORKS OF COAL/LIGNITE BASED THERMAL POWER STATIONS



February, 2020

Sewa Bhawan, Sector 1, R K Puram, New Delhi - 110066



Government of India
Ministry of Power
Central Electricity Authority

GUIDELINES FOR
RENOVATION AND MODERNISATION
/ LIFE EXTENTION WORKS

OF

COAL/LIGNITE BASED THERMAL POWER
STATIONS

February 2020



Central Electricity Authority

Thermal Project Renovation and Modernisation Division

TABLE OF CONTENTS

S.NO.	CONTENTS	PAGE NO.
1.0	Background	1
2.0	Intent of Renovation & Modernisation (R&M)/Life Extension	1
3.0	Need for Revised Policy Guidelines	3
4.0	Concept of Renovation and Modernisation and Life Extension Programme of Thermal (Coal/Lignite based) power stations	4
4.1	Renovation and Modernisation (R&M)Programme	4
4.2	R&M Programme with Life Extension (LE) & Uprating(U)	5
4.3	R&M Programme for meeting Environment Norms	5
4.4	R&M Programme for Flexibilisation	6
4.5	Works not relating to R&M/LifeExtension	6
5.0	Retirement of very Old Units	6
6.0	Methodology of Implementation of R&M and LE&U Schemes	7
6.1	R&M Works	7
6.2	LE&U Works	8
6.3	Monitoring the Progress of Implementation of R&M/LE Schemes	10
7.0	Cost Estimates	10
8.0	Cost Benefit Analysis	11
9.0	Participation of Private Sector in LE&U Programme	12
10.0	Deemed Availability	13
11.0	Award Scheme	13

1.0 BACKGROUND

1.1 Coal based thermal power contributes a major share in the total power available in the country. More than 73% of total generation comes from coal/ lignite based power plants. The first 200 MW unit was installed at Obra in 1977 and the first 500 MW unit was commissioned way back in 1984 in Trombay. Prior to that, the units were of smaller size and many of these were of non-reheat type with lower efficiency. Over a period of past few decades there has been growth in the size of thermal units and in steam parameters resulting in better plant efficiency.

1.2 Renovation and Modernisation (R&M) and Life Extension (LE) have been recognized as cost effective options to achieve additional generation from existing units at low cost and in shorter period. However, new environmental norms which have come into existence post 2015 and increase in penetration of renewables, the R&M cannot be limited to the improvement of performance only. There needs to be all-inclusive approach for R&M of thermal power plants.

1.3 A centrally sponsored R&M Programme was launched in 1984 as Phase-I programme for which financial assistance for implementing R&M works was provided by Govt. of India. The R&M programme continued albeit in a different form subsequently during 9th, 10th, 11th and 12th plan periods which resulted in improved performance from thermal generating units.

1.4 In the 12th plan, the R&M/LE work of 37 units of capacity 7202 MW has been completed and presently 71 units of 14,929 MW capacity has been identified for R&M/LE work for the subsequent five year period (2017- 2022). The old and small size units of early post-independence period were based on technology as available at that time having a very low efficiency. These units are therefore near obsolescence. The LMZ Russian design of larger size units (200/210 MW) and initial KWU design machines are now in fag end of their economic life span. These groups of 200/210 MW machines (LMZ design and early KWU design machines) constituted a major chunk of R&M/LE programme in the 11th and 12th plan.

1.5 There is almost 10,000 MW out of total installed capacity of 46,000 MW of 500 MW units which has been in operation for more than 20 years which would need R&M/LE intervention.

2.0 INTENT OF RENOVATION & MODERNISATION (R&M)/LIFE EXTENSION (LE) PROGRAMME

There has been substantial increase in capacity addition in the successive five year plans of the country which has significantly reduced gap between demand and availability of power in past few years and in between there has been periods of surplus capacity. Due to the rising environmental concerns, it is driving the policy frame work in a direction so as to reduce the thermal power plant emissions.

The integration of RE power requires balancing support from the existing thermal power generators. The earlier role of R&M as maximizing/optimal utilization of the existing generation resources needs to be revised considering the above. Thus R&M domain has to expand to make the plants flexible in an efficient manner with lower emission.

2.1 The new installation being capital intensive, it is considered prudent to maximise the generation from the existing power stations to ensure optimal utilisation of resources. R&M's main role of replacement of the existing obsolete items of equipment in operation with those with more efficient and of latest designs incorporating the state-of-the-art technologies and improved metallurgy would however continue.

2.2 Many thermal power stations in the country were designed for a given quality of coal, which has deteriorated over a period of time. The capacity of the raw coal feeding system, pulverizers, primary air fan system, ash handling system etc., for these power stations may have to be augmented to maintain the rated capacity of the boiler with optimum/improved efficiency, provided the furnace size is adequate to burn the coal of deteriorated quality.

2.3 The environmental regulations are becoming stringent. For the first time emission norms for SO₂, NO_x, mercury levels and water consumption have been notified in Dec 2015. The plants which were designed earlier were provided with environmental systems which may not meet the present day emission standards, requiring either refurbishing the systems or complete replacement.

2.4 India has made the commitments to reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level and to achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030. Hence renewable energy will be playing important role in meeting the energy requirement of the country. As per the plan, the renewables installed capacity is going to be 175GW by 2022. The integration of this high level of renewable capacity in the power system would require lowering the minimum load (upto 40%) and adopting high ramp rate from the thermal power plants. Hence, the power plants may have to be refurbished to meet the new operational regime i.e. changing from base load to flexible mode of operation. In the CEA report *"Flexible operation of thermal plant for integration of renewable generation (January 2019)"*, the requirement of flexibilisation by the existing thermal units has been broadly identified under various categories.

2.5 To bring down the variable cost of energy to the consumers, Merit Order Dispatch is being adopted at plant level which may require R&M for improving the operating performance.

2.6 In view of new operating regimes, it will lead to part load operation of the plants which were earlier operating as base load stations. Hence, R&M intervention may be needed for the refurbishments to improve plant efficiency at part load operation also.

2.7 The R&M/LE programme may be designed in such a way so as to improve the plant operational performance, availability/reliability, efficiency and emission reduction in light of the above.

3.0 NEED FOR REVISED POLICY GUIDELINES

3.1 The generation maximisation with efficiency enhancement and plant uprating was an integral part of the R&M/ Life extension programme. The Government of India have accorded high priority to meet the new environment norms by all thermal power stations and integration of 175GW of renewable power resources by 2022. With this the objective of R&M is shifting from the 'generation maximization' to 'efficient flexible operation with lower emissions'.

3.2 Previously, guidelines were framed mainly for units of capacity 100MW or less with non-reheat type & for 200/210 MW Units of LMZ or earlier design of KWU units. Since the framing of these guidelines many thermal plant units of higher capacities like 250 and 500MW also have outlived their useful lives as such guidelines need to be modified and units which are due for R&M activity need to be identified.

3.3 The need has been felt to revise the above guidelines due to the following:

- (I) There have been delays in achieving the desired completion targets.
- (ii) Constraints are being experienced in supply of materials resulting in time/cost overruns.
- (iii) A large number of units of 500MW capacity are becoming due for R&M/LE works, necessitating need for more agencies to carry out R&M/LE works.
- (iv) Need for new emission control equipment installations in power plants for environmental compliance.
- (v) Dynamic operation of thermal plants for flexibilisation would need high level of automation, refurbishment of boiler, turbine, mills, etc. It will require technology to monitor which will help in reducing the depletion of plant life due to cyclic load variation and frequent start/stop operation.
- (vi) Biomass utilisation for power generation through co-firing in thermal power plants.
- (vii) Converting the Coal fired plant to Biomass firing power plants.
- (viii) Lowering the water consumption in Coal fired power plants.
- (ix) Due to uncertainties in future operational regime of thermal power generation, life extension for shorter duration may have to be considered based on techno-economic analysis.

3.4 The above requirements demand new approach towards implementation of R&M/LE works by the utilities, proper identification of R&M options, preparing realistic time schedules and encouraging increased participation from various executing agencies including private sector.

Accordingly, the existing guidelines have been revised to account for meeting the above challenges.

4.0 CONCEPT OF RENOVATION AND MODERNISATION AND LIFE EXTENSION PROGRAMME OF THERMAL (COAL/LIGNITE BASED) POWER STATIONS

4.1 RENOVATION AND MODERNISATION (R&M) PROGRAMME

4.1.1 The main objective of R&M of power generating units is to make the operating units well equipped with modified/augmented equipment/components/systems, with a view to improve their operating performance, reliability and availability to the original design values, reduction in maintenance requirements, ease of maintenance and enhanced efficiency, meeting the latest emission levels and achieving flexibility in generation.

4.1.2 However, R&M is not a substitute for regular annual or capital maintenance/overhaul which forms a part of operation and maintenance (O&M) activity. Middle life R&M come up preferably after 100,000 hrs. of operation. RLA study and R&M of thermal units which were designed for base load operation may be required even before due to participation in flexibilisation.

4.1.3 The R&M programme is primarily aimed at generation sustenance and overcoming problems arising due to:

- Generic defects.
- Design deficiencies.
- Inefficient operation
- Non-availability of spares because of obsolescence of equipment/components.
- Deterioration in quality of coal as compared to design coal.
- Major replacements of equipment on account of unforeseen failures and/or generation sustenance not covered under regular O&M.
- Stringent environmental norms for PM, SO₂, NO_x, Mercury and Water consumption.
- low availability of flexible power
- Safety requirements, etc.



4.2 R&M PROGRAMME WITH LIFE EXTENSION (LE) & UP RATING (U)

4.2.1 The equipment subjected to fatigue stresses and creep due to high temperatures such as turbine rotor and casings, HP piping, boiler headers, Boiler drum, main steam piping and valves, feed discharge lines etc. are designed for a given fatigue life of about 25-30 years of operation. However, many equipment/ components might become prematurely weak metallographically due to various operational stresses like frequent temperature and pressure excursions, full load trippings, frequent start and stops etc. and accordingly there is need to check the remaining life of these components after about 20 years of life or 1,60,000 hours of operation lest it may result into serious failures.

A systematic study called the Residual Life Assessment (RLA) study involving non-destructive and destructive tests would reveal the remaining life of various critical components of plants and equipment so as to take steps to extend the life of the plant by a further period of about 15-20 years by appropriate repairs/replacements. A RLA study may be carried out earlier, say after 1,00,000 hours of operation if the plant condition so necessitates and as stipulated in IBR 391 A.

RLA study and R&M may be required even before the above said period due to participation in flexibilisation.

4.2.2 The LE programme is a major event in the thermal power station's history, as it envisages extension of life over a considerable period of time beyond its designed life. At this time it is a good practice to examine whether a plant requires a viable modernisation which has not been carried out earlier so that during the extended life the plant operates efficiently and delivers the rated or higher capacity with improved heat rate. Adoption of improved and proven technology can play an important role in plant upgraded output & higher efficiency. There are cost effective options to up rate the machines for higher output and improved efficiencies thus making it economically viable to integrate life extension programme with up rating.

4.3 R&M PROGRAMME FOR MEETING ENVIRONMENT NORMS

Earlier the R&M needs for meeting the environmental norms were limited to upgradation of ESP. However, stringent New environmental norms regarding Particulate matter PM, SO₂, NO_x, Mercury and Water consumption for thermal Power Stations were notified in December 2015. The TPPs may be required to take measures like, augmenting ESP to meet the particulate matter norms, installing Flue gas desulphurising (FGD) for meeting the new SO₂ norms, carrying out combustion optimization/ modification/ DeNO_x retrofit at their units to meet the NO_x norms.

Feasibility study for R&M/LE should also include the various options for meeting new environment norms.

4.4 R&M PROGRAMME FOR FLEXIBILISATION

The flexible operation of thermal plants will be required to balance the variability and intermittency of renewable generation. It may require to conduct study/test runs on thermal units for lowering the minimum load and improving the ramp rate, to do necessary measurements for optimization of the existing controls, conducting thermal feasibility study and stress analysis. Based on the study conducted, it may require installation of condition monitoring system, upgrading C&I system, combustion optimization, steam/flue gas management system, condensate throttling, mill scheduler, etc.

Feasibility study for R&M/LE should also include modifications required for low load operation/ high ramping for the flexible operation.

The flexibilisation capabilities developed shall have to be demonstrated to the satisfaction of grid operators by conducting proper performance tests.

4.5 WORKS NOT RELATING TO R&M / LIFE EXTENSION:

4.5.1 In general, works usually done under routine maintenance and annual or capital maintenance do not fall under the purview of R&M Programme. The repetitive nature of activities having the frequency once in five year or less is covered under O&M.

4.5.2 The following works should not be included as a part of R&M / LE programme:

- I. Infrastructural development work such as township, welfare measures etc. general civil works within the plant such as boundary wall, roads, drainages etc. However, technological structure works required for equipments /structure based on RLA done as per design criteria (such as turbine deck, foundation etc.) shall be part of LE.
- II. Procurement of spare equipments.
- III. Routine repairs/replacements during annual/capital overhauls.

The expenditure on such works which are of O&M in nature is to be met from O&M charges recovered through tariff for sale of electricity as notified by regulatory commission. O&M ought to be attended on a regular basis lest the condition of the unit should deteriorate to such an extent resulting in major breakdowns requiring huge expenditure.

5.0 RETIREMENT OF VERY OLD UNITS:

A few small size units of 100 MW or less capacity are in operation. The average Plant Load Factor of most of these units is very low, even less than 50%. These units are of non-reheat type having very low design efficiencies. Further, because of their ageing & technological obsolescence, these units are performing at further lower efficiency than their design value. Such units need to be retired in a phased manner. The following approach for non-reheat units and other higher size reheating units may be followed for the purpose:



- Consider for retirement of all non-reheat units of 100MW or less rating. However, those units on which major R&M/LE activities have been undertaken and are performing well, such units may continue to operate for another 10 years from the date of post R&M/LE to enable them to recover the expenditures incurred.
- Larger size units (upto rating 110MW reheat, 200/210MW) can also be considered for retirement on economically non-viability on case to case basis.
- The retirement may be prioritized according to their level of performance, say unit heat rate deviating more than 20% to be retired first and subsequently those units with deviation of 15% & 10% from their design heat rate after considering the correction factor for not getting design grade of coal.

6.0 METHODOLOGY OF IMPLEMENTATION OF R&M AND LE&U SCHEMES

6.1 R&M Works

It has been observed that the power utilities are adopting following two main variants in implementation of R&M programme.

- (i) As a rolling plan in which the whole scope of work is conceptualized based on conditions assessment, plant operation data & feedback from O&M engineers / OEM / Consultant recommendations or compliance to statutory norms. Thereafter, the various activities/schemes, so identified are implemented in phases depending on the availability of particular system/unit shutdown. Such approach results in minimizing unit shut down requirement and thereby loss in generation. However, it results in extended execution over a long period of time and benefits accrued cannot be co-related with the activities carried out and investment made.
- (ii) A comprehensive scheme is implemented in a single stretch and taking unit's planned shutdown after ensuring all inputs and supply of materials.

The methodology for implementation is to be decided by the utility. However, the option of comprehensive scheme is preferable due to well definable & quantifiable benefits. R&M required for meeting the environment norms have to be time bound as per the deadline identified by appropriate agency.

- (iii) Based on the analysis carried for the delays experienced in the various R&M projects, following recommendations are suggested:
 - (a) Separate R&M team to be formed by the utilities for the smooth execution of work.
 - (b) Time gap between DPR/RLA studies and zero/award date should not exceed 6-8 months.

- (c) The source of financing R&M/LE works and availability of funds needs to be ensured beforehand to avoid delays.
- (d) ICB/DCB mode of tendering should be preferred especially for the R&M of BTG.
- (e) Bulk tendering of multiple units may be adopted for accruing benefits in price and implementation.
- (f) L1/L2 schedule to be finalized with the suppliers. Sequential supply of material to be tied up with contractor to avoid dumping of material.
- (g) Clarity in scope of work, contractual clauses and price escalation to avoid misinterpretation during execution.
- (h) The underground existing facilities shall be identified by the owner in the contract and the scope of removal of existing scrap/debris in the work areas should be clearly specified to avoid delays.
- (i) Delays in completion of work by contractor should accrue penalties and suitable penalty clause shall be included in the contract.
- (j) Areas prone of technical surprise to be identified in the contract if need arises. The unit rates of the most of the works should be identified in the contract to avoid new work items and delays in the negotiations.
- (k) Shutdown period to be managed by proper planning. It should not be more than 3-8 months depending upon the scope of work.
- (l) R&M/LE works with shutdown requirement of less than 3 months shall be taken up along with capital overhaul/annual maintenance.
- (m) PG test to be completed within three months after the unit gets stabilized. Utilities shall ensure availability of the unit at full load for the PG test and schedule for the flexibilisation (low load/ramp) test. Adequate penalties for the shortfall from the contract to be specified.
- (n) To avoid obsolescence the executing agency shall have to ensure the critical spare support for a minimum period of ten years and should cover the period of life extension after completion of R&M/LE works.

6.2 LE&U Works

In order to implement LE&U works following methodology may be adopted.

- (I) In order to facilitate the implementation of LE&U works, utilities may appoint reputed consultant for rapid life assessment study, condition assessment, energy auditing, thermal performance test, environmental

study, preparation of DPR etc. RLA studies to be conducted on the major plant and equipment through agencies of repute.

- (ii) Based on DPR a detail technical specification & contract document may be prepared. The contract document, inter-alia shall include provisions of changed scope of work which may come up when the machine / equipment is opened or are identified during detailed RLA studies (as a part of scope of work) to meet the stipulated performance guarantees.
- (iii) Foundations of equipment's such as Boiler/TG foundation/Bottom ash hopper/Fan/Coal mill foundations may need to be included in RLA study.
- (iv) While uprating the unit, the dynamic forces/margin of equipment's need to be considered to ensure safety and reliability.
- (v) The auxiliary system capacity and BOP system should be evaluated to avoid any mismatch while uprating.
- (vi) Utilities should consider Govt. Inputs/policy decision with regard to implementation of LE&U works. They should also share data/information to MoP/CEA. The responsibilities of various agencies with regard to implementation of LE&U works shall be as specified as under:

Consultant(s): To assist the utilities, if required, to carry out RLA, energy audit, preparation of DPR, bid specifications, selection of executing agency, implementation & performance evaluation. One or more qualified consultants may be engaged by the utilities depending on the scope of work.

Financial Institutions: To provide funds as loans.

Executing Agency: To carry out the field work.

vii) The following time frame may be adopted for implementing the LE&U schemes:

- a) Appointment of consultant by utilities - 3 months.
- b) RLA/ Energy Audit –3 months.
- c) Freezing the scope of work/ activities for LE&U – 3 months.
- d) Preparation of DPR - 3 months.
- e) Placement of order of LE&U - 6 months.
- f) Shut down of unit - 3 to 8 months depending on the scope of work.
- g) Implementation time after LOA - 18-26 months.
- h) Supply of critical spares - 16 to 20 months from placement of order.

The above requirements call for a new approach towards implementation of R&M/LE works by the utilities by revisiting the existing procedures being adopted by each utility/ stake holders/ approving authority and to simplify them to meet the compressed time schedule and encouraging increased participation from various executing agencies.

- (viii) The utility shall appoint a Nodal Officer of the rank of Chief Engineer who will be responsible for monitoring & coordination with all concerned relating to LE&U scheme.
- (ix) The selection of the executing agency/bidder may be carried through the process of competitive bidding.
- (x) The Life Extension & Uprating work will be declared complete on successful continuous running of the unit for 14 days and at least 72 hours at full rated / uprated capacity after recommissioning of the unit.
- (xi) Life Extension work without the element of uprating (rated capacity and / or efficiency improvement beyond original design values) may be undertaken only in specific cases where uprating is not found techno economically viable.
- (xii) The utilities may approach the Government for additional allocation of power to the extent possible from unallocated quota of central sector power stations during the period of shut down of units for comprehensive life extension works.

6.3 MONITORING THE PROGRESS OF IMPLEMENTATION OF R&M/LE SCHEMES.

- (i) R&M / LE&U schemes shall be monitored by MOP/CEA.
- (ii) The utility shall also have a system of close monitoring of the physical and financial progress of various activities to ensure timely implementation of R&M/LE&U programme.
- (iii) Physical and financial progress report in prescribed format shall be submitted to CEA regularly on quarterly basis.

7.0 COST ESTIMATES

7.1 The estimated cost of the R&M/LE&U scheme has to be worked out based on the estimated cost of the identified individual works. The estimated cost should be, as far as possible, realistic and should be based on current market rates/budgetary offers from the supplying agencies including all taxes and duties. The import content along with the country from where the equipment etc. imported, should be identified. The source of funding is also to be mentioned. The yearly phasing of funds required for implementation of the scheme will have to be given which would help in monitoring the physical and financial progress of the scheme.

7.2 The cost of LE&U works shall not exceed 50% of the EPC cost of a new generating unit of indigenous origin (BHEL). If the LE&U works is limited to BTG, the cost ceiling shall be restricted to 50% of the new BTG unit only. However, a detailed study should be carried out to ensure its techno-economic viability. The payback period may be limited to 5 to 10 years.

7.3 In cases, where the cost is estimated to exceed the above limits, a detailed cost comparison & cost benefit analysis shall be carried out between the R&M/LE work and that of setting up a new green field plant.

8.0 COST BENEFIT ANALYSIS

8.1 The investment decision on R&M/LE&U scheme should be driven by economic sensitivity analysis on cost of generation. The benefits in term of increase in PLF (including additional generation and availability, reduction in forced outages), increase in efficiency, reduction in auxiliary power consumption and fuel consumption, improvement in plant safety and environmental up-gradation expected to be achieved after implementation of R&M/LE&U scheme should be clearly brought out. The techno-economic viability will be established in terms of internal rate of return, net present value, payback period etc. The payback period for R&M / LE&U should be about 5 to 10 years.

Due to new environmental norms power utilities are mandated to install new systems involving huge expenditure. The Payback period for recovery of capital expenditure will be determined by the CERC/SERC and it will vary from project to project since it depends upon the amount of capital expenditure of R&M works, balance capital cost of project, life and the projected PLF.

The flexibilisation operating cost for the plant operation at minimum load and higher ramp rate shall have to be realized from the compensation offered by CERC/SERC for the degraded heat rate, higher maintenance cost. Compensation for operating unit's up to 55% load and incentives for ramp rates in excess of 1% have already been notified by CERC. The regulatory authorities CERC/SERC's shall have to notify the compensation for operating thermal plants below the 55% load as and when the grid requires for flexibilisation.

8.2 The Empowered sub-Committee of the Committee on Infrastructure in its meetings held on 11th January, 2008 and 2nd April 2008 under the chairmanship of the then Deputy Chairman, Planning Commission has included R&M of power stations under the definition of infrastructure. All kind of financial concessions / relaxation towards infrastructure projects as notified by Ministry of Finance from time to time shall also be applicable for R&M / LE&U works.

9.0 PARTICIPATION OF PRIVATE SECTOR IN LE&U PROGRAMME

9.1 In view of the liberalized economic policy of Government of India, private investment including foreign investment, are now allowed in all areas of the power sector. Following alternative options appear practical and feasible for private investment in R&M schemes. However, states/ power utilities may have other innovative options which could also be considered.

(i) Option 1:- Lease, rehabilitate, operate and transfer (LROT)

Under this option, the private promoter (PP) would take over the power station on a long -term lease, say 10 years or more. PP would invest and carry out the R&M of the power station and would take over its operation and maintenance. Normally, the station would revert to the power utility after completion of the contracted period of lease or may be renewed on terms to be specified. However, legal title and ownership of the plant will remain with the utility throughout. This option would require a detailed lease agreement covering all aspects of financing, performance parameters, use of existing resources, sale of generated power etc.

(ii) Option 2:- Sale of Plant

Power utilities could offer power stations for outright sale to private parties. The present worth of the plant would have to be assessed which could be the reserve price for the sale.

(iii) Option 3:- Joint Venture between Power utility and public or private company.

In this option, a new company will be formed as a joint venture (JV) of the state power utility/ State Government and selected private/public collaborator. The JV company would undertake the R&M/ LE works and own, operate and maintain the power station. The private collaborator could also be an equipment supplier. Each partner shall hold minimum 26% equity in the JV company.

(iv) Option 4:- Service Model

In this option the implementation of R&M can be done by defining the baseline and awarding the contractor for a specified duration over which phased performance improvement can be achieved and sustained with flexible payment models.

9.2 As a general rule, choice of private promoter should be made through competitive bidding. The above modes are illustrative. Any other mode as may be found suitable by the utility with in the above broad principles may be adopted by the utility.

9.3 Depending on the options preferred by the power utility, the detailed procedure and bid documents may be prepared by the utility/consultant in line with their procurement policies.



10. DEEMED AVAILABILITY

The thermal units under outage on account of the approved programme of renovation/upgradation should be considered deemed to be available for the period approved in advance by the concerned authorities.

11. AWARD SCHEME

As a recognition of the efforts put up for the timely completion of R&M/LE&U work, award needs to be commissioned intended to encourage and motivate the utilities/agencies.





ऑयल इंडिया लिमिटेड

(भारत सरकार का उद्यम) पंजीकृत कार्यालय: इंदिरा नगर, अरुण

Oil India Limited

(A Government of India Enterprise) Registered Office: Indira Nagar, Arun

प्लॉट. न. 19, सेक्टर 16-ए, नोएडा-201 301 उत्तर प्रदेश

Plot No. : 19, Sector 16-A, Noida-201 301, Uttar Pradesh

दूरभाष / Telephone : 0120-2419000 फैक्स / Fax : 0120-2488310

CIN : L11101AS1959GOI001148 ई-मेल / E-mail : oilindia@oilindia.in, वेबसाईट / Website : www.oil-india.com

संदर्भ नं./Ref. No.:DO:OIL:02/758

दिनांक / Date: 23.02.2024

Sri Ranendra Sarma
Director (Technical), AGBPS
NEEPCO LIMITED

Sub: Comfort Letter - Natural Gas Availability for NEEPCO's Bokuloni Power Plant

Ref: NEEPCO/D(T)/AGBPP-1/2023-24/76 dtd 25.01.2024

Sir,

- 1.0 In response to your request, we hereby confirm the availability of Natural Gas in the region for supply at the rate of 1.4 MMSCMD for the next 15 years.
- 2.0 This continuation of gas supply is contingent upon:
 - 2.1 The continuation of the existing gas allocation by Ministry of Petroleum and Natural Gas (MoP&NG).
 - 2.2 Adherence to the guidelines issued by the Govt. of India/MoP&NG from time to time regarding Domestic natural gas, in terms of future gas production from blocks awarded under various regimes.
 - 2.3 The mutual agreement and execution of a new Gas Sale and Purchase Agreement (GSPA) between NEEPCO Ltd. and Oil India Limited, after expiry of the existing GSPA.

Thank you.

Yours sincerely,
FOR OIL INDIA LIMITED

(Pankaj Kumar Goswami)
Director Operations



ANNEXURE-II
***(RLA REPORT OF AGBP BY NTPC
CONSULTANT)***



Consultancy services for Assessment
of equipment for RLA study of
291MW in AGBP, Kathalguri, Assam.

(From 22/05/19 to 24/05/19)

BY
CONSULTANCY WING
NTPC LTD.,
A-28, SECTOR 24, NOIDA, UP.

Doc. No.: CW-OM-11003/Assessment for RLA/AGBP

CONTENTS

S. No.	Description	Page No.
1	EXECUTIVE SUMMARY.....	4
2	INTRODUCTION.....	7
3	BRIEF ABOUT THE PLANT.....	7
	3.1 - PLANT DETAILS.....	8
	3.2 - PLANT FEATURES AND RUNNING HOURS	9
	3.3 - WORKING PRINCIPLE.....	9
	3.4 - COMBINED CYCLE POWER PLANT.....	10
4	PURPOSE OF THIS ASSESSMENT.....	11
5	METHODOLOGY.....	11
6	EFFICIENCY AND PERFORMANCE CALCULATION.....	12
	6.1 - GAS TURBINE COMPRESSORS.....	12
	6.2 - WHRS PERFORMANCE	13
	6.3 - CONDENSER PERFORMANCE	14
	6.4 - COOLING TOWER PERFORMANCE.....	15
	6.5 - RECOMMENDATIONS OF EFFICIENCY TEST.....	16
7	MAJOR OBSERVATIONS AND RECOMMENDATIONS	17
8	CONCLUSION	21
9	PHOTO GALLERY.....	22

FORWARD

There are two gas based power plants of NEEPCO, one at Kathalguri, Assam 291MW AGBP and other one at Agartala, Tripura 135MW AGTCCPP. In both the stations, the units have crossed or nearly crossing 20 years of life and completing the normative life of 25 years in 2023-24. Thereafter, the company is planning for R&M to extend the life of the power plant.

The Gas turbines in these stations are running with less efficiency due to various reasons. Before going for R&M the company has felt the need of assessment of equipment for RLA study at these stations. Hence, a contract has been awarded to NTPC "Consultancy services for assessment of equipment for RLA study of 291MW AGBP, Kathalguri, Assam and 135MW AGTCCPP, Agartala, Tripura", vide PO no: NEEPCO/ED(O&M)/AGBP-25/2018-19/3798 dated 28/02/2019.

NTPC team has visited the AGBP from 22/05/19 to 24/05/19 and studied the systems, condition of the equipment, running parameters and efficiency. The equipment which require RLA and the equipment which does not require RLA are indicated in the report with reasons. M/S NEEPCO may plan to carry out RLA for these plant equipment.

Sandeep Gupta
AGM (OS)
NTPC Ltd.

1.0 EXECUTIVE SUMMARY

The 291 MW NEEPCO AGBP has normative heat rate 2600kcal/kWh and APC 2.75% as per CERC norms 2019-24. The plant is achieving this normative parameters. The plant is more than 20years old.

After studying the equipment data, calculation of efficiency and checking of healthiness of the equipment, the suggestions for RLA are summarised as below:

Gas Turbines:

GTs are running normal but with reduced capacity. Compressor offline washing is to be done once every 2000 running hours or at the earliest possible opportunity to achieve the rated load. The HGPI components are to be replaced from time to time as per OEM recommendations. Timely inspections/overhauling of units as per OEM recommendation are required to be carried out to ensure machine safety and healthiness.

No RLA is required in GTs at present. The requirement may be reviewed after five years.

Steam Turbines:

The steam turbines are running normal. They are not able to generate designed load due to *sub optimal* condenser performance, Cooling Towers performance and inter stage seals problems. The standby rotor is to be kept ready after refurbishment for use and to be kept under proper preservation for any future requirement.

No RLA is required for steam turbines at present. It may be reviewed after five years.

WHRS:

The boiler tubes are in good condition except the fins are covered with dust. This can be removed by dry ice blasting.

The boiler body has hot spots of temperature 150-170degC (but no leakages were observed). The internal insulation appear to be deteriorated or displaced. It may be rectified in consultation with OEM.

All the WHRS have exceeded the running hours of 1Lakh. As per Regulation 391A of IBR act 1950, RLA of boilers is to be carried out at 1 Lakh running hours and every five years thereafter. **Therefore RLA of all the WHRS must be carried out at the earliest** as all the WHRS have crossed 1 Lakh running hours.

Condensers:

The condenser backpressure is more, which is due to the high CW inlet temperature Condenser & additional heat load to the condenser. The heat load is more due to ejector drain open to the condenser and passing of few Main Steam line drains to the condenser. They are to be arrested or may be taken to separate tank and pump the water to deaerator.

Cooling Towers:

The Cooling Tower outlet temperature is high. Continuous chlorine dosing not taking place. Algae formation in every cell is observed. The cooling fan blade angle needs to be adjusted and requisite number of cooling fans are to be kept in service to ensure rated cooling tower outlet temperature.

Civil structures and foundations:

The Spalling phenomenon was noticed on the civil structure of CW pump House and Cooling tower area. Since, all civil structures including Gas Turbine and Steam Turbine foundations are more than 20 years old now, the RLA of Civil structures and foundations is required. The paint work of steel structure is to be carried at regular interval of 2-3 years to keep them healthy.

Control system of Combined cycle:

Many critical parameters are not available in control room. Upgradation of the control system and governing system are necessary for safe control, data capturing and efficient operation.

2.0 INTRODUCTION

NTPC consultancy wing has been awarded contract by M/S NEEPCO Ltd. vide ref. no: NEEPCO/ED(O&M)/AGBP-25/2018-19/3798 dated 28/02/2019, for carrying out Assessment of equipment for RLA study of 291MW AGBP, Kathalguri, Assam and 135MW AGTCCPP, Agartala, Tripura.

This report pertains to 291MW AGBP, Khatalguri, Assam.

The report for 135MW AGTCCPP, Agartala, Tripura is being submitted subsequently.

3.0 BRIEF ABOUT AGBP POWER PLANT

The Assam Gas Based Power Project with 291 MW installed capacity was conceived in the year 1986 as a Central Sector Project and executed by NEEPCO with loan assistance from the Overseas Economic Cooperation Fund of Japan (now named as Japan Bank of International Cooperation). The Power Station consists of three (3) modules. Each Module comprises of 2 Nos. Gas Turbine Units, 2 Nos. WHRBs and 1 No Steam Turbine Unit. The Design Details of the Units are as under:

3.1 PLANT DETAILS

<u>Name</u> :-	ASSAM GAS BASED POWER PLANT (291 MW)
<u>Capacity</u> :-	Gas Turbine :(33.50 MW x 4) MHI make, (33.50 MW x 2) GE make
	Steam Turbine : 90 MW(30.00 MW x 3 Nos) BHEL Make
	Total capacity = 291 MW
<u>Location</u> :-	Bokuloni, Dist: - Dibrugarh (Assam), PIN – 786 191
<u>Commissioned Date</u> :-	Unit – I : On 16.03.1995
	Unit – II : On 22.03.1995
	Unit – III : On 30.06.1995
	Unit – IV : On 30.07.1995
	Unit – V : On 02.03.1996
	Unit – VI : On 15.10.1996
	Unit – VII : On 01.03.1998
	Unit – VIII : On 28.03.1998
	Unit – IX : On 05.07.1998
<u>Beneficiary States</u> :-	Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura.
<u>Technical Features</u> :-	Fuel & source – Natural Gas.,Oil field of M/S OIL
	Quantity: 1.4 MMSCMD
	Source of water for consumptive use : River Buridihing
	Turbine Type : Single Cylinder Frame – VI
	Generator Type : 2 pole Cylindrical Rotor, Indoor. Evacuation: 220KV lines.

3.2 Plant Features and running hours: -

The Project is fuelled by Natural Gas from M/S Oil India Ltd., supplied at an off take point located nearly 7 km away from the Project. The commitment for drawl of gas is 1.4 MMSCMD(with subsidised up to 1MMSCMD and above is market rate). The gas from the OIL's off take point is transported through a pipeline laid, owned and maintained by M/S Assam Gas Company Ltd. The gas received at the Project being at low pressure (5 kg/cm²) is compressed to 21 kg/cm² by a Gas Booster Station installed in the Project. The Gas Booster consists of four numbers of compressor units of Dresser Rand, USA make driven by respective Gas Engines of Waukesha, (USA) make.

The beneficiary States of the Power Plant are Assam, Manipur, Meghalaya, Tripura, Arunachal Pradesh, Nagaland and Mizoram.

The running hours as on 22/05/19 are as follows:

Unit I	: 169547
Unit II	: 167120
Unit III	: 170542
Unit IV	: 169790
Unit V	: 138738
Unit VI	: 131641
Unit VII	: 140022
Unit VIII	: 139393
Unit IX	: 139789

3.3 Working principle:

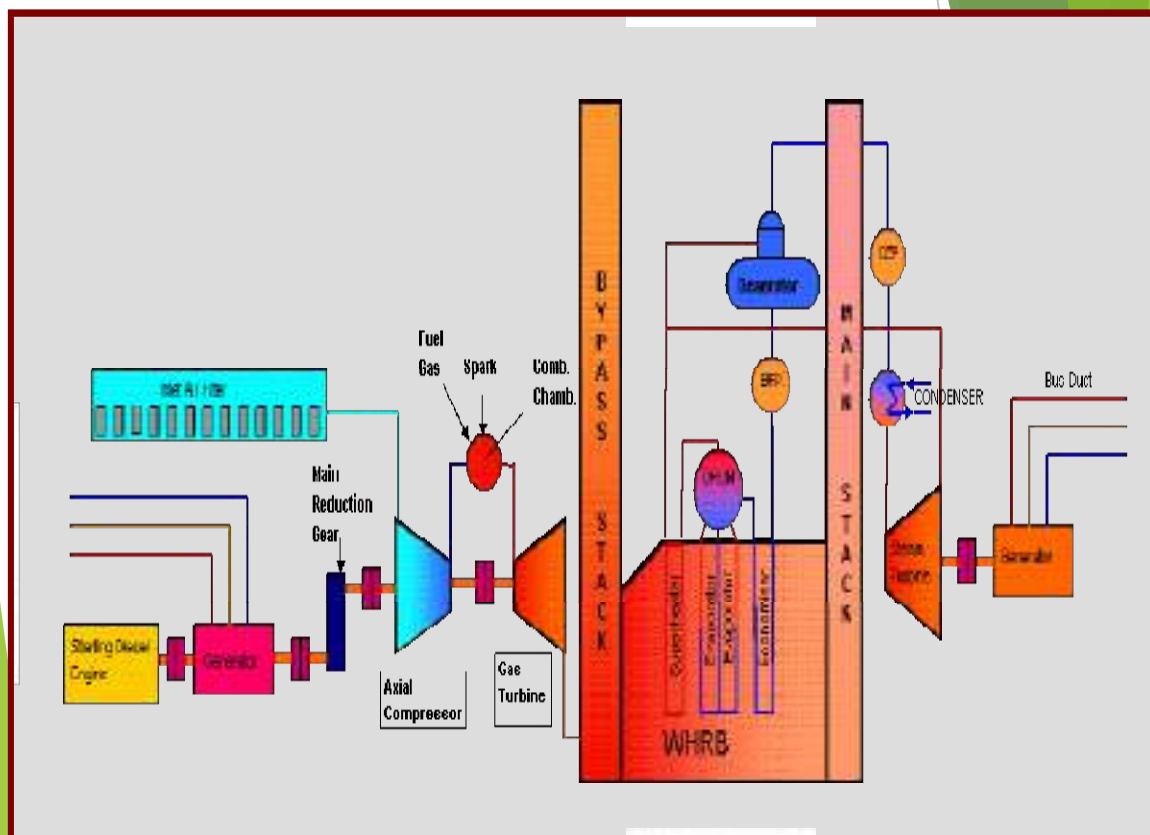
Natural Gas is used as the fuel. Air for combustion is drawn through large inlet section where it is cleaned, controlled and sent through large air compressor which is connected in the same shaft of the gas turbine. This compressed air is sent for combustion with fuel in combustion chamber.

The combusted flue gas is allowed to expand through a gas turbine, where the work is done by the gas turbine which is coupled with generator to generate electricity. The flue gas exits the gas turbine at a very high temperature. This high temperature flue gas is passed through heat recovery steam generators where the heat is utilized to generate steam. This steam is used to generate power through steam cycle in a steam turbine.

3.4 Combine Cycle Power Plant:



COMBINED CYCLE POWER PLANT



4. PURPOSE OF THIS ASSESSMENT

The plant has become more than 20 years old and the units are running at low capacity and not achieving the design load. The plant is completing its life of 25 years in 2023-24. After that R&M with life extension has to be carried out for keeping the station under commercial operation. In this line as preparatory for R&M, the contract for assessment of equipment to identify the problematic area/equipment for RLA of Gas turbine/ Steam turbine and WHRS has been awarded to NTPC.

5. METHODOLOGY

The plant was visited by NTPC team consisting of three members having expertise in GT, WHRS, ST, BOP and Efficiency (O&E) areas, from 22/05/19 to 24/05/2019.

The team visited the plant site, interacted with the concerned executives and collected data. From the running parameters efficiency are calculated. The healthiness of the equipment, age, running parameters, deviations, maintenance practices, spares replacement as per OEM guidelines were studied and the report is prepared.

A preliminary report on site observations was presented in the closing meeting on 24/05/2019.

6. EFFICIENCY AND PERFORMANE CALCULATION

6.1 Gas Turbine Compressors

Parameter	Unit	GT#1	GT#2	GT#3	GT#4	GT#5	GT#6
Compressor inlet temp.	c	26.40	26.00	26.18	26.25	26.0	26.0
Compressor inlet pressure	(mm WC)	-151.60	-151.60	-151.60	-151.60	-151.60	-151.60
Compressor inlet temp.	c	374.50	369.00	373.30	373.60	390.00	390.00
Compressor outlet pressure	(KSC)	9.74	9.65	9.88	9.62	9.00	9.00
Compressor efficiency	%	82.76	83.47	83.56	82.36	75.80	75.80
Compressor efficiency Design	%	89.32	89.32	89.32	89.32	89.32	89.32

The compressor efficiency are low. Offline wet washing has to be carried out regularly once in 2000 running hours or at the earliest available opportunity to restore compressor efficiency and to prevent deterioration

The Gas turbine efficiency and heat rate could not calculated as individual gas flow meter of each GT are not working at present.

6.2 WHRS performance

	Flue Gas Inlet temp C	Flue Gas outlet temp C	Ambient Temperature	Effectiveness (Inlet temp. - outlet temp.) / (inlet temp. – ambient temp.)
HRSG#1	536	219	32	62.90
HRSG#2	525	219	32	62.06
HRSG#3	529	187	33	68.85
HRSG#4	534	187	33	69.16
HRSG#5	536	NA	32	NA
HRSG#6	563	NA	32	NA

The effectiveness of HRSG#1 and 2 are less compared to 3 and 4. Deposits are observed over the fins of SH and economizer tube fins of U#6 which can be removed by dry ice cleaning. As the boilers are more than 20 years old, it is suggested to do carry out dry ice cleaning for all the boilers for better effectiveness.

6.3 Condenser performance

Unit #1 Unit#1 condenser was checked for heat load and condenser flow.
The results are as follows:

Heat load in condenser (Kcal/Hr)		
1	HEAT Load(Heat added by HP/LP STEAM +attemperation-Power Output)/10 ⁸	0.6111936
2	Design Heat Load	0.549
3	Actual/Design	1.1132853
CW Flow in Condenser		
1	CW inlet temperature (Deg C)	39
2	CW Outlet temperature (Deg C)	50
3	CW flow (T/Hr)	5556
4	Design CW flow (T/Hr)	6100
5	CW flow % of design	91.08
6	Cond CW inlet pressure (Ksc)	2.2
7	Cond CW outlet pressure (Ksc)	0.8

Comments

Condenser back pressure is 0.27 Ata against design 0.08 Ata due to following reasons:

- 1) High CW inlet 39 C against the design 27 C increasing the condenser back pressure.
- 2) High heat load. It is seen that heat load is higher than design by 11 %.

*We know by the characteristic of Rankine cycle, that heat rejected increases with increase in condenser back pressure.

- 3) In addition, heat load also increased due to passing of high energy drains to condenser.

Being a Single casing turbine, it is not possible to calculate cylinder efficiency.

Remedial measures:

- 1) Keep all available cells in cooling tower in service. The increase in load due to reduction in back pressure is much more than APC consumed by fans. (In the trial it was seen that ST#1 load increased by 0.5 MW by taking an additional cell in service (Design Power of fan is 75 KW).
- 2) CW pumps impellers, casing and bowls may be coated with polymer energy saving coating for better performance.

6.4 Cooling Tower performance

Cooling Tower Performance				
Sl. No	Parameter	Units	Design	Actual
1	Hot Water Temperature	C	36	46
2	Cold Water Temperature	C	27	40
3	Wet Bulb Temperature	C	20.5	29
4	Dry Bulb Temperature	C	23	30
5	Range(1-2)	C	9	6
6	Approach (2-3)	C	6.5	11
7	Effectiveness($5/(5+6)*100$)	%	58.1	35.3
8	Fan currents (1to 6)	Amp	70,80,85,88,85,78	

Blade angle may be increased slightly by 1 to 2deg wherever the fans taking less amperage. GRP blades may be replaced with FRP blades to reduce Auxiliary Power Consumption.

6.5 Recommendations of Efficiency Test

- Install field instruments and extend the input to the DCS for all the parameters required for compressor efficiency evaluation.
- Evaluate the efficiency of compressor immediately after compressor off-line washing and determine a base line data for all the Gas Turbines.
- Carry out offline compressor washing once every 2000 EOH or at the earliest possible opportunity.
- Carry out the inspections within the stipulated time period given by OEMs.

7. MAJOR OBSERVATIONS AND RECOMMENDATIONS

Sl. No	Area	Observation	Recommendations
1a	GT 1-4	<ul style="list-style-type: none"> - GT 3&4 CRR is done in 2015 and 2017 respectively. - For GT 1&2 CRR is under process. - HGP components are being replaced from time to time. 	<ul style="list-style-type: none"> - RLA is not required. To be reviewed after five years. - To be replaced as per OEM recommended schedule.
1b	GT 5-6	<ul style="list-style-type: none"> - HGP components are being replaced from time to time. 	<ul style="list-style-type: none"> - To be replaced as per OEM recommended schedule. - As the running hours are reaching 1.5lakh EOH, comprehensive rotor refurbishment may be planned in line with OEM recommendation. - All stages of compressor blades coating is suggested for better performance - No separate RLA is required
1c	All GTs	<p>The compressor efficiency found to be low (normal 89%):</p> <ul style="list-style-type: none"> 1 - 82.76% 2 - 83.47% 3 - 83.56% 4 - 82.36% 5 - Stopped condition 6 - 75.8% 	<ul style="list-style-type: none"> - Offline washing is suggested in every 2000 EOH or at the earliest possible opportunity.

1d	Fin fan coolers	Healthiness found OK	
2	STs	<ul style="list-style-type: none"> - There is no problem observed in ST parameters 	<ul style="list-style-type: none"> - Spare rotor to be refurbished and kept ready for future use. - No RLA is required
3a	WHRBs	<ul style="list-style-type: none"> - WHRB 	<ul style="list-style-type: none"> - Deposits observed over the fins of SH and economizer tube fins which can be removed by dry ice cleaning
3b		<ul style="list-style-type: none"> - Boiler body temperature are more for all the boilers. Many hot spots with temperature upto 170-180 deg C are seen. WHRB 3&4 are having more hot spots. Insulation are either deteriorated or displaced 	<ul style="list-style-type: none"> - Regular thermography to be carried out and necessary repair to be done to prevent further damages.
3c		<ul style="list-style-type: none"> - Boiler structure painting 	<ul style="list-style-type: none"> - Recommended once in 2-3 years
3d		<p>Boiler effectiveness are (design 63%):</p> <p>1 - 62.9%</p> <p>2 - 62.06%</p> <p>3 - 68.85</p> <p>4 - 69.16</p> <p>5 – Not available</p> <p>6 – Not available</p>	<ul style="list-style-type: none"> - As per section 391A of IBR 1950, RLA is to be carried out at 1lakh running hours and at every five years interval thereafter. - RLA to be carried out at the earliest.
4a	Condensers	<ul style="list-style-type: none"> - Condenser back pressure is higher (0.27,0.25, 0.19KSC) than design value(0.088KSc) in all machines. - The vac. is low due to high CW inlet temp 40degC against design 27degC and high heat 	<ul style="list-style-type: none"> - PRDS drain may be diverted to open tank and then pump it to D/A with 5-10HP pump.

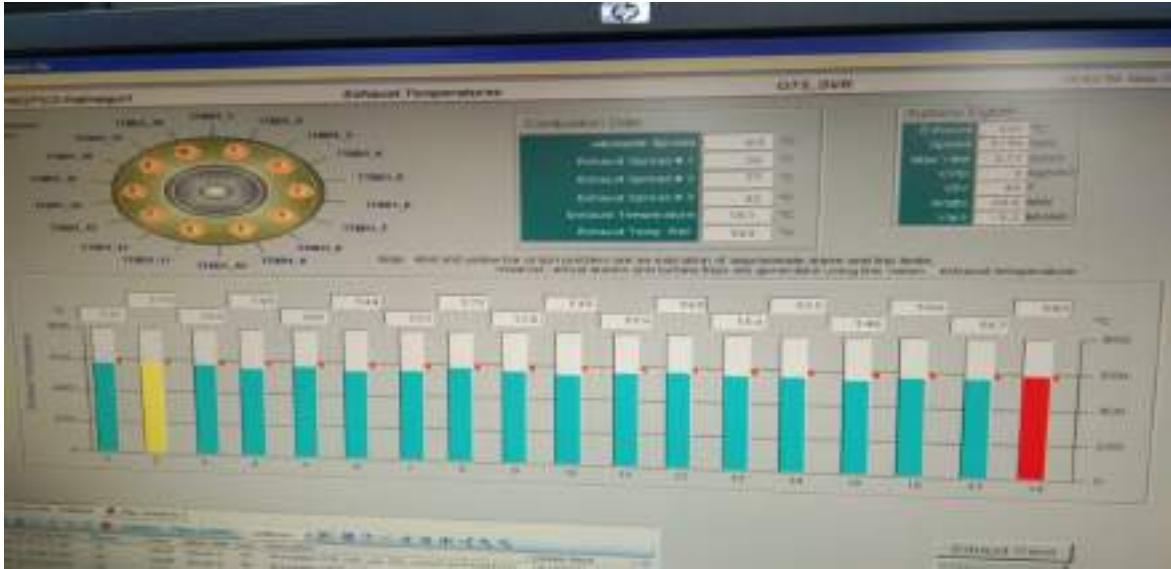
		<p>around 11% high than design value, the reasons are follows:</p> <ul style="list-style-type: none"> -PRDS drain kept open to condenser in all the units, - MS drains found passing in U#4, and -Turbine bypass valve passing in U#4 -Low vac. leads to higher heat rejection in condenser 	
4b		<ul style="list-style-type: none"> - When starting ejector was taken in service in ST#1 the vac. found improved by 0.015KSC and load by 0.3MW indicating the main ejector performance is not upto the mark(both main ejectors in service always). Reason may be: <ul style="list-style-type: none"> - PRDS parameters are not maintained - Ejector orifice may be worned out 	<ul style="list-style-type: none"> - Thorough inspection of ejector system to be carried out to improve the performance. - Alternately, possibility of its replacement with Vacuum pump may be explored. - In next major overhauling of ST, RLA of condenser may be planned. - Epoxy coating of water box may be carried out .
5a	Cooling tower	<ul style="list-style-type: none"> - Continuous Cl2 dosing not taking place, lot of algae formation observed - Each CT is taking 45-57KW (current 70-88A) power against rating 75KW 	<ul style="list-style-type: none"> - Latest technology is dosing of ClO2 in place of Cl2. It is more effective and safe. - CT capability test to be carried out to identify the gaps. Meanwhile, blade angle of the fans taking less load may be increased by 1-

		<ul style="list-style-type: none"> - CW temperature more 	<p>2deg for better performance.</p> <ul style="list-style-type: none"> - FRP blades are recommended in place of GRP blades for reducing APC. - All the available CT fans may be run as it increases better vacuum and generation (on experimental basis standby fan was taken into service and found there was gain of 0.5MW in station)
		CW pumps	<ul style="list-style-type: none"> - Internal coating of CW pumps may be carried out for better efficiency
6a	General	<ul style="list-style-type: none"> - Civil 	<ul style="list-style-type: none"> - As the units are more than twenty years old Structural and civil foundation inspection may be carried out
6b		<ul style="list-style-type: none"> - BFP discharge pressure 80KSc, Drum pressure 38KSc 	<ul style="list-style-type: none"> - BFP DE-staging may be considered to reduce APC
6c		<ul style="list-style-type: none"> - Flue gas temperature at chimney is 210degC 	<ul style="list-style-type: none"> - The excess heat can be utilized by installing vapor absorption system for air conditioning of the plant.
7	ST control system	<ul style="list-style-type: none"> - Many critical parameters are not available - Control system is obsolete 	<ul style="list-style-type: none"> - Up gradation of the control system and governing system of combined cycle area for safe control, data capturing and efficient operation

8. CONCLUSION

- Regular parts replacement from time to time as per OEM recommendation is required to keep Gas Turbines in good health
 - RLA of boilers must be carried out at 1 lakh running hours and then after every five years in line with IBR act.
 - **The civil structure and foundations RLA to be carried out** as they have already crossed twenty years.
-

9. PHOTO GALLERY



GT exhaust parameters are within the limits.



MHI Gas Turbine U#3



Algae formation in CT cells



CW pump house civil structure



Cooling tower doors damaged



Hot spots in WHRS



WHRS economiser tubes - dust on the fins



Closing meeting with preliminary findings presentation



ANNEXURE-III
(REPORT ON CIVIL STRUCTURE
STABILITY OF AGBP BY
JADAVPUR UNIVERSITY)


**REPORT
FOR
CHECKING OF STRUCTURAL STABILITY AND EARTHQUAKE RESISTANCE
OF BUILDINGS AND OTHER STRUCTURES OF ASSAM GAS BASED POWER
PLANT, BOKULONI (NEAR DULIANJAN), DISTRICT. DIBRUGARH, ASSAM.**



Name of the Client : NORTH EASTERN ELECTRIC POWER CORPORATION LIMITED

Work Order No. : NEEPCO/AGBF/CWC/2021-22/T-99/549, Dated on 10.09.2021

*Prepared
By*
Dr. Partha Ghosh
Professor
CONSTRUCTION ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
Kolkata-700106
December 2021


Dr. Partha Ghosh
B. E. (Civil), M.E. (Structural Engg.), Ph.D (Engg.)
Professor
Construction Engg. Department
Jadavpur University, Kolkata-700 106



Construction Engineering Department, Jadavpur University Salt-Lake Campus Kolkata-700106

CONTENTS

<u>Chapters</u>	<u>Page No.</u>
CHAPTER-I	
Introduction	01 - 03
CHAPTER-II	
Project Details	04 - 20
CHAPTER – III	
<u>Various Test Results with Pictures and Visual Inspection</u>	
1 Main Control Building	21 - 35
2 Gas Turbine Building	37 - 77
3 Steam Turbine Building	79 - 135
4 Gas Booster Station Building	136 - 150
5 Raw Water Reservoir	152 - 173
6 Cooling Water	175 - 221
7 Desilting Basin	213 - 231
8 Clarified Water Storage Tank	233 - 277
9 Intake Well and Pump House at Fakhail Ghat Bridge	279 - 291
10 Effluent Treatment Plant	293- 311
11 425 meter Long RCC Bridge at Fakhail Ghat	313 - 332
12 Clariflocculator 1 & 2	334 - 346
13 Aerator	348 -353
14 DM Storage Tank	355 - 369
15 Cooling Water Pump House	370 - 384
16 Air Compressor House	386 - 391
17 10 km Long Raw Water Pipeline at Fakhail Ghat	393 - 408



CHAPTER-I

1.0 INTRODUCTION

1.1 The Non-Destructive, Partially Destructive Test and visual inspection of various structural compounds of Assam Gas Based Power Plant at Bokuloni, Assam. North Eastern Electric Power Corporation Limited had allotted to this job to Dr. Partha Ghosh, Professor of Construction Engineering Department, Jadavpur University, Salt Lake Campus, Plot-8, Block-LB, Sector-III, Kolkata-700106. With Work Order No. : NEEPCO/AGBF/CWC/2021-22/T-99/549, Dated on 10.09.2021

1.2 The Scope of the work consists of Quality assessment & Health monitoring of above-mentioned structure through Non-Destructive and Partially Destructive Test

1.3 The Tests were conducted on September 2021 to December 2021 in presence of Client representatives






A. Different kind of Testing:-

SI No.	Name of Test	Purposes	Make	Relevant Code
1	Ultrasonic Pulse Velocity Test	To know the homogeneity of concrete	Proceq	IS 516 Part-5/Sec-1 2018
2	Schmidt Hammer	Existing Surface compressive strength of concrete	Proceq	IS 516 Part-5/Sec-4 2020
3	Half Cell Potential & Cover Meter	To Know the corrosion intensity of embedded reinforcement	Proceq	IS 516 (Part-5/Sec-2) 2021 & BS 1881 204
4	Electrical Resistivity Test	To Know the corrosion intensity of Concrete	Proceq	AASTHO TP 95
5	Carbonation Test	To determine the depth of concrete affected due to combined attack of atmosphere CO ₂ and moisture	MERCK 0.2 % phenolphthalein Solution used	IS 516 (Part-5/Sec-3) 2021
6	Chlorimeter	To determine the presence of chloride	NDT James	IS 456-2000
7	pH Meter	To determine the pH of Concrete	pH Tester	IS 456-2000
8	Vibration Test	To check the limit of vibration	FLUKE-805FC	ISO








9	Ultrasonic Flaw Detection, Thickness Precision Gauge, UPV	To Determine the homogeneity of Steel	Elcometer	IS 822 1970 Reaffirmed 2019, EN ISO 12944-2 1998
10	Dye Penetration Test	To Visual Inspection Steel Pipe lines	-	IS 3658 1999 Reaffirmed 2020
11	Chemical Analysis (Petrography (SEM), EDX Analysis, XRD/XRF)	To determine the internal properties of concrete	Zeiss & Rikagu	As per ASTM C295

A. Different kind of Testing Instruments: -

Name of the Instruments	Image of Instruments
Schmidt Hammer	
Ultrasonic Pulse Velocity Test	
Half Cell Potential Meter along cover meter (Profometer)	
Electrical Resistivity Test of Concrete (Resipod)	
Carbonation Test	



Chlorimeter	
pH Meter	
Elcometer	
Chemical Analysis Instruments (Ziess, Rikagu)	
Vibration Test (FLUKE-805/80 5FC)	



CHAPTER-II

2. Project Details

A. Ultrasonic Pulse Velocity Test Method as per IS 516 Part-5/Sec-1-2018:

The Pulse Velocity Test is conducted by the Portable Ultrasonic Non-Destructive Digital Indicating Tester (PUNDIT LAB) Make PROCEQ which is internationally reputed highly accurate pulse time recording system. The Ultrasonic Pulse Velocity method consists of measuring the time of travel (in micro seconds) of an ultrasonic pulse passing through the concrete to be tested. Two transducers are used, one to transmit the pulse and the other to receive the pulse. The distance which the pulses travel in the concrete (i.e. the path length) is also measured. The pulse velocity is determined from the relation.

$$\text{Pulse Velocity} = \frac{\text{Path length}}{\text{Transit time}}$$

Depending upon the arrangement of transducers, the Pulse Velocity tests may be Direct, Semi Direct or Indirect. Direct transmission, i.e. placing the transducers on opposite faces is the most accurate method. However, in many situations two opposite faces of the structural member may not be accessible for measurements, in such cases; the receiving transducer is also placed on the same face of the concrete members. Indirect transmission method is used in the present investigation. Accuracy of transit time measurement is dependent on good acoustic coupling between the transducer face and the prepared concrete surface. The test surface is prepared by rubbing the concrete surfaces with Steel brush and cleaned subsequently. Light grease is applied as couplant.

The natural frequency of transducers should preferable be within the range of 20 to 150 KHz. Transducers with a frequency of 50 to 60KHz are useful for most all-round application. Generally lower frequencies allow more depth of penetration. Higher frequencies allow better resolution in the measurements.

The Pulse Velocity method of testing may be applied to the testing of plain, reinforced and pre-stressed concrete whether it is precast or cast-in-situ. The measurement of Pulse Velocity may be used to determine;

- a) The homogeneity of the concrete.
- b) The presence of voids, cracks or other imperfections.
- c) Changes in the structure of the concrete which may occur with time
- d) The quality of the concrete in relation to the standard requirements
- e) The Quality of one element of concrete in relation to another.



Table 1 of IS 516 (PART 5/SEC 1) : 2018 (followed by Amendment No. 1 Nov. 2019) gives Velocity Criteria for Concrete Quality Grading (Clause 2.5.2).

<u>Pulse Velocity (Km/Sec)</u>	<u>General Conditions</u>
i) For Concrete (≤ 25):	
Above 4.50	Excellent
3.50 - 4.50	Good
Below 3.50	Doubtful
ii) For Concrete (> 25):	
Above 4.50	Excellent
3.75 - 4.50	Good
Below 3.75	Doubtful

As per IS 516 (Part 5/Sec 1) : 2018, Clause **2.4.3.2.5** : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s.

The above may be taken as guidelines for assessing the condition of the structure. Any weakness in the form of cracks, voids, weak concrete will result in lower pulse velocities

Details of the Instruments –

PUNDIT LAB Ultrasonic Instrument (Serial No. S/N PLO1-000-0000), made in Switzerland, the technical specification is given below ([www. Proceq.com](http://www.Proceq.com)).

Transit Time Measurement	
Range	0.1-9999 μ s Auto ranging
Resolution	0.1 μ s
Display	79X21 mm passive matrix OLED
Transmitter	Optimized energizing pulse 125V,250V,350V,500V, AUTO
Receiver	
Selectable gain steps Pundit Lab	1X , 10X,100X,AOTO
Bandwidth	20 kHz-500kHz
Memory	Non volatile,. 500measured values
Regional setting	Metric and imperial units supported
Power Supply	
Battery	4X AA Batteries(> 20hour continuous use)
Mains	5v,< 500 mA Via USB Charger
PC	5v,< 500 mA directly Via USB Charger
Mechanical	
Dimensions	172X 55X 220mm
Weight	1.3 kg(Including Batteries)
Environmental Conditions	
Operating temperature	-10 ^o to 60 ^o C(0 ^o TO 140 ^o F)
Humidity	< 95% RH, non condensing
Calibration	Standard calibration sample is available along with the instrument



B. Schmidt Hammer Test Method as per IS 516 (Part 5/Sec 4) : 2020

The Rebound Hammer Instrument is a mechanical device used for performing rapid, non-destructive quality testing on materials according to the customer's specifications. In most cases, however, the material involved is concrete. The device is to be used exclusively on the surfaces of the concrete and with the help of this instrument we can determine the grade of concrete.

B.1.1 Objective: The rebound Hammer Method could be used for

- i.) Assessing the likely compressive strength of concrete with the help of suitable co-relations between rebound Index and compressive strength.
- ii.) Assessing the uniformity of concrete
- iii.) Assessing the quality of the concrete in relation to standard requirements.
- iv.) Assessing the quality of one element of concrete in relation to another.

In this case Proceq Make has been used.

B.1.2 Measuring Procedure as per the Guide line of IS 516 (Part 5/Sec 4) : 2020 :

As a common practice a few test impacts are performed with the concrete test hammer on a smooth, hard surface before taking any measurements and also grindstones are used to smoothen the test surface. When the plunger of rebound hammer is pressed against the surface of the concrete, the spring controlled mass rebounds and the extent of such rebound depends upon the surface hardness of concrete. The surface hardness and therefore the rebound is taken to be related to the compressive strength of the concrete. Then concrete test hammer is positioned perpendicular to the test surface. Thereafter, the impact plunger is deployed by pushing the concrete test hammer towards the test surface until the pushbutton springs out. Each test surface should be tested with at least 5 to 10 impacts. The individual impact points must be spaced at least 20mm apart. Then the average of the 5-10 rebound values 'R' which have been measured is taken. In general practice, the average value of 'R' is first determined from each set of the test readings and then the values which are beyond ± 5 than the average value are ignored. Again, the average value of 'R' is determined from the remaining values of each set of readings. Thereafter, the average value of the total sets of the readings is taken. The value of 'R' so obtained is now used to find the corresponding value of compressive strength from the standard curve of the manufacturer's manual.



C. Measurement of Electrical Resistivity of Concrete as per AASTHO TP 95

The electrical resistance of concrete plays an important role in determining the quality of concrete from the point of view 'corrosion susceptibility potential' at any specific location. This parameter is expressed in terms of "Resistivity" in ohm-cm. For general monitoring, a resistivity check is important because long-term corrosion can be anticipated in concrete structures where accurately measured values are below 10,000 ohm-cm. Further, if resistivity values fall below 5,000 ohm-cm, corrosion must be anticipated at a much earlier period (possibly within 5 years) in the life of a structure. Table 3.14 indicates the general guidelines of resistivity values based on which areas having probable corrosion risk can be identified in concrete structures.

Table-3.14 : Corrosion Risk from Resistivity
(Source: *Indian Concrete Journal*, June 1998)
Resistivity ohm cm. Corrosion Probability

Greater than 20,000	Negligible
10,000 – 20,000	Low
5,000- 10,000	High
Less than 5,000	Very High

D. Carbonation Test as per IS 516 Part-5 Sec-3 2021 :-

This test is carried out to determine the depth of concrete affected due to combined attack of atmospheric carbon dioxide and moisture causing a reduction in level of alkalinity of concrete. A spray of 0.2 % solution of phenolphthalein is used as pH indicator of concrete. The change of colour of concrete to pink indicates that the concrete is in the good health, where no change in colour takes place, it is suggestive of carbonation-affected concrete. The test is conducted by drilling a hole on the concrete surface to different depths upto cover concrete thickness,

removing dust by air blowing, spraying phenolphthalein with physician's injection syringe and needle on such freshly drilled/broken concrete and observing the colour change. The depth of carbonation is estimated based on the change in colour profile. The pH value can also be determined by analysing samples of mortar collected by drilling from the site, dissolving the same in distilled water and thereby titration in laboratory.

E. Chloride Content as per IS 456 2004: -

Chloride content can be determined from broken samples or core samples of concrete. Primarily, the level of chloride near the steel-concrete interface is of prime importance. Chlorides present in concrete are fixed (water insoluble) as well as free (water soluble). Though it is the water soluble chloride ions, which are of importance from corrosion risk point of view, yet total acid soluble (fixed as well as free) chloride contents are determined and compared with the limiting values specified for the concrete to assess the risk of corrosion in concrete. The total acid soluble chlorides expressed by weight of a chloride profile across the cover thickness will be a more useful measurement as this can help to make a rough estimate on chloride diffusion rate. One recent development for field testing of chloride includes the use of chloride ion sensitive electrode. This is samples by drilling and collecting them from different depths (every 5 mm), mixing the sample (of about 1.5 gm weight) with a special chloride extraction liquid, and measuring the electrical

Construction Engineering Department, Jadavpur University Salt-Lake Campus Kolkata-700106



potential of the liquid by chloride –ion selective electrode. With the help of a calibration graph relating electrical potential and chloride content, the chloride content of the samples can be directly determined.

Based on the chemical analysis, corrosion-prone locations can be identified as per the guidelines given Table-3.11

**Table-3.11: Guidelines for identification for corrosion
Prone locations based on Chemical Analysis**

(Source: Indian Concrete Journal, June 1998)

SL No.	Test Results	Interpretations
1.	High pH values greater than 11.5 and very low chloride content	No corrosion
2.	High pH values and high chloride content greater than threshold vaules (0.15 % of weight of cement)	Corrosion prone
3.	Low pH values and high chloride content (greater corrosion prone than threshold values of chloride 0.15% of by weight of cement)	Increased risk of corrosion

Interpretations pH and Chloride in Concrete as ASTM

Chloride Content by Weight of Cement %	Risk of Corrosion Uncarbonated Concrete (pH >10)
<0.2	Negligible
0.2-0.4	Very Low
0.4-0.8	Low or Moderate
0.8-1.5	High
>1.5	Extremely High

Limits of Chloride Content of Concrete

(Table-7 as per IS 456-2000)

SL No.	Type or Use of Concrete	Maximum Total Acid Soluble Chloride Content Expressed as Kg/m ³ of Concrete
1	Concrete containing metal and steam cured at elevated temperature and pre-stressed concrete	0.4
2	Reinforced concrete or plain concrete containing embedded metal	0.6
3	Concrete not containing embedded metal or any material requiring protection from chloride	3.0



F. Measurement of Half Cell Potential as per IS 516 (Part-5/Sec-2) 2021:

Corrosion being an electrical Phenomen, the electrode potential of Steel rebars with reference to a standard electrode under goes changes depending on corrosion activity.

A systematic survey on well –defined grid points gives useful information on the presence or probability of corrosion activity. The same grid points as used for other measurements , namely, rebound hammer and UPV could be used for making the data more meaningful. The common standard electrode used are

- i) Copper-Copper sulphate electrode (CSE)
- ii) Silver-Silver chloride electrode (SSE)
- iii) Mercury-Mercury Chloride electrode (MME)

The measurement consists of giving an electrical connection to the rebar and observing the voltage difference between the bar and a reference electrode in contact with concrete surface. Generally, the voltage potential becomes more and more negative as the corrosion becomes more and more active. However, less negative potential values may also indicate the presence of corrosion activity, if the pH values of concrete are less.

The general guidelines for identifying the probability of corrosion based on half –cell potential values as per IS 516(Part-5/Sec-2)-2021

Table 1 Criteria for Corrosion Condition of Rebar in Concrete for Different Half-Cells
(Clauses 4 and 6.11)

Sl No.	Cu/CuSO ₄ Electrode	Hg/HgCl ₂ Electrode	Ag/AgCl Electrode	Likely Corrosion Condition
(1)	(2)	(3)	(4)	(5)
i)	> - 200 mV or less negative than - 200 mV	> - 126 mV	> - 106 mV	Low (there is a greater than 90 percent probability that no reinforcing steel corrosion is occurring in that area at the time of measurement)
ii)	- 200 mV to - 350 mV	- 126 mV to - 276 mV	- 106 mV to - 256 mV	Corrosion activity of the reinforcing steel in that area is uncertain
iii)	< - 350 mV or more negative than - 350 mV	< - 276 mV	< - 256 mV	High (there is a greater than 90 percent probability that reinforcing steel corrosion is occurring in that area at the time of measurement)
iv)	< - 500 mV	< - 426 mV	< - 406 mV	Severe corrosion

Details of the Instruments –

Profometer corrosion	Technical Specification
Voltage measuring range	-1000 to +1000 mV
Voltage Resolution	1 mV
Impedance	100MQ
Sampling Rate	900HZ
Standard Guideline	ASTM C876, RILEM TC154-EMC, DGZFPB3,SIA 2006, UNI 10174,JGJ/T 152,JSCE E601, CE Certification.



G. Measurement of Concrete Cover as per BS 1881 204:-

The necessity to provide adequate cover thickness to control corrosion needs no emphasis. A cover thickness survey is useful to determine existing cover thickness in a specific location, where damage has been identified and elsewhere, for comparison on the same structure. The cover thickness can be measured non-destructively using commercially known cover meters.

The cover meters are also used to identify the location and diameter of rebar. COVERMASTER and PROFOMETER are the commercially available instruments, which are used to measure the cover thickness and rebar size. Table 3.12 shows how the cover meter readings are to be interpreted for corrosion assessment.

- a) At each end of reinforcing bar, concrete cover not less than 25 mm or less than twice the diameter of the bar should be provided.
- b) For a longitudinal reinforcing bar in a column, concrete cover not less than 40 mm not less than the diameter of such bar should be provided. In case of columns of minimum dimension of 20 cm or under, whose reinforcing bars do not exceed 12 mm, concrete cover of 25 mm to be used for reinforcement.
- c) For longitudinal reinforcing bars in a beam, not less than 30 mm or less than the diameter of the bar.
- d) For tensile, compressive shear or other reinforcements in a slab or wall not less than 15 mm, not less than the diameter of such bar.
- e) For any other reinforcement not less than 15 mm, concrete cover not less than the diameter of such bar.
- f) For footings and other principal structural members in which the concrete is deposited directly against the ground, cover to the bottom reinforcement shall be 75 mm. If concrete is poured on a layer of lean concrete, the bottom cover may be reduced to 50 mm.
- g) For concrete surfaces exposed to the weather or the ground after removal of forms, such as retaining walls, grade beams, footing sides and top etc. cover should not be less than 50 mm.
- h) Increased cover thickness shall be provided as indicated on the drawings, for surfaces exposed to the action of harmful chemicals (or exposed to earth contaminated by such chemicals), acid, alkali, saline atmosphere, sulphur, smoke etc.



- i) For liquid retaining structures, the minimum cover to all steel shall be 40mm or the diameter of the main bar, whichever is greater. In the presence of sea water and oils and waters of a corrosive character the covers, shall be increased by 10 mm.
- j) Protection to reinforcement in case of concrete exposed to harmful surroundings may also be given by providing a dense impermeable concrete with approved protective coatings. In such a case the extra cover mentioned in (b) & (i) above may be reduced.
- k) The correct cover shall be maintained by cement mortar cubes (blocks) or other approved means. Reinforcements for footings, grade beams and slabs on a sub-grade shall be supported on precast concrete blocks as approved by EIC. The use of pebbles or stones shall not be permitted.
- l) The minimum clear distance between reinforcing bars shall be in accordance with IS:456 – 2000 or as shown in drawing.

Profometer 6 Cover meter	Technical Specification
Cover measuring range	Up to 185 mm
Cover measuring accuracy	± 1 to 4 mm (0.04 to 16 inch)
Measuring Resolution	Depending on diameter and cover
Path measuring accuracy on smooth surface	± 3 mm (0.12 inch) + 0.5% to 1.0% of measured length
Diameter measuring range	Cover up to 63 mm , diameter up to 40 mm
Diameter measuring accuracy	± 1 mm on single rebar.
Standard Guideline	BS 1881-204, DIN 1045, DGZIP B2 SN 505262 SS 78-B4 DBV Guidelines CE certification.



I. Ultrasonic Thickness, Ultrasonic Pulse Velocity, Ultrasonic Flaw Detection Test as per relevant IS & EN Code : -

In ultrasonic thickness gauges, the thickness of a sample is evaluated using ultrasonic pulse echo method as a product of ultrasonic velocity in the sample and the time of travel of the ultrasonic waves. The gauge evaluates the time of flight basically and then multiplies it with some value of velocity. A timer or flip-flop circuit measures the time interval between the pulse that triggers the circuit on and the pulse that puts the circuit off.

The ultrasonic wave propagation in materials is a complex phenomenon. This depends upon the frequency, probe characteristics and the acoustic properties and thickness of the material of the sample. Since the exact beam characteristics in the sample are not known, it forces some errors to enter in. The inherent errors of ultrasonic gauges can be appreciably reduced by some adjustments both in the instrument as well as during calibration. The instrument is provided with automatic amplitude control that makes the heights of echoes equal even if these are coming from different thicknesses. This electronic correction is specially necessary in thick samples. The thin samples do not require this correction but pose the problem of non-linearity in the Vee path if twin probe is being used.

A twin probe shall be used in thickness measurement between 1.5 mm and 20 mm. These probes pose a problem due to their different Vee path in thinner samples resulting into large non-linearity below 3 mm of steel. This requires the linearity correction, if twin probes are used for thin sections.

Single probes have large dead zone or poor near surface resolution due to the continuous ringing of crystal and the finite saturation time of receiver. Such probes shall be used for measurement of samples with thickness above 20 mm. For samples with thickness below 1.5 mm, single probe with delay lines shall be used. These probes shall be highly damped and will have nominal frequency of 10 MHz or more.

The diameter of the probe chosen depends upon several factors. It would be better to have as small diameter as possible, say 10 mm, allow proper contact on curved surface. This will also result in smaller beam diameter which gives finer resolution in the measurement of variation in thickness. However, small diameter probes suffer from larger beam diffraction giving some times spurflus echoes from lateral wall after the first back wall echo. If the lateral dimensions are not large enough, either high frequency has to be used or higher diameter has to be used.



The couplant that allows the transfer of energy from transducer to sample and back can affect the measurement of thickness. The variation in thickness of couplant while scanning the sample and also the difference between couplant thickness on, reference block and test sample shall be kept minimum. The use of delay line made of a material having small acoustic impedance, such as perspex, is recommended for thin sections.

Two reference blocks, one near the maximum range of interest and the other near the minimum of this range shall be taken. These blocks may be made of hard, non-corrosive material if thickness to be measured is between 3 mm and 20 mm. Below 3 mm, blocks made of material acoustically identical to test sample have to be taken if twin probe is used. Above 20 mm, blocks made of material with nearly same attenuation as test sample are to be used.

ELCOMETER:-

19 TECHNICAL SPECIFICATION

Model		MTG6	MTG8
Thickness Range ^b	Pulsed Echo	0.63 - 500mm (0.025 - 19.999")	
	Echo-Echo ThruPaint™	2.54 - 20mm (0.100 - 0.787")	
Accuracy	Pulsed Echo	0.63 - 9.99mm: ±0.05mm; 10 - 500mm: ±0.5% (0.025 - 0.393": ±0.004"; 0.394 - 20": ±0.5%)	
	Echo-Echo ThruPaint™	2.54 - 9.99mm: ±0.05mm; 10 - 20mm: ±0.5% (0.100 - 0.393": ±0.004"; 0.394 - 0.787": ±0.5%)	
Velocity Range		1250 - 10,000m/s (0.0492 - 0.3937in/μs)	
Resolution		0.1mm (0.01") or 0.01mm (0.001") switchable	
Measurement Rate		4 Hz (4 readings per second) 8 Hz (8 readings per second) 16 Hz (16 readings per second)	
Gauge Memory		Single batch of up to 1,500 readings	100,000 readings in up to 1,000 batches
Operating Temperature		-10 to 50°C (14 to 122°F)	
Power Supply		2 x AA batteries	
Battery Life ^b		Alkaline: Approximately 15 hours Lithium: Approximately 28 hours	
Gauge Weight		210g (7.4oz) including batteries, without transducer	
Gauge Dimensions		145 x 73 x 37mm (5.7 x 2.87 x 1.46") without transducer	
Can be used in accordance with: ASTM E 797, EN 14127, EN 15317			



Atmospheric-corrosivity categories and examples of typical environments as per EN ISO 12944-2 1998 Table 1

Corrosivity category	Mass loss per unit surface/thickness loss (after first year of exposure)				Examples of typical environments in a temperate climate (informative only)	
	Low-carbon steel		Zinc		Exterior	Interior
	Mass loss g/m ²	Thickness loss µm	Mass loss g/m ²	Thickness loss µm		
C1 very low	≤ 10	≤ 1,3	≤ 0,7	≤ 0,1	—	Heated buildings with clean atmospheres, e.g. offices, shops, schools, hotels.
C2 low	> 10 to 200	> 1,3 to 25	> 0,7 to 5	> 0,1 to 0,7	Atmospheres with low level of pollution. Mostly rural areas.	Unheated buildings where condensation may occur, e.g. depots, sports halls.
C3 medium	> 200 to 400	> 25 to 50	> 5 to 15	> 0,7 to 2,1	Urban and industrial atmospheres, moderate sulfur dioxide pollution. Coastal areas with low salinity.	Production rooms with high humidity and some air pollution, e.g. food-processing plants, laundries, breweries, dairies.
C4 high	> 400 to 650	> 50 to 80	> 15 to 30	> 2,1 to 4,2	Industrial areas and coastal areas with moderate salinity.	Chemical plants, swimming pools, coastal ship- and boatyards.
C5-I very high (industrial)	> 650 to 1 500	> 80 to 200	> 30 to 60	> 4,2 to 8,4	Industrial areas with high humidity and aggressive atmosphere.	Buildings or areas with almost permanent condensation and with high pollution.
C5-M very high (marina)	> 650 to 1 500	> 80 to 200	> 30 to 60	> 4,2 to 8,4	Coastal and offshore areas with high salinity.	Buildings or areas with almost permanent condensation and with high pollution.

NOTES

1 The loss values used for the corrosivity categories are identical to those given in ISO 9223.

2 In coastal areas in hot, humid zones, the mass or thickness losses can exceed the limits of category C5-M. Special precautions must therefore be taken when selecting protective paint systems for structures in such areas.



J. Petrography of concrete as per ASTM C856:-

A microstructural examination by optical and scanning electron microscopy (SEM) of the paste and aggregate on a prepared sample of concrete to look for features such as degree of cement hydration, micro cracking, reaction products, breakdown of aggregate and evidence of poor freeze-thaw performance. A mineralogical assessment of the aggregate is also performed to determine if appropriate aggregate was used and if it caused any deleterious reactions.



Scanning Electron Microscope



K. Vibration Test of Foundation and Machine

Test Method as per ISO 10816

The Vibration Meter (FLUKE 805FC) is a Digital device (make by Fluke) used for performing Bearing health and Vibration Severity as per ISO 10816. Now a days the Vibration Meter became highly demandable because it is provide data with highly accuracy.

1.1 Uses :

The Vibration Meter could be used for

- i.) Assessing the Vibration Severity.
- ii.) Assessing the Acceleration.
- iii.) Assessing the Displacement.
- iv.) Assessing the Velocity.
- v.) Assessing the Crest Factor+
- vi.) Assessing the Temperature.

1.2 Accessories:

Description	PN
Belt Holster	4106625
Storage / Shipping Case	4094432
Battery Door	4059351
USB Cable	356901

1.3 Specification:

Sensor

Sensitivity (typical) 100 mV / g \pm 10 %
 Measurement Range 0.01 g to 50 g
 Frequency Range 10 Hz to 1,000 Hz
 and 4,000 Hz to 20,000 Hz
 Resolution 0.01 g
 Accuracy (typical)..... At 100 Hz: \pm 5 % of measured value
 Amplitude Units
 Acceleration g, m/sec²
 Velocity in/sec, mm/sec
 Displacement mils, μ m
 Temperature Measurement
 Range -20 °C to 200 °C (-4 °F to 392 °F)

1.4 Application:

The Meter measures Bearing health and the Overall Vibration condition of a machine. Three types of measurements are available which is Bearing vibration, Overall Vibration, and Temperature. All the measurement units is provide as per requirement.

In most applications the default RPM setting of >600 RPM is correct. Sometimes it must change this range for low frequency applications where the shaft rotation is <600 RPM. A severity scale does not show on the display when the setting is <600 RPM.

Construction Engineering Department, Jadavpur University Salt-Lake Campus Kolkata-700106



The machine shows Crest Factor. Crest Factor is the ratio of the peak value / RMS value of a time domain vibration signal. Vibration analysts use this ratio to find bearing faults. However, the Crest Factor method has a key limitation. The Crest Factor increases during initial bearing degradation when the peak value increases. It then decreases as the bearing damage worsens and the RMS value increases. A low Crest Factor value could show a healthy bearing or a significantly degraded bearing.

1.5 Test Result :

To get the Vibration Severity Result should be follow the ISO 10816.

From, Table 7 of ISO 10816-1 :

Table 7. Vibration Severity - ISO 10816-1

Vibration Velocity Vrms	Machine		Class I Small Machines	Class II Medium Machines	Class III Large Rigid Foundation	Class IV Large Soft Foundation
	in/s	mm/s				
0.01	0.28					
0.02	0.45					
0.03	0.71			GOOD		
0.04	1.12					
0.07	1.80					
0.11	2.80			SATISFACTORY		
0.18	4.50					
0.28	7.10			UNSATISFACTORY		
0.44	11.20					
0.70	18.00					
1.10	28.00			UNACCEPTABLE		
1.77	45.9					

From, Table 3.5 of ACI 351.3R :

**Table 3.5—Short-term permissible values
(DIN 4150-3)**

Type of building	Foundation (1 to 10 Hz)	Foundation (10 to 50 Hz)	Foundation (50 to 100 Hz)	Top complete floor (all frequencies)
Industrial and commercial	0.8 in./s (20 mm/s)	0.8 to 1.6 in./s (20 to 40 mm/s)	1.6 to 2.0 in./s (40 to 50 mm/s)	1.6 in./s (40 mm/s)
Residential	0.2 in./s (5 mm/s)	0.2 to 0.6 in./s (5 to 15 mm/s)	0.6 to 0.8 in./s (15 to 20 mm/s)	0.6 in./s (15 mm/s)
Special or sensitive	0.1 in./s (3 mm/s)	0.1 to 0.3 in./s (3 to mm/s)	0.3 to 0.4 in./s (8 to 10 mm/s)	0.3 in./s (8 mm/s)



K. Vibration meter as per ISO-

1.MAIN CONTROL ROOM BUILDING

Performed test: -



Visual Inspection: -

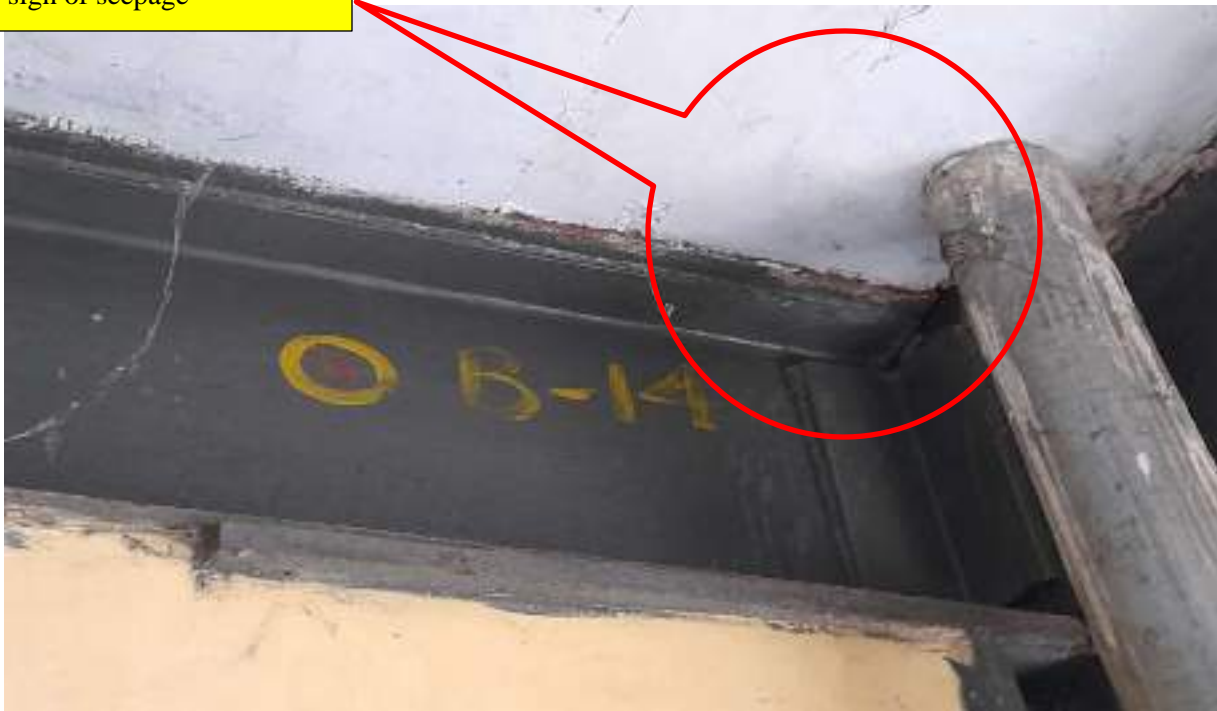
1. Most of Steel ISMB Members are in good condition no sign of Flaw (Sagging, Corrosion, Paint Delamination) somehow the ISMB members near window area and Toilet slab area ISMB members are delaminated and corroded due to environmental hazards(rain, heat, dust, UV rays)
2. The structural members beside the broken windows are damaging due to environmental hazards (Rain, Dust, Heat, UV Rays)
3. Toilet floor Slab areas damping/leaking.
4. Roof areas are covered with Tar felt. For long term sustainability of the roof the area should be repair with advance roof treatment techniques (Epoxy, PU, APP, HDPE etc.)
5. Drainage metal pipe should be replaced with CPVC or UPVC pipes better sustainability of the structural components.



Bottom area of the ISMB Members are corroded due rain water



Toilet area slabs have clear sign of seepage



Drainage metal pipe should be replaced with PVC alternatives



slabs have clear sign of
damping/leaking



slabs have clear sign of
damping/leaking



TEST RESULTS



1.The Ultrasonic Thickness Precision Gauge Tests Results: -

Name of the Building: - Main Control Room Building											
Location: GL Entrance Near Staircase											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-1	Web/Flange	19.31	19.24	19.38	19.56	19.47	19.59	10.80	C2 Low
2		C-2	Web/Flange	9.93	10.20	9.64	9.20	10.36	9.84	11.23	C2 Low
3		C-3	Web/Flange	10.10	9.80	1.10	10.64	8.99	8.83	9.56	C2 Low
4		C-4	Web/Flange	20.02	20.38	20.16	20.08	20.17	20.56	2.65	C1 Very Low
5	Beam	B-1	Web/Flange	28.56	28.11	29.96	27.76	30.42	27.48	8.53	C2 Low
6		B-2	Web/Flange	7.95	7.96	7.77	20.06	8.00	7.98	7.56	C2 Low
7		B-3	Web/Flange	6.02	5.89	12.29	12.35	12.46	12.54	12.56	C2 Low

Name of the Building :- Main Control Room Building											
Location : 1st Floor at 4.5 m Level											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-1	Web/Flange	15.98	16.01	15.96	16.22	15.93	15.92	5.29	C2 Low
2		C-2	Web/Flange	15.91	16.13	16.12	16.12	15.92	15.98	6.32	C2 Low
3		C-3	Web/Flange	15.98	16.08	16.03	15.88	16.00	16.10	10.26	C2 Low
4		C-4	Web/Flange	16.33	16.31	16.45	16.16	15.82	16.00	3.26	C2 Low
5		C-5	Web/Flange	16.03	15.83	15.94	15.88	16.22	16.02	6.38	C2 Low
6		C-6	Web/Flange	16.03	16.13	16.98	16.67	16.05	16.10	4.26	C2 Low
7		C-7	Web/Flange	16.20	15.91	16.05	16.02	16.98	15.99	5.03	C2 Low
8		C-8	Web/Flange	15.62	15.82	16.01	15.87	16.70	15.85	3.26	C2 Low



9	C-9	Web/Flange	15.92	15.95	15.82	15.87	15.85	15.79	4.26	C2 Low
10	C-10	Web/Flange	16.97	16.04	15.84	16.90	15.89	15.72	1.35	C1 Very Low
11	C-11	Web/Flange	15.98	15.92	15.62	15.94	15.94	15.62	2.69	C1 Very Low
12	C-12	Web/Flange	16.54	16.24	16.99	15.23	16.16	17.04	2.87	C1 Very Low
13	C-13	Web/Flange	17.05	16.22	16.22	16.59	16.23	16.22	3.65	C2 Low
14	C-14	Web/Flange	16.25	16.44	17.22	16.52	16.22	17.24	4.29	C2 Low
15	C-15	Web/Flange	17.25	16.42	17.24	16.29	15.21	16.24	5.64	C2 Low
16	C-16	Web/Flange	16.25	16.02	17.52	16.24	16.20	15.24	3.59	C2 Low
17	C-17	Web/Flange	17.25	16.32	16.22	16.33	16.10	16.05	4.59	C2 Low
18	C-18	Web/Flange	16.22	15.05	13.22	14.22	16.09	16.03	7.89	C2 Low
19	C-19	Web/Flange	17.22	16.22	14.55	16.22	15.22	16.22	10.36	C2 Low
20	C-20	Web/Flange	16.55	16.44	16.02	17.05	16.59	16.02	2.36	C1 Very Low
21	C-21	Web/Flange	20.36	20.39	20.33	20.47	20.38	20.41	1.69	C1 Very Low
22	C-22	Web/Flange	21.63	20.94	20.98	21.12	21.43	20.95	2.65	C1 Very Low
23	C-23	Web/Flange	12.61	12.70	12.67	12.52	12.56	12.65	6.59	C2 Low
24	C-24	Web/Flange	12.62	12.65	12.75	12.65	12.59	12.22	5.26	C2 Low
25	C-25	Web/Flange	12.11	11.28	12.03	12.02	11.97	11.98	6.48	C2 Low
26	C-26	Web/Flange	12.87	12.82	12.82	12.62	12.64	12.48	2.56	C1 Very Low
27	C-27	Web/Flange	16.30	16.29	16.27	16.28	16.24	15.25	1.65	C1 Very Low
28	C-28	Web/Flange	16.14	16.19	15.99	16.10	16.95	16.20	3.59	C2 Low
29	C-29	Web/Flange	20.63	20.65	20.75	20.60	20.95	20.91	4.51	C2 Low
30	C-30	Web/Flange	16.50	16.14	16.03	16.04	15.99	16.21	3.89	C2 Low
31	C-31	Web/Flange	15.95	16.24	17.03	16.02	16.04	16.54	4.85	C2 Low
32	C-32	Web/Flange	15.25	15.65	16.20	16.40	15.45	16.22	7.81	C2 Low
33	C-33	Web/Flange	16.94	16.92	16.91	16.90	16.89	16.86	2.35	C1 Very Low
34	C-34	Web/Flange	16.54	16.57	16.46	16.52	16.49	17.03	1.69	C1 Very Low



35		C-35	Web/Flange	16.93	16.95	17.06	16.73	16.90	16.54	1.84	C1 Very Low
36		C-36	Web/Flange	17.21	17.06	16.25	17.24	17.04	16.91	1.67	C1 Very Low
37		C-37	Web/Flange	16.71	16.61	16.79	16.63	16.65	16.61	2.89	C1 Very Low
38		C-38	Web/Flange	20.58	20.57	20.56	20.60	20.45	20.41	1.65	C1 Very Low
39		C-39	Web/Flange	16.20	15.32	16.42	16.00	16.25	16.29	3.87	C2 Low
40		C-40	Web/Flange	16.45	16.42	16.52	16.44	16.23	16.22	4.85	C2 Low
41		C-41	Web/Flange	16.42	16.40	16.59	16.43	16.24	16.40	3.56	C2 Low
42		C-42	Web/Flange	16.89	16.44	16.52	16.42	16.69	16.84	1.94	C1 Very Low

Name of the Building :- Main Control Room Building											
Location : 1st Floor at 4.5 m Level											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Beam	B-1	Web/Flange	11.95	11.92	12.06	12.11	11.89	12.65	16.59	C2 Low
2		B-2	Web/Flange	12.22	12.20	12.19	11.95	12.27	12.29	14.47	C2 Low
3		B-3	Web/Flange	12.24	12.25	12.36	12.33	12.29	12.16	12.38	C2 Low
4		B-4	Web/Flange	12.72	13.68	12.93	12.70	12.69	12.73	8.56	C2 Low
5		B-5	Web/Flange	12.60	12.67	12.65	12.57	12.50	12.63	16.59	C2 Low
6		B-6	Web/Flange	11.98	11.86	11.92	11.92	11.63	11.65	15.48	C2 Low
7		B-7	Web/Flange	12.43	12.50	12.39	12.48	12.61	12.76	17.54	C2 Low
8		B-8	Web/Flange	12.45	12.46	12.52	12.45	12.42	12.77	18.32	C2 Low
9		B-9	Web/Flange	12.61	12.55	12.42	12.60	12.43	12.44	15.23	C2 Low
10		B-10	Web/Flange	12.14	12.01	12.05	12.03	12.04	12.14	16.22	C2 Low
11		B-11	Web/Flange	12.50	12.41	12.42	12.49	12.40	12.25	5.32	C2 Low
12		B-12	Web/Flange	12.39	12.27	12.16	12.44	12.42	12.41	6.25	C2 Low



13	B-13	Web/Flange	12.14	12.20	12.38	12.25	12.27	12.30	14.78	C2 Low
14	B-14	Web/Flange	12.02	12.18	12.98	12.02	12.05	12.09	16.59	C2 Low
15	B-15	Web/Flange	12.48	12.35	12.43	12.41	12.43	12.44	15.68	C2 Low
16	B-16	Web/Flange	7.25	8.26	7.29	7.34	7.21	8.05	25.48	C3 Medium
17	B-17	Web/Flange	8.07	8.10	8.14	8.06	8.12	8.07	26.32	C3 Medium
18	B-18	Web/Flange	12.16	12.13	12.14	12.40	12.25	12.27	12.64	C2 Low
19	B-19	Web/Flange	12.11	12.08	12.12	12.16	12.15	12.28	13.48	C2 Low
20	B-20	Web/Flange	12.21	12.14	12.22	12.16	12.15	12.28	16.59	C2 Low
21	B-21	Web/Flange	12.71	12.73	12.70	12.68	12.67	12.66	14.32	C2 Low
22	B-22	Web/Flange	12.21	12.16	12.28	12.31	12.24	12.95	8.56	C2 Low
23	B-23	Web/Flange	12.75	12.05	12.32	12.44	12.54	12.90	7.84	C2 Low
24	B-24	Web/Flange	12.76	12.16	12.42	12.59	12.53	12.39	11.35	C2 Low
25	B-25	Web/Flange	13.05	12.02	12.53	12.42	12.61	12.63	12.68	C2 Low
26	B-26	Web/Flange	12.95	12.53	12.54	12.52	12.63	12.62	16.89	C2 Low
27	B-27	Web/Flange	12.66	12.62	12.59	12.56	12.34	12.61	17.54	C2 Low
28	B-28	Web/Flange	12.62	12.42	12.53	12.53	12.51	12.63	16.59	C2 Low
29	B-29	Web/Flange	12.52	12.63	12.53	13.19	12.22	12.53	17.54	C2 Low
30	B-30	Web/Flange	12.02	12.63	12.16	12.62	13.26	13.26	16.51	C2 Low
31	B-31	Web/Flange	13.62	13.02	12.49	12.22	12.52	12.53	12.35	C2 Low
32	B-32	Web/Flange	12.42	12.54	12.53	12.54	12.42	12.62	11.48	C2 Low
33	B-33	Web/Flange	12.63	12.64	12.67	12.65	12.65	12.63	16.54	C2 Low
34	B-34	Web/Flange	12.64	12.65	12.63	12.60	12.63	12.61	17.54	C2 Low
35	B-35	Web/Flange	12.53	12.74	12.50	12.52	12.57	12.64	16.59	C2 Low
36	B-36	Web/Flange	12.52	12.89	12.55	12.68	12.92	12.66	17.54	C2 Low
37	B-37	Web/Flange	12.28	12.80	12.72	12.28	12.72	12.86	16.53	C2 Low



Name of the Building :- Main Control Room Building											
Location : Ground Floor											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-1	Web/Flange	19.78	19.65	19.23	19.48	19.55	19.65	2.65	C1 Very Low
2		C-2	Web/Flange	25.16	25.12	25.13	25.18	25.10	25.07	2.64	C1 Very Low
3		C-3	Web/Flange	20.77	20.19	20.15	20.16	20.48	20.14	2.15	C1 Very Low
4		C-4	Web/Flange	20.15	20.19	20.22	20.15	20.14	20.16	3.56	C2 Low
5		C-5	Web/Flange	20.70	20.77	20.72	20.35	20.73	20.79	2.15	C1 Very Low
6		C-6	Web/Flange	20.35	20.30	20.38	20.32	20.33	20.24	4.21	C2 Low
7		C-7	Web/Flange	20.90	20.89	20.74	20.76	20.79	20.85	3.15	C2 Low
8		C-8	Web/Flange	20.24	20.20	20.23	20.28	20.28	20.29	2.36	C1 Very Low
9		C-9	Web/Flange	20.30	20.22	20.24	20.29	20.20	20.21	3.19	C2 Low
10		C-10	Web/Flange	20.12	20.09	20.17	20.15	20.19	20.16	2.33	C1 Very Low
11		C-11	Web/Flange	20.16	20.05	20.22	20.19	20.20	20.23	2.16	C1 Very Low
12		C-12	Web/Flange	20.34	20.37	20.30	20.32	20.37	20.34	3.59	C2 Low
13		C-13	Web/Flange	20.40	20.38	20.42	20.39	20.37	20.34	4.57	C2 Low
14		C-14	Web/Flange	20.23	20.22	20.34	20.30	20.18	20.19	3.16	C2 Low
15		C-15	Web/Flange	20.20	20.24	20.48	20.35	20.36	20.34	3.59	C2 Low
16		C-16	Web/Flange	20.35	20.39	20.42	20.38	20.45	20.60	3.16	C2 Low
17		C-17	Web/Flange	20.70	20.66	20.74	20.69	20.59	20.50	3.48	C2 Low
18		C-18	Web/Flange	20.82	20.78	20.79	20.86	20.90	20.87	3.58	C2 Low



19		C-19	Web/Flange	20.72	20.76	20.71	20.75	20.70	20.78	3.69	C2 Low
20		C-20	Web/Flange	20.12	20.18	20.30	20.16	20.20	20.28	3.16	C2 Low
21		C-21	Web/Flange	20.52	20.64	20.56	20.59	20.64	20.72	3.12	C2 Low
22		C-22	Web/Flange	20.64	20.67	20.72	20.65	20.40	20.79	2.15	C1 Very Low
23		C-23	Web/Flange	20.20	20.30	20.23	20.34	20.22	20.35	3.29	C2 Low
24		C-24	Web/Flange	20.90	20.79	20.93	20.96	20.92	20.90	3.18	C2 Low
25		C-25	Web/Flange	20.38	20.34	20.32	20.37	20.32	20.31	3.48	C2 Low
Location : AC Plant											
26	Column	C-26	Web/Flange	30.24	30.25	30.38	30.29	30.34	30.38	3.56	C2 Low
27		C-27	Web/Flange	12.16	12.19	12.20	12.18	12.25	12.08	4.26	C2 Low
28		C-28	Web/Flange	16.32	16.30	16.28	16.34	16.28	16.32	3.12	C2 Low
29		C-29	Web/Flange	20.62	16.25	16.45	16.32	16.40	16.36	2.61	C1 Very Low
30		C-30	Web/Flange	12.10	12.10	12.12	12.16	12.19	12.09	5.21	C2 Low
31		C-31	Web/Flange	12.28	12.30	12.30	12.30	12.28	12.32	5.48	C2 Low
32		C-32	Web/Flange	8.28	8.21	8.29	8.24	8.22	8.20	3.45	C2 Low
33		C-33	Web/Flange	12.20	12.24	12.36	12.31	12.09	12.25	4.89	C2 Low



2.The Ultrasonic Pulse Velocity Tests Results: -

Name of the Building: - Main Control Room Building						
Location : GL Entrance Near Staircase						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	C-1	Web/Flange	1509	5890	25.62%
2		C-2	Web/Flange	2930		49.75%
3		C-3	Web/Flange	3189		54.14%
4		C-4	Web/Flange	2960		50.25%
5	Beam	B-1	Web/Flange	3663		62.19%
6		B-2	Web/Flange	4160		70.63%
7		B-3	Web/Flange	2960		50.25%

Name of the Building :- Main Control Room Building						
Location : 1st Floor at 4.5 m Level						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	C-1	Web/Flange	5466	5890	93%
2		C-2	Web/Flange	3660		62%
3		C-3	Web/Flange	3663		62%
4		C-4	Web/Flange	3549		60%
5		C-5	Web/Flange	3665		62%
6		C-6	Web/Flange	3674		62%
7		C-7	Web/Flange	3667		62%
8		C-8	Web/Flange	3687		63%
9		C-9	Web/Flange	3669		62%
10		C-10	Web/Flange	4947		84%
11		C-11	Web/Flange	4798		81%
12		C-12	Web/Flange	4806		82%
13		C-13	Web/Flange	5112		87%
14		C-14	Web/Flange	2906		49%
15		C-15	Web/Flange	4912		83%
16		C-16	Web/Flange	2949		50%
17		C-17	Web/Flange	2937		50%
18		C-18	Web/Flange	5038		86%
19		C-19	Web/Flange	3684		63%
20		C-20	Web/Flange	3284		56%
21		C-21	Web/Flange	2897		49%



22	C-22	Web/Flange	2837		48%
23	C-23	Web/Flange	4662	5890	79%
24	C-24	Web/Flange	4670		79%
25	C-25	Web/Flange	4934		84%
26	C-26	Web/Flange	4615		78%
27	C-27	Web/Flange	3669		62%
28	C-28	Web/Flange	3717		63%
29	C-29	Web/Flange	3702		63%
30	C-30	Web/Flange	2866		49%
31	C-31	Web/Flange	3296		56%
32	C-32	Web/Flange	3186		54%
33	C-33	Web/Flange	3494		59%
34	C-34	Web/Flange	3682		63%
35	C-35	Web/Flange	3748		64%
36	C-36	Web/Flange	3015		51%
37	C-37	Web/Flange	3668		62%
38	C-38	Web/Flange	3751		64%
39	C-39	Web/Flange	3742		64%
40	C-40	Web/Flange	3284		56%
41	C-41	Web/Flange	3840		65%
42	C-42	Web/Flange	3528		60%

Name of the Building: - Main Control Room Building						
Location: 1st Floor at 4.5 m Level						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Beam	B-1	Web/Flange	4885	5890	83%
2		B-2	Web/Flange	4869		83%
3		B-3	Web/Flange	4816		82%
4		B-4	Web/Flange	4636		79%
5		B-5	Web/Flange	4685		80%
6		B-6	Web/Flange	3038		52%
7		B-7	Web/Flange	4774		81%
8		B-8	Web/Flange	4775		81%
9		B-9	Web/Flange	4746		81%
10		B-10	Web/Flange	4892		83%
11		B-11	Web/Flange	4777		81%
12		B-12	Web/Flange	4892		83%
13		B-13	Web/Flange	4835		82%
14		B-14	Web/Flange	4860		83%
15		B-15	Web/Flange	4797		81%
16		B-16	Web/Flange	4957		84%
17		B-17	Web/Flange	4732		80%
18		B-18	Web/Flange	4893		83%



19		B-19	Web/Flange	4725		80%
20		B-20	Web/Flange	4527		77%
21		B-21	Web/Flange	4472		76%
22		B-22	Web/Flange	4365		74%
23		B-23	Web/Flange	3897		66%
24		B-24	Web/Flange	3795		64%
25		B-25	Web/Flange	3847		65%
26		B-26	Web/Flange	4126		70%
27		B-27	Web/Flange	3727		63%
28		B-28	Web/Flange	4865		83%
29		B-29	Web/Flange	4124		70%
30		B-30	Web/Flange	4204		71%
31		B-31	Web/Flange	4106		70%
32		B-32	Web/Flange	4126		70%
33		B-33	Web/Flange	4154		71%
34		B-34	Web/Flange	4384		74%
35		B-35	Web/Flange	3584		61%
36		B-36	Web/Flange	3986		68%
37		B-37	Web/Flange	3920		67%

Name of the Building: - Main Control Room Building						
Location: Ground Floor						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	C-1	Web/Flange	3129	5890	53%
2		C-2	Web/Flange	3234		55%
3		C-3	Web/Flange	3984		68%
4		C-4	Web/Flange	3872		66%
5		C-5	Web/Flange	3942		67%
6		C-6	Web/Flange	3692		63%
7		C-7	Web/Flange	3720		63%
8		C-8	Web/Flange	3820		65%
9		C-9	Web/Flange	4120		70%
10		C-10	Web/Flange	4325		73%



11		C-11	Web/Flange	3840		65%
12		C-12	Web/Flange	3820	5890	65%
13		C-13	Web/Flange	4029		68%
14		C-14	Web/Flange	4056		69%
15		C-15	Web/Flange	3925		67%
16		C-16	Web/Flange	3870		66%
17		C-17	Web/Flange	3927		67%
18		C-18	Web/Flange	4206		71%
19		C-19	Web/Flange	4420		75%
20		C-20	Web/Flange	3625		62%
21		C-21	Web/Flange	3920		67%
22		C-22	Web/Flange	3828		65%
23		C-23	Web/Flange	3420		58%
24		C-24	Web/Flange	4278		73%
25		C-25	Web/Flange	4320		73%
Location : Ground Floor AC Plant						
26	Column	C-26	Web/Flange	3825	5890	65%
27		C-27	Web/Flange	3729		63%
28		C-28	Web/Flange	3829		65%
29		C-29	Web/Flange	4206		71%
30		C-30	Web/Flange	4205		71%
31		C-31	Web/Flange	3926		67%
32		C-32	Web/Flange	3809		65%
33		C-33	Web/Flange	4020		68%



2.GAS TURBINE BUILDING



Performed test: -



Schmidt Hammer Test



Ultrasonic pulse velocity Test of concrete





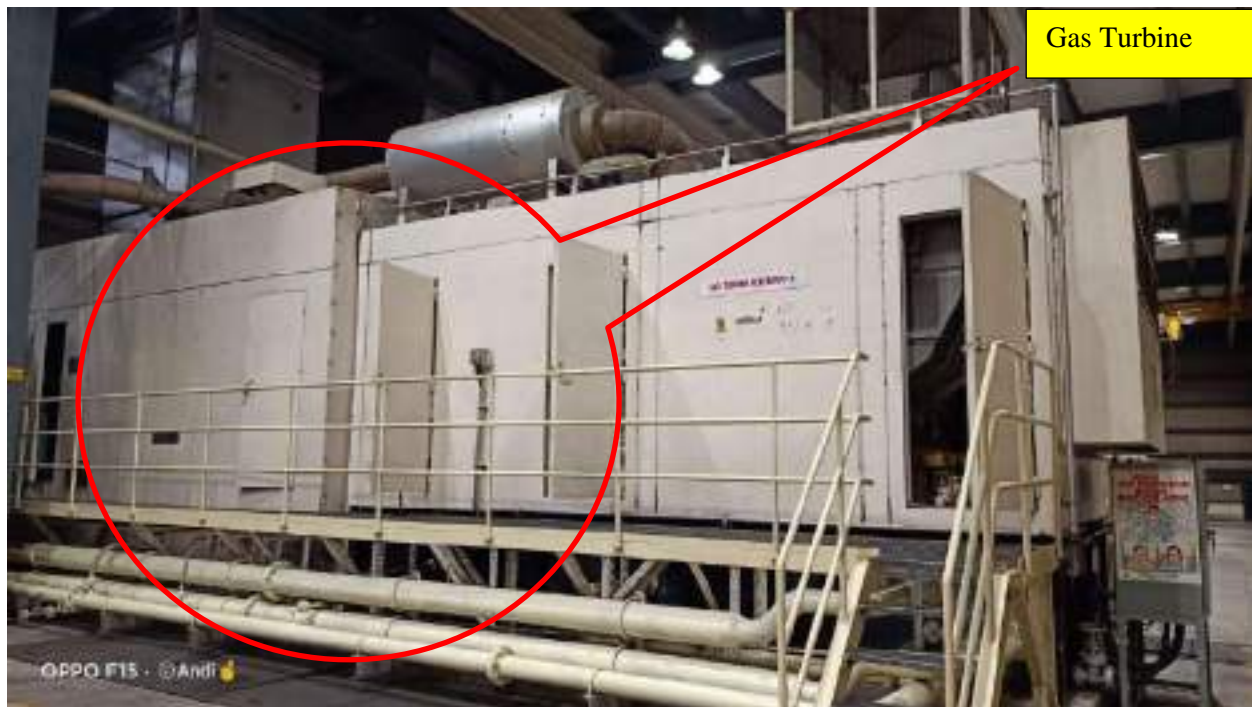
Electrical Resistivity Test

Vibration Test



Visual Inspection: -

1. Most of Steel ISMB Members are in good condition no sign of Flaw (Sagging, Corrosion, Paint Delamination) somehow the ISMB members near window area and battery rooms area ISMB members are delaminated and corroded due to environmental hazards (rain, heat, dust, UV rays)
2. The structural members beside the broken windows are damaging due to environmental hazards (Rain, Dust, Heat, UV Rays)
3. Roof areas are covered with Tar felt. For long term sustainability of the roof the area should be repair with advance roof treatment techniques (Epoxy, PU, APP, HDPE etc.)
4. If drainage pipes are made of metal should be replaced with CPVC or UPVC pipes better sustainability of the structural components.
5. 6 No. of RCC Turbine foundations have no sign of external deterioration or physical damage.







Tarfelt covered roof



TEST RESULTS



1.The Ultrasonic Thickness Precision Gauge Tests Results: -

Name of the Building :- Gas Turbine Building											
Location : Ground Floor											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (µm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-1	Web/Flange	27.93	28.42	28.99	26.99	28.22	27.20	5.68	C2 Low
2		C-2	Web/Flange	12.65	12.37	12.68	12.53	12.92	12.06	2.32	C1 Very Low
3		C-3	Web/Flange	15.56	15.68	15.72	15.69	15.73	15.72	4.59	C2 Low
4		C-4	Web/Flange	24.74	24.85	24.92	24.52	24.42	25.42	5.32	C2 Low
5		C-5	Web/Flange	12.72	12.76	12.74	12.73	12.79	12.78	4.23	C2 Low
6		C-6	Web/Flange	13.20	13.26	13.95	13.69	13.85	13.20	5.32	C2 Low
7		C-7	Web/Flange	25.64	25.69	25.68	25.71	25.65	25.67	2.89	C1 Very Low
8		C-8	Web/Flange	25.69	25.89	25.62	25.20	25.72	25.68	5.48	C2 Low
9		C-9	Web/Flange	28.87	28.97	28.56	28.01	29.00	28.99	3.12	C2 Low
10		C-10	Web/Flange	25.87	25.57	25.20	25.20	25.53	25.49	4.51	C2 Low
11		C-11	Web/Flange	17.89	20.40	20.30	20.30	20.39	20.28	7.56	C2 Low
12		C-12	Web/Flange	16.49	16.43	16.40	16.43	16.42	16.39	2.35	C1 Very Low
13		C-13	Web/Flange	16.89	16.26	16.59	16.62	16.26	16.28	4.58	C2 Low
14		C-14	Web/Flange	16.20	16.11	16.16	16.19	16.20	16.20	6.23	C2 Low
15		C-15	Web/Flange	16.52	16.56	16.49	16.28	16.20	16.20	5.32	C2 Low
16		C-16	Web/Flange	15.98	15.27	15.60	15.52	15.99	15.20	4.52	C2 Low
17		C-17	Web/Flange	15.82	15.79	15.87	15.90	15.83	16.02	6.35	C2 Low
18		C-18	Web/Flange	15.32	15.50	15.67	15.78	15.54	15.52	4.56	C2 Low
19		C-19	Web/Flange	16.42	16.37	16.33	16.32	16.52	16.28	2.35	C1 Very Low
20		C-20	Web/Flange	16.59	16.52	16.56	16.58	16.52	16.54	5.76	C2 Low
21		C-21	Web/Flange	16.54	16.60	16.43	16.32	16.44	16.92	4.23	C2 Low
22		C-22	Web/Flange	16.42	16.38	16.52	16.42	16.32	16.28	3.26	C2 Low
23		C-23	Web/Flange	15.96	15.01	16.01	15.99	16.06	16.02	4.51	C2 Low
24		C-24	Web/Flange	16.20	16.01	16.28	16.27	16.20	16.19	3.56	C2 Low



25	C-25	Web/Flange	16.62	16.82	16.88	16.69	17.92	16.88	2.89	C1 Very Low
26	C-26	Web/Flange	16.25	16.55	16.20	16.56	16.28	16.59	4.57	C2 Low
27	C-27	Web/Flange	16.28	16.39	16.23	16.32	16.38	16.34	6.23	C2 Low
28	C-28	Web/Flange	16.27	16.23	16.33	16.32	16.52	16.58	4.28	C2 Low
29	C-29	Web/Flange	17.20	17.02	17.82	17.86	17.28	16.28	4.18	C2 Low
30	C-30	Web/Flange	17.89	17.82	17.84	17.28	17.85	17.85	5.23	C2 Low
31	C-31	Web/Flange	16.48	16.49	16.54	16.42	16.44	16.32	6.15	C2 Low
32	C-32	Web/Flange	25.50	25.52	25.62	25.33	25.20	25.34	6.48	C2 Low
33	C-33	Web/Flange	22.95	22.52	22.90	22.40	22.52	22.40	5.49	C2 Low
34	C-34	Web/Flange	25.20	25.20	25.38	25.36	25.39	25.42	6.12	C2 Low
35	C-35	Web/Flange	15.68	15.92	15.56	15.52	15.20	15.62	7.23	C2 Low
36	C-36	Web/Flange	25.55	25.58	25.50	25.54	25.49	25.42	6.22	C2 Low
37	C-37	Web/Flange	15.29	15.82	15.56	15.28	15.20	15.20	7.48	C2 Low
38	C-38	Web/Flange	16.27	16.89	16.20	16.52	16.20	16.20	5.41	C2 Low
39	C-39	Web/Flange	16.04	16.52	16.52	16.02	16.89	16.20	5.23	C2 Low
40	C-40	Web/Flange	16.92	16.52	16.20	16.52	16.28	16.52	6.28	C2 Low
41	C-41	Web/Flange	16.37	16.23	16.38	16.36	16.37	16.30	2.65	C1 Very Low
42	C-42	Web/Flange	16.28	16.20	16.20	16.52	16.36	16.42	6.23	C2 Low
43	C-43	Web/Flange	16.45	16.48	16.54	16.52	16.52	16.52	4.52	C2 Low
44	C-44	Web/Flange	16.28	16.28	16.20	16.42	16.52	16.56	6.25	C2 Low
45	C-45	Web/Flange	16.44	16.54	16.52	16.28	16.52	16.42	4.89	C2 Low



46	C-46	Web/Flange	16.22	16.54	16.22	16.65	16.25	16.23	5.23	C2 Low
47	C-47	Web/Flange	16.51	16.50	16.52	16.69	16.52	16.32	6.13	C2 Low
48	C-48	Web/Flange	16.54	16.52	16.55	16.22	16.34	16.34	5.62	C2 Low
49	C-49	Web/Flange	16.50	16.11	16.23	16.24	16.52	16.33	5.32	C2 Low
50	C-50	Web/Flange	16.52	16.22	16.23	16.52	16.52	16.34	4.89	C2 Low
51	C-51	Web/Flange	16.02	15.99	16.22	16.54	16.50	16.22	5.65	C2 Low
52	C-52	Web/Flange	16.24	16.22	16.42	16.55	16.24	16.24	4.87	C2 Low
53	C-53	Web/Flange	16.22	15.95	15.96	16.24	16.16	16.11	5.62	C2 Low
54	C-54	Web/Flange	12.25	12.32	12.35	12.35	12.36	12.22	4.78	C2 Low
55	C-55	Web/Flange	12.54	12.49	12.52	12.11	12.42	12.42	6.12	C2 Low
56	C-56	Web/Flange	16.54	16.52	16.52	16.52	16.50	16.42	5.36	C2 Low
57	C-57	Web/Flange	16.51	16.55	16.22	16.12	16.22	16.19	6.71	C2 Low
58	C-58	Web/Flange	16.48	16.20	16.22	16.12	16.22	16.19	4.23	C2 Low
59	C-59	Web/Flange	16.25	16.48	16.53	16.22	16.32	16.20	5.55	C2 Low
60	C-60	Web/Flange	16.22	16.54	16.53	16.23	16.23	16.23	5.16	C2 Low



Name of the Building: - Gas Turbine Building												
Location: 1st Floor												
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1	
1	Column	C-61	Web/Flange	25.12	25.14	25.18	25.17	25.18	25.28	5.23	C2 Low	
2		C-62	Web/Flange	25.56	25.52	25.41	25.38	25.34	25.34	6.47	C2 Low	
3		C-63	Web/Flange	16.63	16.34	16.20	16.48	16.24	16.48	5.55	C2 Low	
4		C-64	Web/Flange	25.60	25.22	25.48	25.33	25.32	25.27	5.15	C2 Low	
5		C-65	Web/Flange	25.56	25.50	25.51	25.58	25.44	25.50	3.26	C2 Low	
6		C-66	Web/Flange	25.68	25.60	25.63	25.59	25.40	25.20	2.41	C1 Very Low	
7		C-67	Web/Flange	25.80	25.40	25.78	25.40	25.28	25.48	3.22	C2 Low	
8		C-68	Web/Flange	16.29	16.21	16.32	16.34	16.32	16.43	3.48	C2 Low	
9		C-69	Web/Flange	25.30	25.33	25.20	25.37	16.35	16.39	3.64	C2 Low	
10		C-70	Web/Flange	25.80	25.78	25.70	25.72	25.74	25.74	3.48	C2 Low	
11		C-71	Web/Flange	25.60	25.56	25.42	25.65	25.49	25.39	4.56	C2 Low	
12		C-72	Web/Flange	25.87	25.20	25.82	25.24	25.42	25.42	4.14	C2 Low	
13		C-73	Web/Flange	16.22	16.18	16.25	16.33	16.34	16.29	2.65	C1 Very Low	
14		C-74	Web/Flange	25.75	25.75	25.78	25.42	16.34	16.34	2.62	C1 Very Low	
15		C-75	Web/Flange	25.38	25.30	25.34	25.41	25.40	25.40	2.69	C1 Very Low	
16		C-76	Web/Flange	16.20	16.29	16.28	16.18	16.20	16.40	3.51	C2 Low	
17		C-77	Web/Flange	16.37	16.32	16.25	16.34	16.20	16.40	3.69	C2 Low	
18		C-78	Web/Flange	16.23	16.70	16.72	16.66	16.52	16.28	4.23	C2 Low	
19		C-79	Web/Flange	16.18	16.40	16.20	16.32	16.32	16.19	4.89	C2 Low	
20		C-80	Web/Flange	25.32	25.37	25.22	25.40	25.40	25.20	3.78	C2 Low	



21		C-81	Web/Flange	16.32	16.40	16.29	16.18	16.23	16.34	3.22	C2 Low
22		C-82	Web/Flange	25.16	25.18	25.21	25.15	25.20	25.12	4.51	C2 Low
23		C-83	Web/Flange	20.28	20.24	20.27	20.70	20.72	20.89	2.15	C1 Very Low
24		C-84	Web/Flange	16.42	16.40	16.38	16.44	16.20	16.28	3.26	C2 Low
25		C-85	Web/Flange	16.32	16.41	16.40	16.40	16.40	16.20	4.88	C2 Low
26		C-86	Web/Flange	16.20	16.25	16.43	16.18	16.23	16.18	4.89	C2 Low
27		C-87	Web/Flange	16.40	16.42	16.42	16.71	16.20	16.70	5.16	C2 Low
28		C-88	Web/Flange	16.26	16.38	16.42	16.33	16.30	16.32	3.26	C2 Low
29		C-89	Web/Flange	16.28	16.28	16.24	16.32	16.40	16.38	3.48	C2 Low
30		C-90	Web/Flange	16.32	16.34	16.22	16.32	16.42	16.38	3.16	C2 Low

2. The Ultrasonic Pulse Velocity Tests Results: -

Name of the Building: - Gas Turbine Building						
Location: Ground Floor						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (for Low Carbon Steel should not be less than 50 % of the desired industrial velocity)
1	Column	C-1	Web/Flange	4352	5890	74%
2		C-2	Web/Flange	4539		77%
3		C-3	Web/Flange	4865		83%
4		C-4	Web/Flange	2330		40%
5		C-5	Web/Flange	4723		80%
6		C-6	Web/Flange	3270		56%
7		C-7	Web/Flange	3927		67%
8		C-8	Web/Flange	3829		65%
9		C-9	Web/Flange	3728		63%



10		C-10	Web/Flange	2520		43%
11		C-11	Web/Flange	2756		47%
12		C-12	Web/Flange	2727		46%
13		C-13	Web/Flange	2872		49%
14		C-14	Web/Flange	2889		49%
15		C-15	Web/Flange	2779		47%
16		C-16	Web/Flange	3285		56%
17		C-17	Web/Flange	3562		60%
18		C-18	Web/Flange	3729		63%
19		C-19	Web/Flange	3528		60%
20		C-20	Web/Flange	3892		66%
21		C-21	Web/Flange	3628		62%
22		C-22	Web/Flange	3820		65%
23		C-23	Web/Flange	3820		65%
24		C-24	Web/Flange	3520		60%
25		C-25	Web/Flange	3427		58%
26		C-26	Web/Flange	3328		57%
27		C-27	Web/Flange	3290		56%
28		C-28	Web/Flange	3820		65%
29		C-29	Web/Flange	3520		60%
30		C-30	Web/Flange	3892		66%
31		C-31	Web/Flange	3827		65%
32		C-32	Web/Flange	3920		67%
33		C-33	Web/Flange	4320		73%



34		C-34	Web/Flange	3820		65%
35		C-35	Web/Flange	3720		63%
36		C-36	Web/Flange	3620		61%
37		C-37	Web/Flange	3328		57%
38		C-38	Web/Flange	3890		66%
39		C-39	Web/Flange	3820		65%
40		C-40	Web/Flange	3820		65%
41		C-41	Web/Flange	3926		67%
42		C-42	Web/Flange	3662		62%
43		C-43	Web/Flange	3825		65%
44		C-44	Web/Flange	3528		60%
45		C-45	Web/Flange	3865		66%
46		C-46	Web/Flange	2826		48%
47		C-47	Web/Flange	3089		52%
48		C-48	Web/Flange	4184		71%
49		C-49	Web/Flange	4867		83%
50		C-50	Web/Flange	4625		79%
51		C-51	Web/Flange	4385		74%
52		C-52	Web/Flange	4897		83%
53		C-53	Web/Flange	4523		77%
54		C-54	Web/Flange	4384		74%
55		C-55	Web/Flange	4186		71%
56		C-56	Web/Flange	4285		73%
57		C-57	Web/Flange	4319		73%



58		C-58	Web/Flange	4284		73%
59		C-59	Web/Flange	4281		73%
60		C-60	Web/Flange	4212		72%

Name of the Building: - Gas Turbine Building						
Location: At 4.5 m Level (1st Floor)						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	C-61	Web/Flange	4728	5890	80%
2		C-62	Web/Flange	4820		82%
3		C-63	Web/Flange	4240		72%
4		C-64	Web/Flange	4620		78%
5		C-65	Web/Flange	4787		81%
6		C-66	Web/Flange	4642		79%
7		C-67	Web/Flange	4562		77%
8		C-68	Web/Flange	4820		82%
9		C-69	Web/Flange	4765		81%
10		C-70	Web/Flange	4862		83%
11		C-71	Web/Flange	4420		75%
12		C-72	Web/Flange	4620		78%
13		C-73	Web/Flange	3920		67%
14		C-74	Web/Flange	4120		70%
15		C-75	Web/Flange	3920		67%
16		C-76	Web/Flange	3840		65%
17		C-77	Web/Flange	3720		63%



18		C-78	Web/Flange	3520		60%
19		C-79	Web/Flange	3642		62%
20		C-80	Web/Flange	3864		66%
21		C-81	Web/Flange	3490		59%
22		C-82	Web/Flange	3720		63%
23		C-83	Web/Flange	3422		58%
24		C-84	Web/Flange	3565		61%
25		C-85	Web/Flange	3876		66%
26		C-86	Web/Flange	3427		58%
27		C-87	Web/Flange	3529		60%
28		C-88	Web/Flange	3538		60%
29		C-89	Web/Flange	3672		62%
30		C-90	Web/Flange	3879		66%



3. The Schmidt Hammer Tests Results: -

Site Name: ASSAM GAS BASED POWER PLANT, NEEPCO							Date : 06.10.2021		
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure: GAS TURBINE BUILDING									
Location : GT FOUNDATION - 01									
1	Point F - 01	V↓	34	32	33	36	37	34	38
2			30	32	34	38	39	35	40
3	Point F - 02	V↓	36	33	35	38	32	35	40
4			32	31	34	34	36	33	36
5	Point F - 03	V↓	36	34	33	36	32	34	38
6			32	38	34	32	36	34	38
135	Point F - 04	V↓	36	34	33	32	33	34	38
136			34	32	35	31	34	33	36
137	Point F - 05	V↓	35	34	38	34	30	34	38
138			32	32	38	32	34	34	38
139	Point F - 06	V↓	33	36	35	36	34	35	40
140			38	32	34	32	30	33	36
141	Point F - 07	V↓	33	32	34	32	34	33	36
142			34	32	33	37	34	34	38
143	Point F - 08	V↓	36	32	34	36	32	34	38
144			36	33	36	34	33	34	38
145	Point F - 09	H→←	50	48	54	50	48	50	64
146			49	52	53	49	48	50	64
147	Point F - 10	H→←	48	46	44	48	50	47	58
148			48	46	42	47	48	46	56



149	Point F - 11	H→←	48	46	42	48	50	47	58
150			52	48	42	50	49	50	64
151	Point F - 12	H→←	38	39	42	40	34	39	42
152			36	38	36	38	39	37	38
153	Point F - 13	H→←	40	42	48	40	49	43	50
154			38	36	34	36	38	36	36
155	Point F - 14	H→←	34	32	36	38	34	35	34
Average Compressive Strength = 43.33									
Location : GT FOUNDATION - 02									
1	Point F - 01	V↓	32	28	32	34	36	32	34
2			34	38	32	36	34	35	40
3	Point F - 02	V↓	30	36	33	38	31	34	38
4			33	36	37	32	34	34	38
5	Point F - 03	V↓	32	34	32	33	35	33	36
6			36	38	39	38	36	37	44
135	Point F - 04	V↓	34	32	36	32	34	34	38
136			31	33	34	34	32	33	36
137	Point F - 05	V↓	35	34	36	32	32	34	38
138			36	32	28	32	36	33	36
139	Point F - 06	V↓	31	34	36	32	34	33	36
140			32	34	30	36	32	33	36
141	Point F - 07	V↓	32	36	32	31	31	32	34
142			33	36	37	36	34	35	40
143	Point F - 08	V↓	38	32	32	36	34	34	38
147	Point F - 10	H→←	34	36	40	42	44	41	46



148			36	34	38	39	42	38	40
149	Point F - 11	H→←	38	38	40	42	34	38	40
150			39	36	32	38	36	36	36
151	Point F - 12	H→←	35	36	38	42	38	38	40
152			34	32	36	32	34	34	32
153	Point F - 13	H→←	34	36	32	34	40	35	34
154			40	42	44	45	42	43	50
155	Point F - 14	H→←	40	42	40	48	44	42	48
156			40	46	42	42	42	42	48
Average Compressive Strength =									39.04
Location: GT FOUNDATION - 03									
1	Point F - 01	V↓	33	32	29	33	34	32	34
2			32	34	30	36	32	33	36
3	Point F - 02	V↓	34	33	36	29	36	34	38
4			32	34	30	32	34	32	34
5	Point F - 03	V↓	33	35	36	32	34	34	38
6			35	36	32	30	32	33	36
135	Point F - 04	V↓	31	34	36	34	32	33	36
136			32	38	34	32	32	34	38
137	Point F - 05	V↓	28	34	35	34	36	35	40
138			32	38	34	32	34	34	38
139	Point F - 06	V↓	38	32	34	30	38	34	38
140			32	33	36	35	34	34	38
141	Point F - 07	V↓	32	34	36	32	34	34	38
142			28	34	30	32	34	32	34



141	Point F - 08	V↓	28	30	34	32	32	31	32
142			30	28	34	32	33	31	32
147	Point F - 09	H→←	38	32	36	32	36	35	34
148			32	35	34	32	32	33	30
147	Point F - 10	H→←	34	32	36	30	32	33	30
148			34	36	32	34	32	34	32
149	Point F - 11	H→←	36	32	36	34	34	34	32
150			32	34	32	32	34	33	30
151	Point F - 12	H→←	34	36	32	30	38	34	32
152			32	30	36	34	32	33	30

Average Compressive Strength = 34.58

Location: GT FOUNDATION - 04

1	Point F - 01	V↓	32	36	30	34	30	32	34
2			32	31	34	34	32	33	36
3	Point F - 02	V↓	34	30	36	32	36	34	38
4			32	28	34	39	32	32	34
5	Point F - 03	V↓	36	34	32	38	38	36	42
6			32	34	32	34	32	33	36
135	Point F - 04	V↓	30	28	32	30	36	31	32
136			35	31	36	32	34	34	38
137	Point F - 05	V↓	30	36	32	37	36	34	38
138			32	34	32	38	32	34	38
139	Point F - 06	V↓	28	30	31	34	33	31	32
140			34	32	34	36	34	34	38
141	Point F - 07	V↓	32	30	35	37	36	34	38



142			34	32	38	34	32	34	38
141	Point F - 08	V↓	30	32	34	30	34	32	34
142			30	28	30	34	37	31	32
147	Point F - 09	V↓	34	39	36	38	34	36	42
148			33	31	34	36	34	34	38
147	Point F - 10	H→←	40	38	39	36	34	37	38
148			42	40	38	36	32	39	42
149	Point F - 11	H→←	36	34	36	36	32	35	34
150			34	33	34	32	34	33	30
151	Point F - 12	H→←	36	34	32	38	32	34	32
152			34	32	34	38	32	34	32
153	Point F - 13	H→←	36	32	36	32	34	34	32
154			32	34	34	32	36	34	32
155	Point F - 14	H→←	32	36	38	34	35	35	34
156			30	34	32	36	32	33	30
155	Point F - 15	H→←	34	36	38	32	35	35	34
156			32	34	32	34	32	33	30
Average Compressive Strength = 35.27									
Location: GT FOUNDATION - 05									
1	Point F - 01	V↓	32	38	32	38	34	35	40
2			32	30	35	36	34	33	36
3	Point F - 02	V↓	32	38	32	28	33	31	32
4			35	31	34	32	34	33	36
5	Point F - 03	V↓	32	34	32	36	34	34	38
6			32	34	36	34	30	33	36



135	Point F - 04	V↓	34	32	30	38	32	33	36
136			32	34	32	34	32	33	36
137	Point F - 05	V↓	34	32	30	32	34	32	34
138			38	32	34	32	34	34	38
139	Point F - 06	V↓	32	30	34	34	36	33	36
140			32	34	30	34	34	33	36
141	Point F - 07	V↓	30	39	38	36	34	37	44
142			34	32	34	32	30	32	34
141	Point F - 08	V↓	32	34	32	30	32	32	34
142			28	32	34	32	34	32	34
147	Point F - 09	V↓	30	28	31	32	32	31	32
148			32	28	30	32	34	31	32

Average Compressive Strength = 35.78

Location: GT FOUNDATION - 06

1	Point F - 01	H→←	34	36	32	31	35	34	32
2			36	32	32	36	32	34	32
3	Point F - 02	H→←	32	34	36	32	31	33	30
4			34	32	34	32	30	32	30
5	Point F - 03	H→←	36	34	34	31	35	34	32
6			32	34	32	34	30	32	30
135	Point F - 04	H→←	32	36	34	35	32	34	32
136			32	34	32	30	34	32	30
137	Point F - 05	H→←	34	36	32	35	37	35	34
138			32	34	32	36	32	33	30
139	Point F - 06	H→←	36	34	31	30	36	33	30



140			34	32	30	32	35	33	30
141	Point F - 07	H→←	30	36	34	32	35	33	30
142			32	34	32	30	36	33	30
141	Point F - 08	H→←	34	31	33	34	37	34	32
147	Point F - 09	H→←	36	35	34	36	32	35	34
148			32	34	32	32	32	32	30
Average Compressive Strength =									31.06
Location : GT ROOF									
1	Point F - 01	V↓	33	38	30	32	30	31	32
2			32	30	32	34	30	32	34
3	Point F - 02	V↓	24	20	22	28	29	25	24
4			20	22	24	28	28	24	22
5	Point F - 03	V↓	22	20	25	26	27	24	22
6			28	20	21	23	24	23	20
135	Point F - 04	V↓	24	24	22	23	26	24	22
136			22	24	26	28	24	25	24
137	Point F - 05	V↓	20	22	21	18	23	21	16
138			23	26	24	20	22	23	20
139	Point F - 06	V↓	20	22	24	25	28	24	22
140			20	24	26	22	29	24	22
141	Point F - 07	V↓	28	24	20	29	30	28	28
142			29	30	30	29	32	30	32
Average Compressive Strength =									24.29



4. The Ultrasonic Pulse Velocity of Concrete Tests Results: -

Site Name : ASSAM GASED BASED POWER PLANT, NEEPCO					
Name of the Structure: GAS TURBINE BUILDING				Date : 06.10.2021	
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location : GT FOUNDATION - 01					
1	Point F - 01	Indirect	300	3.164	Doubtful
2	Point F - 02	Indirect	300	2.614	Doubtful
3	Point F - 03	Indirect	300	3.259	Doubtful
4	Point F - 04	Indirect	300	3.289	Doubtful
5	Point F - 05	Indirect	300	3.467	Doubtful
6	Point F - 06	Indirect	300	3.516	Good
7	Point F - 07	Indirect	300	3.167	Doubtful
8	Point F - 08	Indirect	300	2.004	Doubtful
9	Point F - 09	Indirect	300	3.145	Doubtful
10	Point F - 10	Indirect	300	3.348	Doubtful
11	Point F - 11	Indirect	300	3.425	Doubtful
12	Point F - 12	Indirect	300	3.911	Good
13	Point F - 13	Indirect	300	3.865	Good
14	Point F - 14	Indirect	300	3.628	Good
Average Velocity =				3.272	Doubtful
Location : GT FOUNDATION - 02					
15	Point F - 01	Indirect	300	3.259	Doubtful
16	Point F - 02	Indirect	300	3.487	Doubtful
17	Point F - 03	Indirect	300	3.832	Good
18	Point F - 04	Indirect	300	3.754	Good



19	Point F - 05	Indirect	300	3.689	Good
20	Point F - 06	Indirect	300	3.428	Doubtful
21	Point F - 07	Indirect	300	3.832	Good
22	Point F - 08	Indirect	300	2.954	Doubtful
23	Point F - 10	Indirect	300	4.342	Good
24	Point F - 11	Indirect	300	4.280	Good
25	Point F - 12	Indirect	300	3.329	Doubtful
26	Point F - 13	Indirect	300	4.837	Excellent
27	Point F - 14	Indirect	300	4.592	Excellent
Average Velocity =				3.817	Good
Location : GT FOUNDATION - 03					
28	Point F - 01	Indirect	300	3.222	Doubtful
29	Point F - 02	Indirect	300	3.169	Doubtful
30	Point F - 03	Indirect	300	3.268	Doubtful
31	Point F - 04	Indirect	300	3.314	Doubtful
32	Point F - 05	Indirect	300	3.340	Doubtful
33	Point F - 06	Indirect	300	3.259	Doubtful
34	Point F - 07	Indirect	300	3.368	Doubtful
35	Point F - 08	Indirect	300	3.269	Doubtful
36	Point F - 09	Indirect	300	4.662	Excellent
37	Point F - 10	Indirect	300	4.418	Good
38	Point F - 11	Indirect	300	3.326	Doubtful
39	Point F - 12	Indirect	300	3.824	Good
Average Velocity =				3.537	Good
Location : GT FOUNDATION - 04					



40	Point F - 01	Indirect	300	3.184	Doubtful
41	Point F - 02	Indirect	300	3.289	Doubtful
42	Point F - 03	Indirect	300	3.342	Doubtful
43	Point F - 04	Indirect	300	3.625	Good
44	Point F - 05	Indirect	300	3.425	Doubtful
45	Point F - 06	Indirect	300	3.120	Doubtful
46	Point F - 07	Indirect	300	2.168	Doubtful
47	Point F - 08	Indirect	300	2.628	Doubtful
48	Point F - 09	Indirect	300	2.892	Doubtful
49	Point F - 10	Indirect	300	3.471	Doubtful
50	Point F - 11	Indirect	300	3.568	Good
51	Point F - 12	Indirect	300	3.742	Good
52	Point F - 10	Indirect	300	3.641	Good
53	Point F - 11	Indirect	300	3.528	Good
54	Point F - 12	Indirect	300	3.325	Doubtful
Average Velocity =				3.263	Doubtful
Location : GT FOUNDATION - 05					
55	Point F - 01	Indirect	300	3.562	Good
56	Point F - 02	Indirect	300	3.179	Doubtful
57	Point F - 03	Indirect	300	3.854	Good
58	Point F - 04	Indirect	300	2.864	Doubtful
59	Point F - 05	Indirect	300	3.084	Doubtful
60	Point F - 06	Indirect	300	2.995	Doubtful
61	Point F - 07	Indirect	300	2.163	Doubtful
62	Point F - 08	Indirect	300	3.456	Doubtful



63	Point F - 09	Indirect	300	3.764	Good
Average Velocity =				3.213	Doubtful
Location : GT FOUNDATION - 06					
64	Point F - 01	Indirect	300	3.356	Doubtful
65	Point F - 02	Indirect	300	3.289	Doubtful
66	Point F - 03	Indirect	300	3.164	Doubtful
67	Point F - 04	Indirect	300	3.254	Doubtful
68	Point F - 05	Indirect	300	2.234	Doubtful
69	Point F - 06	Indirect	300	2.234	Doubtful
70	Point F - 07	Indirect	300	2.254	Doubtful
71	Point F - 08	Indirect	300	4.134	Good
72	Point F - 09	Indirect	300	3.714	Good
Average Velocity =				3.070	Doubtful
Location : GT ROOF					
73	Point F - 01	Indirect	300	2.876	Doubtful
74	Point F - 02	Indirect	300	4.231	Good
75	Point F - 03	Indirect	300	3.040	Doubtful
76	Point F - 04	Indirect	300	3.817	Good
77	Point F - 05	Indirect	300	3.290	Doubtful
78	Point F - 06	Indirect	300	2.814	Doubtful
79	Point F - 07	Indirect	300	3.319	Doubtful
Average Velocity =				3.341	Doubtful



5. Electrical Resistivity Test Results: -

Name of the Structure: Gas Turbine Building						
Location: Gas Turbine Foundation -1						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	F-1-1	86020	88050	62070	78713	Negligible
2	F-1-2	88030	92090	87070	89063	Negligible
3	F-1-3	87020	83020	84050	84697	Negligible
4	F-2-1	90020	96050	93020	93030	Negligible
5	F-2-2	94050	97060	94010	95040	Negligible
6	F-2-3	80070	85060	89040	84723	Negligible
7	F-3-1	102030	105030	107040	104700	Negligible
8	F-3-2	111040	111080	110020	110713	Negligible
9	F-3-3	105040	105080	108090	106070	Negligible
10	F-4-1	99080	99840	99080	99333	Negligible
11	F-4-2	99080	99070	99010	99053	Negligible
12	F-4-3	82020	85060	87090	84723	Negligible
13	F-5-1	45050	48070	52030	48383	Negligible
14	F-5-2	52090	54040	56020	54050	Negligible
15	F-5-3	52400	54040	54040	53493	Negligible
16	F-6-1	82040	86020	87050	85037	Negligible
17	F-6-2	82040	86020	86080	84713	Negligible
18	F-6-3	87900	88400	82500	86267	Negligible
19	F-7-1	62300	68200	72500	67667	Negligible
20	F-7-2	59900	50300	78200	62800	Negligible



21	F-7-3	80300	72400	75600	76100	Negligible
22	F-8-1	38200	39500	42700	40133	Negligible
23	F-8-2	30500	39600	40200	36767	Negligible
24	F-8-3	28300	22700	30300	27100	Negligible
25	F-9-1	190200	105200	110300	135233	Negligible
26	F-9-2	130500	138900	99200	122867	Negligible
27	F-9-3	103200	110500	120900	111533	Negligible
28	F-10-1	99700	82200	87700	89867	Negligible
29	F-10-2	162200	138900	159200	153433	Negligible
30	F-10-3	53200	58500	68900	60200	Negligible
31	F-11-1	105200	112300	138700	118733	Negligible
32	F-11-2	99200	95700	89200	94700	Negligible
33	F-11-3	78500	62300	68500	69767	Negligible
34	F-12-1	140200	138900	120700	133267	Negligible
35	F-12-2	112500	130300	125500	122767	Negligible
36	F-12-3	110700	99200	98300	102733	Negligible
37	F-13-1	98700	107500	130400	112200	Negligible
38	F-13-2	67700	68900	82500	73033	Negligible

Location : Gas Turbine Foundation -2

1	F-1-1	58500	59300	60400	59400	Negligible
2	F-1-2	75600	79200	77700	77500	Negligible
3	F-1-3	68300	72500	62300	67700	Negligible
4	F-2-1	68200	65300	62400	65300	Negligible
5	F-2-2	75200	94600	34200	68000	Negligible
6	F-2-3	26800	23200	30400	26800	Negligible



7	F-3-1	26700	26300	34500	29167	Negligible
8	F-3-2	28300	22200	30700	27067	Negligible
9	F-3-3	38500	39400	42200	40033	Negligible
10	F-4-1	40200	38500	50400	43033	Negligible
11	F-4-2	59300	68200	62300	63267	Negligible
12	F-4-3	38200	22300	28400	29633	Negligible
13	F-5-1	22300	28400	30500	27067	Negligible
14	F-5-2	38500	28200	39200	35300	Negligible
15	F-5-3	49300	42400	59300	50333	Negligible
16	F-6-1	62500	68700	72400	67867	Negligible
17	F-6-2	59300	50800	49200	53100	Negligible
18	F-6-3	38900	30200	28400	32500	Negligible
19	F-7-1	22300	30400	28200	26967	Negligible
20	F-7-2	38900	39500	48300	42233	Negligible
21	F-7-3	40200	28400	24200	30933	Negligible
22	F-8-1	30400	32200	38900	33833	Negligible
23	F-8-2	28600	22300	42200	31033	Negligible
24	F-8-3	22800	38600	24500	28633	Negligible
25	F-9-1	62300	80500	72700	71833	Negligible
26	F-9-2	78200	69300	62500	70000	Negligible
27	F-9-3	59300	49700	39200	49400	Negligible
28	F-10-1	24500	28700	38900	30700	Negligible
29	F-10-2	42700	49300	36500	42833	Negligible
30	F-10-3	34300	30200	22400	28967	Negligible
31	F-11-1	48900	59700	62800	57133	Negligible



32	F-11-2	59600	52200	49300	53700	Negligible
33	F-11-3	38400	28300	22200	29633	Negligible
34	F-12-1	80500	72600	99200	84100	Negligible
35	F-12-2	110200	112500	95700	106133	Negligible
36	F-12-3	62900	68300	59500	63567	Negligible
37	F-13-1	72800	82200	89500	81500	Negligible
38	F-13-2	78200	62700	68300	69733	Negligible
39	F-13-3	65300	63200	70500	66333	Negligible
40	F-14-1	38400	30300	32600	33767	Negligible
41	F-14-2	39500	28200	22400	30033	Negligible
42	F-14-3	41300	45200	50300	45600	Negligible

Location : Gas Turbine Foundation -3

1	F-1-1	30200	32300	38600	33700	Negligible
2	F-1-2	40500	49200	59700	49800	Negligible
3	F-1-3	38300	67200	50300	51933	Negligible
4	F-2-1	28300	22700	24200	25067	Negligible
5	F-2-2	42500	38900	30700	37367	Negligible
6	F-2-3	28900	30200	39300	32800	Negligible
7	F-3-1	98300	57400	42600	66100	Negligible
8	F-3-2	42200	38300	36300	38933	Negligible
9	F-3-3	50300	59700	62500	57500	Negligible
10	F-4-1	26300	28400	22600	25767	Negligible
11	F-4-2	28200	32200	38700	33033	Negligible
12	F-4-3	24500	30500	39200	31400	Negligible
13	F-5-1	34500	32800	37300	34867	Negligible



14	F-5-2	34900	22300	28400	28533	Negligible
15	F-5-3	32500	38900	24700	32033	Negligible
16	F-6-1	22600	26800	28300	25900	Negligible
17	F-6-2	38500	29700	32200	33467	Negligible
18	F-6-3	42300	39200	38700	40067	Negligible
19	F-7-1	34500	29900	30800	31733	Negligible
20	F-7-2	42900	50700	59200	50933	Negligible
21	F-7-3	62300	68200	50400	60300	Negligible
22	F-8-1	36300	38900	42500	39233	Negligible
23	F-8-2	50200	59400	62300	57300	Negligible
24	F-8-3	68700	64300	59700	64233	Negligible
25	F-9-1	40200	38700	39200	39367	Negligible
26	F-9-2	28900	29200	30500	29533	Negligible
27	F-9-3	32300	38900	28400	33200	Negligible
28	F-10-1	24600	28700	39300	30867	Negligible
29	F-10-2	59400	62500	52200	58033	Negligible
30	F-10-3	38300	30400	39500	36067	Negligible
31	F-11-1	78900	59700	60100	66233	Negligible
32	F-11-2	78300	80500	70400	76400	Negligible
33	F-11-3	63300	67200	68400	66300	Negligible
34	F-12-1	20500	28600	32200	27100	Negligible
35	F-12-2	38900	42700	59300	46967	Negligible
36	F-12-3	62400	68200	72500	67700	Negligible
37	F-8-1	70500	78900	76300	75233	Negligible
38	F-8-2	62200	68400	59200	63267	Negligible



39	F-8-3	42300	49500	39300	43700	Negligible
40	F-9-1	22500	25300	29400	25733	Negligible
41	F-9-2	38900	36200	42500	39200	Negligible
42	F-9-3	28300	24600	40200	31033	Negligible
Location : Gas Turbine Foundation -4						
1	F-1-1	38900	28700	22500	30033	Negligible
2	F-1-2	42200	49300	59300	50267	Negligible
3	F-1-3	62700	68200	50700	60533	Negligible
4	F-2-1	30200	38500	39900	36200	Negligible
5	F-2-2	28900	24700	30500	28033	Negligible
6	F-2-3	22300	32200	39400	31300	Negligible
7	F-3-1	32600	24800	34600	30667	Negligible
8	F-3-2	38900	29600	32900	33800	Negligible
9	F-3-3	22800	28300	24200	25100	Negligible
10	F-4-1	22900	28900	28700	26833	Negligible
11	F-4-2	24300	32200	38500	31667	Negligible
12	F-4-3	20900	38300	28400	29200	Negligible
13	F-5-1	22600	28300	26600	25833	Negligible
14	F-5-2	30300	38900	39200	36133	Negligible
15	F-5-3	40200	42600	38900	40567	Negligible
16	F-6-1	28900	28300	29700	28967	Negligible
17	F-6-2	30200	38900	32400	33833	Negligible
18	F-6-3	22900	28700	24600	25400	Negligible
19	F-7-1	21300	23600	25500	23467	Negligible
20	F-7-2	39400	24500	30900	31600	Negligible



21	F-7-3	28200	22700	38300	29733	Negligible
22	F-8-1	29300	28700	26300	28100	Negligible
23	F-8-2	42600	49400	59200	50400	Negligible
24	F-8-3	68300	50400	40300	53000	Negligible
25	F-9-1	22400	23600	25400	23800	Negligible
26	F-9-2	38900	28200	30300	32467	Negligible
27	F-9-3	32200	39400	40200	37267	Negligible
28	F-10-1	32200	42500	43200	39300	Negligible
29	F-10-2	36300	38500	32600	35800	Negligible
30	F-10-3	28200	29300	42700	33400	Negligible
31	F-11-1	41200	45900	50300	45800	Negligible
32	F-11-2	38900	39200	30400	36167	Negligible
33	F-11-3	29200	28400	36500	31367	Negligible
34	F-12-1	70300	68200	59500	66000	Negligible
35	F-12-2	63200	58400	42300	54633	Negligible
36	F-12-3	38600	36300	32200	35700	Negligible
37	F-13-1	56200	62300	68400	62300	Negligible
38	F-13-2	59300	42600	45700	49200	Negligible
39	F-13-3	38900	36200	37800	37633	Negligible
40	F-14-1	22600	28900	29300	26933	Negligible
41	F-14-2	32400	38900	40200	37167	Negligible
42	F-14-3	42600	50400	58400	50467	Negligible
43	F-15-1	80200	78900	79300	79467	Negligible
44	F-15-2	62100	68300	70200	66867	Negligible
45	F-15-3	59200	42400	38500	46700	Negligible



Location : Gas Turbine Foundation -5						
1	F-1-1	30400	38500	39200	36033	Negligible
2	F-1-2	49300	50200	59300	52933	Negligible
3	F-1-3	68200	62300	45200	58567	Negligible
4	F-2-1	30200	38900	42600	37233	Negligible
5	F-2-2	22900	28200	32300	27800	Negligible
6	F-2-3	26300	29200	28400	27967	Negligible
7	F-3-1	38900	42600	50200	43900	Negligible
8	F-3-2	59300	62800	68500	63533	Negligible
9	F-3-3	72200	68300	78200	72900	Negligible
10	F-4-1	82300	79700	80300	80767	Negligible
11	F-4-2	59200	49400	62600	57067	Negligible
12	F-4-3	38900	42300	32200	37800	Negligible
13	F-5-1	22600	28300	30400	27100	Negligible
14	F-5-2	24300	32200	39300	31933	Negligible
15	F-5-3	59400	40300	38500	46067	Negligible
16	F-6-1	22300	28400	29900	26867	Negligible
17	F-6-2	24600	38500	40700	34600	Negligible
18	F-6-3	40200	49600	38900	42900	Negligible
19	F-7-1	20900	28300	30500	26567	Negligible
20	F-7-2	28400	24500	38900	30600	Negligible
21	F-7-3	50600	49700	42300	47533	Negligible
22	F-8-1	28200	30600	29500	29433	Negligible
23	F-8-2	22500	32900	38600	31333	Negligible
24	F-8-3	49700	39200	32900	40600	Negligible



25	F-9-1	25600	22300	28400	25433	Negligible
26	F-9-2	24200	30500	38300	31000	Negligible
27	F-9-3	36300	24200	39400	33300	Negligible
Location : Gas Turbine Foundation -6						
1	F-1-1	38900	40200	39300	39467	Negligible
2	F-1-2	30400	28700	24900	28000	Negligible
3	F-1-3	22300	25600	28400	25433	Negligible
4	F-2-1	45900	49700	50300	48633	Negligible
5	F-2-2	59700	62400	68700	63600	Negligible
6	F-2-3	55200	59300	49500	54667	Negligible
7	F-3-1	38300	28700	30200	32400	Negligible
8	F-3-2	22400	30400	39500	30767	Negligible
9	F-3-3	40200	49500	42200	43967	Negligible
10	F-4-1	20600	22300	28400	23767	Negligible
11	F-4-2	24600	30200	36500	30433	Negligible
12	F-4-3	38900	40500	49200	42867	Negligible
13	F-5-1	32500	38900	40300	37233	Negligible
14	F-5-2	28900	22600	25200	25567	Negligible
15	F-5-3	30500	36300	39500	35433	Negligible
16	F-6-1	62200	64500	68700	65133	Negligible
17	F-6-2	59300	50200	60400	56633	Negligible
18	F-6-3	38900	36300	42200	39133	Negligible
19	F-7-1	22600	30200	36400	29733	Negligible
20	F-7-2	38900	40300	49500	42900	Negligible
21	F-7-3	22300	28700	24300	25100	Negligible



22	F-8-1	59200	68400	62500	63367	Negligible
23	F-8-2	72200	78300	69200	73233	Negligible
24	F-8-3	80400	70700	68300	73133	Negligible
25	F-9-1	42900	38400	36400	39233	Negligible
26	F-9-2	50700	59300	38900	49633	Negligible
27	F-9-3	36200	32900	29700	32933	Negligible
Gas Turbine Building Roof						
1	F-1-1	38900	36700	38900	38167	Negligible
2	F-1-2	29200	28300	30400	29300	Negligible
3	F-1-3	42100	45600	50300	46000	Negligible
4	F-2-1	32200	38600	41500	37433	Negligible
5	F-2-2	28300	32400	42300	34333	Negligible
6	F-2-3	29100	35200	38500	34267	Negligible
7	F-3-1	24600	28300	32200	28367	Negligible
8	F-3-2	28300	29200	32200	29900	Negligible
9	F-3-3	36400	38500	42200	39033	Negligible
10	F-4-1	28500	29700	32300	30167	Negligible
11	F-4-2	38300	36500	30200	35000	Negligible
12	F-4-3	42400	45800	50300	46167	Negligible
13	F-5-1	28300	32400	36200	32300	Negligible
14	F-5-2	42200	40500	49300	44000	Negligible
15	F-5-3	50200	59300	60400	56633	Negligible
16	F-6-1	23600	28200	29300	27033	Negligible
17	F-6-2	40300	49500	55300	48367	Negligible
18	F-6-3	39200	38700	42500	40133	Negligible



19	F-7-1	42200	38900	36200	39100	Negligible
20	F-7-2	32300	29200	39400	33633	Negligible
21	F-7-3	28400	22700	26200	25767	Negligible

Vibration Test results

Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (µm)	Temperature (°C)	CF Plus	Comment
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3(for RCC foundation)				
2	Building Name - Gas Turbine Building								
i)	Location: Gas Turbine Generator-1								
	Starting Diesel Engine (At Machine)	2.33	31.86	1.00	Good	5.70	65.6	10	Satisfactory
	Starting Diesel Engine (At Foundation)	1.23	0.48	0.28	OK	3.00	26.3	0	Good
	Generator (At Machine)	1.36	4.83	1.71	Good	6.15	27.5	2	Good
	Generator (At Foundation)	0.18	0.00	0.24	OK	2.91	27.9	0	Good
	Gas Turbine (At Machine)	6.21	27.52	4.00	Satisfactory	5.97	66.6	7	Satisfactory
	Gas Turbine (At Foundation)	0.17	0.00	0.25	OK	3.50	29.9	0	Good
ii)	Location: Gas Turbine Generator-2								
	Starting Diesel Engine (At Machine)	0.91	5.87	1.37	Good	4.49	61.8	6	Satisfactory
	Starting Diesel Engine (At Foundation)	0.28	0.00	0.25	OK	3.22	30.0	0	Good



iii)	Generator (At Machine)	1.67	2.87	1.50	Good	4.79	26.0	1	Good	
	Generator (At Foundation)	0.28	0.00	0.32	OK	3.64	28.3	0	Good	
	Reduction Gear (At Machine)	1.46	5.14	1.40	Good	5.17	60.7	2	Good	
	Reduction Gear (At Foundation)	0.28	2.43	0.28	OK	3.62	24.9	1	Good	
	Gas Turbine (At Machine)	5.29	14.50	2.91	Satisfactory	6.72	88.4	5	Good	
	Gas Turbine (At Foundation)	0.36	1.08	0.28	OK	3.81	28.7	0	Good	
	Location: Gas Turbine Generator-3									
	Starting Diesel Engine (At Machine)	0.89	9.54	1.18	Good	4.65	66.6	6	Satisfactory	
	Starting Diesel Engine (At Foundation)	0.93	0.28	0.30	OK	3.55	26.4	7	Satisfactory	
	Generator (At Machine)	2.64	7.65	0.78	Good	3.58	25.9	2	Good	
	Generator (At Foundation)	0.45	0.00	0.35	OK	3.64	28.8	0	Good	
	iv)	Reduction Gear (At Machine)	2.05	13.20	1.74	Good	6.31	65.3	4	Good
Reduction Gear (At Foundation)		0.69	0.54	0.31	OK	2.82	24.4	0	Good	
Axial Compressor (At Machine)		8.53	18.62	9.43	Unsatisfactory	19.10	29.5	6	Satisfactory	
Axial Compressor (At Foundation)		0.16	0.00	0.28	OK	3.76	24.0	0	Good	
Gas Turbine (At Machine)		6.19	20.16	3.59	Satisfactory	9.67	59.3	6	Satisfactory	
Gas Turbine (At Foundation)		0.19	0.59	0.25	OK	3.34	23.6	0	Good	
Location: Gas Turbine Generator-4										
Starting Diesel Engine (At Machine)		0.96	5.18	1.53	Good	5.09	64.9	5	Satisfactory	
Starting Diesel Engine (At Foundation)	0.61	0.42	0.25	OK	2.96	24.9	0	Good		



	Generator (At Machine)	2.14	3.91	0.80	Good	3.67	27.1	1	Good
	Generator (At Foundation)	0.50	0.00	0.29	OK	2.82	28.1	0	Good
	Reduction Gear (At Machine)	1.23	4.05	1.27	Good	4.90	63.3	2	Good
	Reduction Gear (At Foundation)	0.31	1.24	0.29	OK	3.09	26.3	0	Good
	Axial Compressor (At Machine)	5.48	26.31	1.99	Satisfactory	4.95	30.2	7	Satisfactory
	Axial Compressor (At Foundation)	0.32	5.35	0.27	OK	3.15	25.3	3	Good
	Gas Turbine (At Machine)	5.36	19.66	3.09	Satisfactory	6.07	64.8	6	Satisfactory
	Gas Turbine (At Foundation)	0.21	0.39	0.26	OK	3.73	22.5	0	Good
v)	Location: Gas Turbine Generator-5								
	Starting Diesel Engine (At Machine)	2.01	9.06	1.41	Good	4.90	73.6	4	Good
	Starting Diesel Engine (At Foundation)	0.10	0.00	0.21	OK	3.00	34.2	0	Good
	Generator (At Machine)	3.14	1.42	2.59	Satisfactory	7.03	51.4	0	Good
	Generator (At Foundation)	0.25	0.00	0.29	OK	3.30	26.1	0	Good
	Reduction Gear (At Machine)	0.95	0.00	1.89	Satisfactory	6.03	55.8	0	Good
	Reduction Gear (At Foundation)	0.18	0.00	0.52	OK	4.29	22.2	0	Good
	Excitor (At Machine)	5.39	4.31	5.51	Unsatisfactory	17.27	67.3	2	Good
	Excitor (At Foundation)	0.21	0.00	0.60	OK	3.78	21.3	0	Good
	Gas Turbine (At Machine)	5.30	25.82	2.21	Satisfactory	6.34	94.5	7	Satisfactory
	Gas Turbine (At Foundation)	0.45	0.50	0.38	OK	3.76	55.4	0	Good
vi)	Location: Gas Turbine Generator-6								



Starting Diesel Engine (At Machine)	1.31	5.39	1.90	Satisfactory	5.66	61.8	2	Good
Starting Diesel Engine (At Foundation)	0.16	0.00	0.27	OK	3.30	32.8	0	Good
Generator (At Machine)	3.91	0.63	3.32	Satisfactory	6.84	49.1	0	Good
Generator (At Foundation)	0.25	0.00	0.43	OK	3.68	30.1	0	Good
Excitor (At Machine)	7.17	5.50	10.41	Unsatisfactory	30.65	65.3	2	Good
Excitor (At Foundation)	0.34	0.00	0.97	OK	4.29	24.6	0	Good
Gas Turbine (At Machine)	3.10	11.73	2.25	Satisfactory	7.38	78.3	3	Good
Gas Turbine (At Foundation)	0.36	0.00	0.42	OK	3.99	32.3	0	Good



3.STEAM TURBINE BUILDING



Performed Tests: -

Ultrasonic Thickness Gauge









Extracting Core Samples from TG Foundation





In-Situ
Compressive
Strength Test

Carbonation Test
0.2 %
Phenolphthalein
Solution



Concrete pH Test



Visual Inspection: -

1. Most of Steel ISMB Members (Specially the ISMB which Supported the Heavy machineries and pipelines) are not healthy condition due to leakage of water. There is sign of pitting corrosion, Paint Delamination, Leaching).
2. The structural members beside the broken windows are damaging due to environmental hazards (Rain, Dust, Heat, UV Rays)
3. Floor Slab areas dampening/leaking which need to be treated.
4. Roof areas are covered with Tar felt. For long term sustainability of the roof the area should be repaired with advanced roof treatment techniques (Epoxy, PU, APP, HDPE etc.)
5. Metal pipe should be replaced with better alternatives (CPVC, UPVC) for better sustainability of the structural components.
6. All Three TG Foundations (Except Steam Turbine TG -3) one column lower Portion have clear sign of spalling



Vibration Test



Visual Inspection: -





Vibration Test





Paint was delaminated and corroded portion is exposed



Horizontal Cracks in wall
due corroded ISMB
Members







Wall Shear Crack



Bottom Portion Pitting Corrosion









Water Leakage sign
Water Leakage sign







Corrosion Leaching







Water Leakage at ceiling portion



Water Leakage at ceiling portion





Corroded ISMB Members



Pitting corrosion due to water leakage





TEST RESULTS



1.The Ultrasonic Thickness Precision Gauge Tests Results: -

Name of the Building:- Steam Turbine Building											
Location : Ground Floor											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-1	Web/Flange	16.80	16.78	16.72	16.28	16.28	16.42	3.56	C2 Low
2		C-2	Web/Flange	9.35	9.26	9.62	9.45	9.20	9.28	7.89	C2 Low
3		C-3	Web/Flange	25.18	25.20	25.42	25.40	25.40	25.42	2.48	C1 Very Low
4		C-4	Web/Flange	9.31	9.29	9.42	9.34	9.42	9.28	6.59	C2 Low
5		C-5	Web/Flange	9.24	9.28	9.31	9.24	9.24	9.33	6.74	C2 Low
6		C-6	Web/Flange	12.22	12.24	12.34	12.40	12.17	12.16	5.26	C2 Low
7		C-7	Web/Flange	16.25	16.40	16.20	16.32	16.28	16.30	4.12	C2 Low
8		C-8	Web/Flange	12.39	12.28	12.20	9.57	9.28	9.32	2.55	C1 Very Low
9		C-9	Web/Flange	12.38	12.38	12.42	12.38	12.42	12.30	4.59	C2 Low
10		C-10	Web/Flange	12.32	12.42	12.42	12.32	12.30	12.20	6.22	C2 Low
11		C-11	Web/Flange	16.57	16.49	16.50	16.67	16.52	16.56	7.56	C2 Low
12		C-12	Web/Flange	16.29	16.39	16.23	16.33	16.20	16.04	7.42	C2 Low
13		C-13	Web/Flange	24.69	24.20	24.30	24.04	24.02	24.06	6.59	C2 Low
14		C-14	Web/Flange	9.48	9.42	9.24	9.32	9.20	9.20	4.81	C2 Low
15		C-15	Web/Flange	10.16	10.23	10.24	10.30	10.34	10.35	7.23	C2 Low



16	C-16	Web/Flange	9.00	9.23	9.05	9.20	9.20	9.20	6.53	C2 Low
17	C-17	Web/Flange	15.19	15.23	15.32	15.32	15.32	15.34	7.51	C2 Low
18	C-18	Web/Flange	15.18	15.20	15.23	15.20	15.30	15.34	4.23	C2 Low
19	C-19	Web/Flange	19.56	19.42	19.20	19.32	19.40	19.33	3.84	C2 Low
20	C-20	Web/Flange	20.20	20.18	20.49	20.33	20.30	20.59	3.16	C2 Low
21	C-21	Web/Flange	20.32	20.80	20.72	20.42	20.20	20.32	4.48	C2 Low
22	C-22	Web/Flange	20.32	19.30	19.34	19.62	19.60	19.25	5.32	C2 Low
23	C-23	Web/Flange	20.04	20.09	20.11	20.18	20.12	20.20	6.59	C2 Low
24	C-24	Web/Flange	20.01	20.09	20.18	20.18	20.18	20.19	6.32	C2 Low
25	C-25	Web/Flange	21.20	20.16	20.16	20.18	20.18	20.19	5.22	C2 Low
26	C-26	Web/Flange	20.19	20.20	20.22	20.20	20.18	20.21	4.48	C2 Low
27	C-27	Web/Flange	21.20	21.32	21.04	21.09	21.07	20.06	3.26	C2 Low
28	C-28	Web/Flange	20.15	20.07	20.17	20.18	20.09	20.08	4.78	C2 Low
29	C-29	Web/Flange	16.15	20.20	20.40	20.57	20.70	20.24	5.57	C2 Low
30	C-30	Web/Flange	25.58	25.20	25.65	25.34	25.34	25.20	3.48	C2 Low
31	C-31	Web/Flange	16.20	16.18	16.12	16.24	16.18	16.34	4.79	C2 Low
32	C-32	Web/Flange	16.21	16.20	16.23	16.34	16.32	16.40	5.30	C2 Low
33	C-33	Web/Flange	16.47	16.42	16.52	16.32	16.30	16.30	4.71	C2 Low
34	C-34	Web/Flange	16.44	16.24	16.09	16.89	16.42	16.04	4.63	C2 Low
35	C-35	Web/Flange	16.01	16.02	16.04	16.24	16.42	16.42	3.59	C2 Low
36	C-36	Web/Flange	9.04	9.98	9.72	9.20	10.12	9.20	6.18	C2 Low
37	C-37	Web/Flange	25.54	25.40	24.80	24.28	24.85	25.80	5.48	C2 Low
38	C-38	Web/Flange	25.59	25.35	25.39	25.30	25.32	25.34	3.33	C2 Low
39	C-39	Web/Flange	25.03	25.40	25.20	25.30	25.32	25.30	3.26	C2 Low
40	C-40	Web/Flange	15.87	15.90	15.87	15.20	15.72	15.79	4.59	C2 Low



41	C-41	Web/Flange	12.64	12.54	12.20	15.20	15.89	15.80	5.22	C2 Low
42	C-42	Web/Flange	25.60	25.23	25.32	25.64	25.62	25.64	4.79	C2 Low
43	C-43	Web/Flange	12.02	12.04	12.06	12.04	12.09	12.01	3.82	C2 Low
44	C-44	Web/Flange	12.03	12.40	12.06	12.03	12.40	12.07	5.12	C2 Low
45	C-45	Web/Flange	12.64	12.62	12.54	12.28	12.34	12.42	4.30	C2 Low
46	C-46	Web/Flange	25.22	25.23	25.34	25.08	25.34	25.32	5.37	C2 Low
47	C-47	Web/Flange	12.17	12.15	12.29	12.16	12.18	12.37	6.59	C2 Low
48	C-48	Web/Flange	12.00	12.08	12.04	12.07	12.12	12.04	4.81	C2 Low
49	C-49	Web/Flange	12.09	12.12	12.79	12.29	12.70	12.25	2.64	C1 Very Low
50	C-50	Web/Flange	12.02	12.06	12.04	12.15	12.09	12.08	3.15	C2 Low
51	C-51	Web/Flange	25.02	25.04	25.08	25.33	25.04	25.08	4.59	C2 Low
52	C-52	Web/Flange	12.74	12.70	12.82	12.77	12.80	12.56	6.78	C2 Low
53	C-53	Web/Flange	16.73	12.70	12.74	12.71	12.65	12.64	5.31	C2 Low
54	C-54	Web/Flange	24.46	24.48	24.99	24.56	24.87	24.90	4.71	C2 Low
55	C-55	Web/Flange	12.60	12.64	12.66	12.62	12.64	12.56	3.59	C2 Low
56	C-56	Web/Flange	12.40	12.40	12.37	12.50	12.38	12.34	2.22	C1 Very Low
57	C-57	Web/Flange	25.77	25.72	25.72	25.70	25.70	25.79	2.16	C1 Very Low
58	C-58	Web/Flange	14.12	14.04	14.15	14.14	14.16	14.20	3.89	C2 Low
59	C-59	Web/Flange	12.65	12.64	12.63	12.54	12.44	12.43	3.77	C2 Low
60	C-60	Web/Flange	16.18	16.15	16.11	16.09	16.07	16.01	4.29	C2 Low
61	C-61	Web/Flange	12.62	12.55	12.70	12.64	12.68	12.59	5.26	C2 Low
62	C-62	Web/Flange	15.68	15.34	15.59	15.28	15.70	15.18	6.75	C2 Low
63	C-63	Web/Flange	16.63	16.60	16.52	16.48	16.34	16.54	7.26	C2 Low



64		C-64	Web/Flange	16.46	16.42	16.39	16.34	16.34	16.54	6.32	C2 Low
65		C-65	Web/Flange	16.56	16.49	16.38	16.34	16.35	16.39	7.23	C2 Low
66		C-66	Web/Flange	15.84	15.79	15.82	15.78	15.80	15.76	7.53	C2 Low

67		B-1	Web/Flange	12.44	12.40	12.32	12.44	12.40	12.20	8.89	C2 Low
68	Beam	B-2	Web/Flange	12.20	12.18	12.25	12.40	12.72	12.42	10.32	C2 Low
69		B-3	Web/Flange	12.70	12.18	12.20	12.08	12.11	12.09	12.35	C2 Low

Name of the Building :- Steam Turbine Building											
Location : 1st Floor											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-67	Web/Flange	20.42	20.70	20.24	20.42	20.42	20.24	3.89	C2 Low
2		C-68	Web/Flange	20.28	20.42	20.20	20.42	20.42	20.24	2.31	C1 Very Low
3		C-69	Web/Flange	20.39	20.32	20.59	20.20	20.24	20.20	3.89	C2 Low
4		C-70	Web/Flange	20.32	20.20	20.20	20.30	20.04	20.02	2.48	C1 Very Low
5		C-71	Web/Flange	19.89	20.20	20.01	20.20	20.32	20.32	2.15	C1 Very Low
6		C-72	Web/Flange	20.59	20.32	20.34	20.24	20.04	20.03	3.76	C2 Low
7		C-73	Web/Flange	20.32	20.30	20.12	20.16	20.18	20.32	4.52	C2 Low
8		C-74	Web/Flange	20.30	20.32	20.30	20.18	20.38	20.04	4.71	C2 Low
9		C-75	Web/Flange	19.29	19.80	19.67	19.65	19.72	19.70	3.68	C2 Low



10	C-76	Web/Flange	19.34	19.43	19.20	19.20	19.32	19.82	3.89	C2 Low
11	C-77	Web/Flange	20.34	20.33	20.42	20.30	20.33	20.03	4.12	C2 Low
12	C-78	Web/Flange	20.06	20.16	20.18	20.30	20.19	20.30	5.32	C2 Low
13	C-79	Web/Flange	20.18	20.18	20.18	20.18	20.18	20.18	5.12	C2 Low
14	C-80	Web/Flange	20.18	20.15	20.07	20.09	20.04	20.04	5.78	C2 Low
15	C-81	Web/Flange	20.18	20.18	20.04	20.08	20.08	20.16	6.38	C2 Low
16	C-82	Web/Flange	9.07	9.05	9.20	9.25	9.04	9.12	4.13	C2 Low
17	C-83	Web/Flange	25.20	25.18	25.16	25.18	25.30	25.20	5.61	C2 Low
18	C-84	Web/Flange	9.20	9.32	9.30	9.28	9.34	9.20	4.58	C2 Low
19	C-85	Web/Flange	25.20	25.04	25.12	25.16	25.20	25.30	3.89	C2 Low
20	C-86	Web/Flange	16.16	16.52	16.32	16.30	16.32	16.70	3.16	C2 Low
21	C-87	Web/Flange	12.70	12.64	12.55	12.72	12.72	12.32	4.78	C2 Low
22	C-88	Web/Flange	12.39	12.38	12.32	12.42	12.32	12.09	5.89	C2 Low
23	C-89	Web/Flange	16.38	16.32	16.32	16.30	16.32	16.20	6.47	C2 Low
24	C-90	Web/Flange	9.50	9.25	9.35	9.32	9.32	9.32	5.23	C2 Low
25	C-91	Web/Flange	16.10	16.20	16.05	16.20	16.12	16.14	6.23	C2 Low
26	C-92	Web/Flange	16.29	16.30	16.23	16.32	16.34	16.32	5.32	C2 Low
27	C-93	Web/Flange	12.09	12.11	12.20	12.18	12.18	12.18	5.73	C2 Low



Name of the Building :- Steam Turbine Building											
Location : 2nd Floor											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-94	Web/Flange	16.00	16.06	16.03	16.98	16.04	16.05	5.32	C2 Low
2		C-95	Web/Flange	16.47	16.42	16.04	16.20	16.42	16.25	6.21	C2 Low
3		C-96	Web/Flange	16.04	16.03	16.06	16.20	16.40	16.32	4.59	C2 Low
4		C-97	Web/Flange	16.31	16.34	16.39	16.22	16.20	16.20	6.22	C2 Low
5		C-98	Web/Flange	16.09	16.03	16.08	16.12	16.20	16.15	3.21	C2 Low
6		C-99	Web/Flange	16.99	16.95	16.72	16.96	16.86	16.72	2.68	C1 Very Low
7		C-100	Web/Flange	15.85	15.90	15.30	15.52	15.67	15.34	4.56	C2 Low
8		C-101	Web/Flange	16.36	16.32	16.32	16.42	16.04	16.03	3.89	C2 Low
9		C-102	Web/Flange	16.20	16.32	16.12	16.20	16.32	16.04	4.15	C2 Low
10		C-103	Web/Flange	16.20	16.42	16.32	16.32	16.32	16.08	3.48	C2 Low
11		C-104	Web/Flange	16.51	16.42	16.32	16.40	16.20	16.34	3.16	C2 Low
12		C-105	Web/Flange	15.87	15.20	15.30	15.20	15.72	16.32	1.89	C1 Very Low
13		C-106	Web/Flange	15.90	15.98	15.80	15.20	15.60	15.72	4.56	C2 Low
14		C-107	Web/Flange	16.16	16.20	15.20	15.30	15.32	15.20	6.18	C2 Low
15		C-108	Web/Flange	25.30	25.03	25.04	25.11	25.16	25.14	2.50	C1 Very Low
16		C-109	Web/Flange	25.65	25.59	25.42	25.65	25.60	25.67	3.48	C2 Low
17		C-110	Web/Flange	16.67	16.56	16.28	16.59	16.49	16.30	4.89	C2 Low
18		C-111	Web/Flange	25.35	25.06	25.09	25.04	25.04	16.28	3.48	C2 Low
19		C-112	Web/Flange	25.28	25.02	25.20	25.32	25.32	16.20	3.16	C2 Low
20		C-113	Web/Flange	16.59	16.32	16.30	16.40	16.32	16.32	2.48	C1 Very Low
21		C-114	Web/Flange	16.00	16.02	16.32	16.32	16.25	16.20	3.49	C2 Low
22		C-115	Web/Flange	25.30	25.31	25.32	25.34	25.30	25.30	5.68	C2 Low
23		C-116	Web/Flange	26.04	26.03	26.09	25.04	25.03	25.06	3.15	C2 Low
24		C-117	Web/Flange	24.47	24.72	24.69	24.65	24.68	24.62	2.65	C1 Very Low
25		C-118	Web/Flange	15.98	15.92	15.70	15.72	15.64	15.89	3.89	C2 Low
26		C-119	Web/Flange	15.90	15.94	15.92	15.79	15.86	15.88	3.46	C2 Low
27		C-120	Web/Flange	25.09	25.02	25.08	25.12	25.03	25.07	3.48	C2 Low
28		C-121	Web/Flange	25.72	25.70	25.70	25.68	25.74	25.75	4.56	C2 Low
29		C-122	Web/Flange	16.05	16.10	16.08	16.11	16.08	16.09	3.21	C2 Low



2. Ultrasonic Pulse velocity Tests: -

Name of the Building :- Steam Turbine Building						
Location : Ground Floor						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	C-1	Web/Flange	3520	5890	60%
2		C-2	Web/Flange	3640		62%
3		C-3	Web/Flange	4420		75%
4		C-4	Web/Flange	3890		66%
5		C-5	Web/Flange	4205		71%
6		C-6	Web/Flange	4569		78%
7		C-7	Web/Flange	4520		77%
8		C-8	Web/Flange	4620		78%
9		C-9	Web/Flange	3540		60%
10		C-10	Web/Flange	4420		75%
11		C-11	Web/Flange	3420		58%
12		C-12	Web/Flange	4387		74%
13		C-13	Web/Flange	3428		58%
14		C-14	Web/Flange	3489		59%
15		C-15	Web/Flange	3592		61%
16		C-16	Web/Flange	3520		60%
17		C-17	Web/Flange	4020		68%
18		C-18	Web/Flange	4325		73%
19		C-19	Web/Flange	3420		58%
20		C-20	Web/Flange	3620		61%



21	C-21	Web/Flange	3320	56%
22	C-22	Web/Flange	3292	56%
23	C-23	Web/Flange	3425	58%
24	C-24	Web/Flange	3204	54%
25	C-25	Web/Flange	3409	58%
26	C-26	Web/Flange	3829	65%
27	C-27	Web/Flange	3725	63%
28	C-28	Web/Flange	3629	62%
29	C-29	Web/Flange	3520	60%
30	C-30	Web/Flange	3628	62%
31	C-31	Web/Flange	3529	60%
32	C-32	Web/Flange	4204	71%
33	C-33	Web/Flange	4620	78%
34	C-34	Web/Flange	3520	60%
35	C-35	Web/Flange	4250	72%
36	C-36	Web/Flange	3972	67%
37	C-37	Web/Flange	3284	56%
38	C-38	Web/Flange	3682	63%
39	C-39	Web/Flange	4280	73%
40	C-40	Web/Flange	3404	58%
41	C-41	Web/Flange	4205	71%
42	C-42	Web/Flange	3282	56%
43	C-43	Web/Flange	4725	80%
44	C-44	Web/Flange	3562	60%
45	C-45	Web/Flange	3540	60%



46	C-46	Web/Flange	4725	80%
47	C-47	Web/Flange	3579	61%
48	C-48	Web/Flange	3687	63%
49	C-49	Web/Flange	3582	61%
50	C-50	Web/Flange	3729	63%
51	C-51	Web/Flange	4728	80%
52	C-52	Web/Flange	3529	60%
53	C-53	Web/Flange	3680	62%
54	C-54	Web/Flange	4527	77%
55	C-55	Web/Flange	4287	73%
56	C-56	Web/Flange	3529	60%
57	C-57	Web/Flange	4501	76%
58	C-58	Web/Flange	3420	58%
59	C-59	Web/Flange	3720	63%
60	C-60	Web/Flange	3529	60%
61	C-61	Web/Flange	3728	63%
62	C-62	Web/Flange	4028	68%
63	C-63	Web/Flange	3520	60%
64	C-64	Web/Flange	3685	63%
65	C-65	Web/Flange	4229	72%
66	C-66	Web/Flange	3628	62%
66	B-1	Web/Flange	3520	60%
66	B-2	Web/Flange	3492	59%
66	B-3	Web/Flange	3820	65%



Name of the Building :- Steam Turbine Building						
Location : 1st Floor						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	C-67	Web/Flange	3570	5890	61%
2		C-68	Web/Flange	3672		62%
3		C-69	Web/Flange	3928		67%
4		C-70	Web/Flange	3875		66%
5		C-71	Web/Flange	3720		63%
6		C-72	Web/Flange	3729		63%
7		C-73	Web/Flange	3872		66%
8		C-74	Web/Flange	3452		59%
9		C-75	Web/Flange	3625		62%
10		C-76	Web/Flange	3787		64%
11		C-77	Web/Flange	3625		62%
12		C-78	Web/Flange	3720		63%
13		C-79	Web/Flange	3875		66%
14		C-80	Web/Flange	3920		67%
15		C-81	Web/Flange	3520		60%
16		C-82	Web/Flange	3427		58%
17		C-83	Web/Flange	4526		77%
18		C-84	Web/Flange	3521		60%
19		C-85	Web/Flange	3684		63%
20		C-86	Web/Flange	3528		60%



21		C-87	Web/Flange	4520		77%
22		C-88	Web/Flange	4423		75%
23		C-89	Web/Flange	4521		77%
24		C-90	Web/Flange	3520		60%
25		C-91	Web/Flange	4200		71%
26		C-92	Web/Flange	3928		67%
27		C-93	Web/Flange	3842		65%

Name of the Building :- Steam Turbine Building						
Location : 2nd Floor						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) <i>(for Low Carbon Steel should not be less than 50 % of the desired industrial velocity)</i>
1	Column	C-94	Web/Flange	3492	5890	59%
2		C-95	Web/Flange	3342		57%
3		C-96	Web/Flange	3380		57%
4		C-97	Web/Flange	3680		62%
5		C-98	Web/Flange	3701		63%
6		C-99	Web/Flange	3870		66%
7		C-100	Web/Flange	3720		63%
8		C-101	Web/Flange	3650		62%
9		C-102	Web/Flange	3872		66%
10		C-103	Web/Flange	3569		61%
11		C-104	Web/Flange	3925		67%
12		C-105	Web/Flange	4028		68%



13	C-106	Web/Flange	3420	58%
14	C-107	Web/Flange	4528	77%
15	C-108	Web/Flange	4020	68%
16	C-109	Web/Flange	4520	77%
17	C-110	Web/Flange	4480	76%
18	C-111	Web/Flange	3870	66%
19	C-112	Web/Flange	4720	80%
20	C-113	Web/Flange	4002	68%
21	C-114	Web/Flange	4029	68%
22	C-115	Web/Flange	3842	65%
23	C-116	Web/Flange	4625	79%
24	C-117	Web/Flange	4522	77%
25	C-118	Web/Flange	4250	72%
26	C-119	Web/Flange	4570	78%
27	C-120	Web/Flange	3982	68%
28	C-121	Web/Flange	3825	65%
29	C-122	Web/Flange	4623	78%

3. Schmidt Hammer Test Results; -

Site Name : ASSAM GAS BASED POWER PLANT, NEEPCO							Date : 06.10.2021			
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)	
Name of the Structure : STEAM TURBINE BUILDING										
Location : ST - 01										
1	Point C-01	H→←	32	38	36	37	34	35	34	



2			34	32	40	42	42	40	44
3	Point C-02	H→κ←	34	32	36	34	36	34	32
4			32	34	32	36	34	34	32
5	Point C-03	H→κ←	40	36	36	38	34	37	38
6			34	36	32	34	36	34	32
7	Point C-04	H→κ←	38	34	32	36	38	36	36
8			40	42	38	34	32	39	42
9	Point C-05	H→κ←	38	32	34	38	34	35	34
10			36	32	34	36	38	35	34
11	Point C-06	H→κ←	39	42	40	44	42	41	46
12			38	42	44	38	35	39	42
13	Point C-07	H→κ←	36	34	39	37	34	36	36
14			36	34	36	34	36	35	34
15	Point C-08	H→κ←	34	32	34	34	36	34	32
16	Point W-09	H→κ←	32	36	34	32	36	34	32
17			34	33	32	34	32	33	30
18	Point W-10	H→κ←	30	28	34	36	34	32	30
19			36	32	36	34	30	34	32
20	Point W-11	H→κ←	32	34	32	34	36	34	32
21			31	34	31	34	32	32	30
22	Point W-12	H→κ←	32	30	34	32	34	32	30
23			30	34	34	32	34	33	30
24	Point W-13	H→κ←	32	36	34	30	34	33	30
25			28	33	35	32	31	32	30
26	Point C-09	H→κ←	34	38	36	34	32	35	34



27			34	30	32	30	34	32	30
28	Point C-10	H→κ←	36	34	36	34	37	35	34
29			34	32	34	34	33	33	30
30	Point C-11	H→κ←	40	38	34	34	36	36	36
31	Point W-01	H→κ←	22	23	28	24	22	24	16
32			24	28	24	24	28	26	20
33	Point W-02	H→κ←	20	22	28	27	28	25	18
34			24	24	21	28	20	23	14
35	Point W-03	H→κ←	22	24	21	29	20	22	14
36			28	24	24	28	20	25	18
37	Point W-04	H→κ←	22	24	24	20	22	22	14
38			24	28	24	28	22	25	18
39	Point W-05	H→κ←	32	30	32	34	34	32	30
40			32	34	36	32	34	34	32
41	Point W-06	H→κ←	34	32	30	32	34	32	30
42	Point W-07	H→κ←	34	32	30	32	34	32	30
43	Point C-12	H→κ←	36	34	38	34	32	35	34
44			34	32	37	32	38	35	34
45	Point C-13	H→κ←	34	36	32	34	36	34	32
46			38	37	36	34	36	36	36
47	Point F - 01	H→κ←	34	2	34	30	32	30	26
48			30	32	34	32	30	32	30
49	Point F - 02	H→κ←	34	30	36	32	34	33	30
50			30	30	28	36	32	31	28
Average Compressive Strength =									30.44



Location : ST - 02									
51	Point C-01	H→←	38	36	34	34	32	35	34
52			33	36	34	33	36	34	32
53	Point C-02	H→←	34	32	34	32	36	34	32
54			36	37	38	33	36	36	36
55		H→←	36	34	37	32	34	35	34
56			36	34	34	38	32	35	34
57	Point W-01	H→←	30	28	26	32	34	30	26
58			30	34	28	27	32	30	26
59	Point W-02	H→←	20	24	30	28	24	27	20
60			23	24	22	23	28	24	16
61	Point W-03	H→←	24	29	28	32	34	31	28
62			30	32	34	30	28	31	28
63	Point W-04	H→←	32	32	30	28	28	30	26
64			32	28	30	29	28	29	24
65	Point W-05	H→←	28	34	32	31	33	32	30
66			30	34	28	29	32	31	28
67	Point C-03	H→←	32	36	35	33	32	34	32
68			30	34	32	38	32	33	30
69	Point W-06	H→←	28	30	24	28	29	28	22
70			27	29	28	30	32	29	24
71	Point W-07	H→←	29	30	30	32	34	31	28
72			30	32	31	32	30	31	28
73	Point W-08	H→←	32	30	32	30	32	31	28
74			34	30	32	30	32	32	30



75	Point W-09	H→←	30	32	34	30	32	32	30
76			34	32	28	29	30	31	28
77	Point C-05	H→←	34	28	31	3	32	28	22
78			34	36	38	34	37	36	36
79	Point C-06	H→←	34	36	34	32	30	33	30
80			32	34	30	36	34	33	30
81	Point C-07	H→←	34	32	30	32	34	32	30
82	Point C-08	H→←	36	34	32	34	32	34	32
83			34	32	36	32	30	33	30
84	Point C-09	H→←	34	36	38	34	36	36	36
85			31	34	37	35	32	34	32
86	Point W-10	H→←	28	30	32	32	30	30	26
87			30	32	32	30	32	31	28
88	Point W-11	H→←	30	32	34	30	28	31	28
89			31	28	33	32	33	31	28
90	Point W-12	H→←	28	24	28	32	30	28	22
91			24	26	32	34	30	31	28
92	Point W-14	H→←	28	29	30	33	32	30	26
93			30	32	34	32	30	32	30
94	Point W-15	H→←	30	32	34	30	32	32	30
95			34	30	39	32	32	32	30
96	Point C-10	H→←	32	30	32	36	34	33	30
97	Point C-11	H→←	30	34	32	28	34	32	30
98			32	32	34	30	32	32	30
99	Point C-12	H→←	36	32	34	37	34	35	34



100			30	32	34	30	32	32	30
101	Point C-13	H→κ←	32	30	28	34	32	31	28
102			28	31	33	32	34	32	30
103	Point C-14	H→κ←	28	32	34	32	34	32	30
104			30	32	34	32	30	32	30
105	Point F - 01	H→κ←	30	32	34	30	32	32	30
106			30	34	32	30	34	32	30
107	Point F - 02	H→κ←	26	29	34	32	34	31	28
108			30	39	28	32	34	31	28
Average Compressive Strength = 28.90									
Location : ST - 03									
109	Point C-03	H→κ←	36	38	34	39	32	36	36
110			34	32	34	32	34	33	30
111	Point C-04	H→κ←	36	32	39	32	38	35	34
112			32	34	36	34	33	34	32
113	Point W-06	H→κ←	28	32	31	24	28	29	24
114			30	32	34	32	32	32	30
115	Point W-07	H→κ←	34	32	34	30	33	33	30
116			34	32	30	31	35	32	30
117	Point W-08	H→κ←	30	33	32	30	28	31	28
118			24	25	28	28	27	26	20
119	Point W-09	H→κ←	24	28	24	23	27	25	18
120			30	31	32	34	32	32	30
121	Point W-10	H→κ←	28	24	30	28	30	28	22
122			24	25	28	31	28	27	20



123	Point C-05	H→κ←	34	32	36	39	34	35	34
124			32	36	34	32	34	34	32
125	Point C-06	H→κ←	34	32	36	34	32	34	32
126			34	30	32	30	34	32	30
127	Point C-07	H→κ←	32	34	30	32	30	32	30
128			32	30	34	32	34	32	30
129	Point C-08	H→κ←	36	37	36	34	32	35	34
130			34	36	32	34	32	34	32
131	Point C-10	H→κ←	32	34	32	28	31	31	28
132			31	24	28	30	29	28	22
133	Point C-11	H→κ←	24	29	31	32	34	32	30
134			30	32	34	32	30	32	30
135	Point W-12	H→κ←	32	34	30	32	34	32	30
136			30	32	30	34	32	32	30
137	Point W-13	H→κ←	32	30	32	30	32	31	28
138			28	32	30	28	29	29	24
139	Point C-11	H→κ←	32	34	30	28	36	32	30
140			28	33	36	35	34	35	34
141	Point C-01	H→κ←	34	32	34	36	34	34	32
142			32	34	36	34	32	34	32
143	Point C-02	H→κ←	34	33	38	36	34	35	34
144			32	36	33	34	31	33	30
145	Point W - 01	H→κ←	28	32	30	32	30	30	26
146			30	32	34	30	32	32	30
147	Point W - 02	H→κ←	30	28	30	34	32	31	28



148			30	32	34	32	30	32	30
149	Point W - 03	H→←	28	24	29	31	32	29	24
150			25	29	28	30	28	28	22
151	Point W - 04	H→←	24	28	32	30	29	29	24
152			29	32	30	34	32	31	28
153	Point W - 05	H→←	30	32	30	32	30	31	28
154	Point W - 14	H→←	32	39	32	36	34	35	34
155			32	30	32	34	32	32	30
156	Point W - 10	H→←	36	32	34	32	34	34	32
157			32	34	36	34	32	34	32
158	Point C - 12	H→←	32	34	32	31	30	32	30
159			34	33	31	34	30	32	30
160	Point C - 09	H→←	34	36	32	33	31	33	30
161			32	33	34	33	32	33	30
162	Point F - 01	H→←	32	34	31	30	34	32	30
163			30	32	36	32	30	32	30
164	Point F - 02	H→←	28	30	29	32	34	31	28
165			28	30	31	32	34	31	28
Average Compressive Strength =									29.05
Location : Roof Slab									
166	Point - 01	V↓	30	28	32	34	28	30	32
167			28	30	24	23	24	26	24
168	Point - 02	V↓	32	34	30	28	29	31	32
169			34	28	30	29	31	30	32
170	Point - 03	V↓	34	30	28	24	29	29	30



171			31	34	28	30	28	30	32
172	Point - 04	V↓	32	34	32	33	31	32	34
173			30	32	33	34	32	32	34
174	Point - 05	V↓	34	33	32	31	35	33	36
175			30	28	30	30	32	30	32
176	Point - 06	V↓	28	30	29	32	31	30	32
177			24	29	32	34	32	32	34
178	Point - 07	V↓	28	27	30	32	30	29	30
179			28	24	32	29	31	29	30
180	Point - 08	V↓	30	33	34	28	29	31	32
181			32	31	30	28	30	30	32
182	Point - 09	V↓	30	28	24	32	34	31	32
183			33	30	26	29	30	30	32
Average Compressive Strength =									31.78

4. Ultrasonic Pulse Velocity of Concrete Test Results:-

Site Name : ASSAM GASED BASED POWER PLANT, NEEPCO					
Name of the Structure : STEAM TURBINE BUILDING				Date : 06.10.2021	
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity Km/sec	Remarks
Location : ST - 01					
1	Point C-01	Direct	1200	4.247	Good
2	Point C-02	Direct	1200	4.463	Good
3	Point C-03	Direct	1000	3.500	Good



4	Point C-04	Direct	1000	3.829	Good
5	Point C-05	Direct	1000	3.625	Good
6	Point C-06	Direct	1000	4.325	Good
7	Point C-07	Direct	300	2.224	Doubtful
8	Point C-08	Direct	300	3.292	Doubtful
9	Point W-09	Indirect	300	1.294	Doubtful
10	Point W-10	Indirect	300	2.302	Doubtful
11	Point W-11	Indirect	300	1.602	Doubtful
12	Point W-12	Indirect	300	1.652	Doubtful
13	Point W-13	Indirect	300	1.652	Doubtful
14	Point C-09	Indirect	300	2.034	Doubtful
15	Point C-10	Indirect	300	2.042	Doubtful
16	Point C-11	Indirect	300	2.191	Doubtful
17	Point W- 01	Indirect	300	2.049	Doubtful
18	Point W- 02	Indirect	300	2.120	Doubtful
19	Point W- 03	Indirect	300	2.134	Doubtful
20	Point W- 04	Indirect	300	2.139	Doubtful
21	Point W- 05	Indirect	300	3.394	Doubtful



22		Indirect	300	3.236	Doubtful
23	Point W- 06	Indirect	300	3.246	Doubtful
24	Point W- 07	Indirect	300	3.664	Good
25	Point W- 12	Indirect	300	2.533	Doubtful
26	Point W- 13	Indirect	300	2.533	Doubtful
27	Point F - 01	Indirect	300	3.204	Doubtful
28	Point F - 02	Indirect	300	3.528	Good
Average Velocity =				2.788	Doubtful
Location : ST - 02					
29	Point C-01	Direct	1200	4.132	Good
30	Point C-02	Direct	1250	4.325	Good
31		Direct	300	4.129	Good
32	Point W-01	Indirect	300	4.206	Good
33	Point C - 03	Indirect	300	3.000	Doubtful
34	Point W-06	Indirect	300	3.125	Doubtful
35	Point W-07	Indirect	300	3.146	Doubtful
36	Point W-08	Indirect	300	3.205	Doubtful
37	Point W-09	Indirect	300	3.428	Doubtful
38	Point C - 05	Direct	1200	4.420	Good



39	Point C - 06	Direct	1200	3.928	Good
40	Point C - 07	Indirect	300	3.527	Good
41	Point C - 08	Indirect	300	3.725	Good
42	Point C - 09	Indirect	300	3.526	Good
43	Point W - 10	Indirect	300	2.892	Doubtful
44	Point W - 11	Indirect	300	3.421	Doubtful
45	Point W - 12	Indirect	300	3.725	Good
46	Point W - 14	Indirect	300	3.725	Good
47	Point W - 15	Indirect	300	3.245	Doubtful
48	Point C - 10	Direct	1200	4.207	Good
49	Point C - 11	Indirect	300	2.302	Doubtful
50	Point C - 12	Indirect	300	2.684	Doubtful
51	Point C - 13	Indirect	300	3.207	Doubtful
52	Point C - 14	Indirect	300	3.429	Doubtful
53	Point F - 01	Indirect	300	3.222	Doubtful
54	Point F - 02	Indirect	300	3.855	Good
Average Velocity =				3.528	Good
Location : ST - 03					
55	Point C-03	Direct	1250	4.425	Good



56	Point C-04	Direct	1250	4.028	Good
57	Point W-06	Direct	300	3.270	Doubtful
58	Point W-07	Indirect	300	3.320	Doubtful
59	Point W-08	Indirect	300	3.420	Doubtful
60	Point W-09	Indirect	300	3.120	Doubtful
61	Point W-10	Indirect	300	2.790	Doubtful
62	Point C - 05	Direct	1000	4.204	Good
63	Point C - 06	Direct	1000	4.945	Excellent
64	Point C - 07	Indirect	300	3.625	Good
65	Point C - 08	Indirect	300	3.265	Doubtful
66	Point W - 10	Indirect	300	3.029	Doubtful
67	Point W - 11	Indirect	300	3.129	Doubtful
68	Point W - 12	Indirect	300	2.928	Doubtful
69	Point W - 13	Indirect	300	2.823	Doubtful
70	Point C - 11	Indirect	300	3.421	Doubtful
71	Point C - 01	Direct	1250	4.333	Good
72	Point C - 02	Direct	1250	4.289	Good
73	Point W - 01	Indirect	300	3.055	Doubtful



74	Point W - 02	Indirect	300	3.289	Doubtful
75	Point W - 03	Indirect	300	3.242	Doubtful
76	Point W - 04	Indirect	300	3.625	Good
77	Point W - 05	Indirect	300	3.249	Doubtful
78	Point W - 14	Indirect	300	3.250	Doubtful
79	Point C - 10	Indirect	300	3.687	Good
80	Point C - 12	Indirect	300	3.523	Good
81	Point C - 09	Indirect	300	3.697	Good
82	Point F - 01	Indirect	300	3.427	Doubtful
83	Point F - 02	Indirect	300	3.331	Doubtful
Average Velocity =				3.508	Good
Location : Roof Slab					
84	Point - 01	Indirect	300	3.195	Doubtful
85	Point - 02	Indirect	300	2.451	Doubtful
86	Point - 03	Indirect	300	2.892	Doubtful
87	Point - 04	Indirect	300	3.414	Doubtful
88	Point - 05	Indirect	300	2.553	Doubtful
89	Point - 06	Indirect	300	3.151	Doubtful
90	Point - 07	Indirect	300	3.967	Good



91	Point - 08	Indirect	300	3.663	Good
92	Point - 09	Indirect	300	3.484	Doubtful
Average Velocity =				3.197	Doubtful

5. The Electrical Resistivity Test Results: -

Name of the Structure : Steam Turbine Building						
Location : Steam Turbine TG -1						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	C-1'1-1	95700	98300	112700	102233	Negligible
2	C-1'1-2	120700	138900	140200	133267	Negligible
3	C-1'1-3	99800	110200	120800	110267	Negligible
4	W-1-1	30200	32400	36300	32967	Negligible
5	W-1-2	28200	22500	29400	26700	Negligible
6	W-1-3	40300	45200	29700	38400	Negligible
7	W-4-1	28200	30700	38900	32600	Negligible
8	W-4-2	22600	28700	29200	26833	Negligible
9	W-4-3	30300	32500	38700	33833	Negligible
10	C-1'2-1	99700	92200	110300	100733	Negligible
11	C-1'2-2	112400	120500	113300	115400	Negligible
12	C-1'2-3	99200	95600	90700	95167	Negligible
13	W-5-1	38900	45600	50300	44933	Negligible
14	W-5-2	59400	28300	29400	39033	Negligible
15	W-5-3	22200	28600	32200	27667	Negligible
16	W-7-1	22200	30700	32200	28367	Negligible
17	W-7-2	28200	38900	36300	34467	Negligible



18	W-7-3	42300	45400	38700	42133	Negligible
19	W-8-1	22700	28400	36900	29333	Negligible
20	W-8-2	32500	36200	39500	36067	Negligible
21	W-8-3	42400	46300	50400	46367	Negligible
22	C-1'3-1	97700	98500	120700	105633	Negligible
23	C-1'3-2	132200	138600	122300	131033	Negligible
24	C-1'3-3	99500	92200	98500	96733	Negligible
25	C-1'4-1	120200	138300	142200	133567	Negligible
26	C-1'4-2	99700	98200	92500	96800	Negligible
27	C-1'4-3	112200	120500	132300	121667	Negligible
28	W-9-1	22300	28400	29600	26767	Negligible
29	W-9-2	32500	36200	38900	35867	Negligible
30	W-9-3	39200	42700	45400	42433	Negligible
31	W-10-1	40200	45300	49200	44900	Negligible
32	W-10-2	50400	59200	62300	57300	Negligible
33	W-10-3	68700	63300	70200	67400	Negligible
34	W-12-1	38900	42600	45300	42267	Negligible
35	W-12-2	36300	32200	28400	32300	Negligible
36	W-12-3	22300	25600	37800	28567	Negligible
37	W-13-1	62200	68300	59500	63333	Negligible
38	W-13-2	50400	42200	38900	43833	Negligible
39	W-13-3	32500	36300	29200	32667	Negligible
40	C-10-1	120300	132200	138500	130333	Negligible
41	C-10-2	90300	99400	90200	93300	Negligible
42	C-10-3	78600	72300	69500	73467	Negligible



43	C-13-1	110400	99500	105400	105100	Negligible
44	C-13-2	112300	120200	99700	110733	Negligible
45	C-13-3	80400	85200	78600	81400	Negligible
46	F-1-1	59200	60300	63200	60900	Negligible
47	F-1-2	49300	46400	38900	44867	Negligible
48	F-1-3	36200	30500	29300	32000	Negligible
49	F-2-1	22300	28400	26500	25733	Negligible
50	F-2-2	32600	38900	42400	37967	Negligible
51	F-2-3	50300	55700	59200	55067	Negligible
Location :Steam Turbine TG -2						
1	C-1-1	110200	112400	105200	109267	Negligible
2	C-1-2	99800	95700	120300	105267	Negligible
3	C-1-3	114300	122800	99400	112167	Negligible
4	W-1-1	38200	36300	39500	38000	Negligible
5	W-1-2	30400	32200	29300	30633	Negligible
6	W-1-3	26500	28200	30400	28367	Negligible
7	W-4-1	22700	26300	32200	27067	Negligible
8	W-4-2	28400	29200	36500	31367	Negligible
9	W-4-3	38900	32500	38900	36767	Negligible
10	C-3-1	90200	95300	99700	95067	Negligible
11	C-3-2	110300	120400	122300	117667	Negligible
12	C-3-3	134900	99700	102100	112233	Negligible
13	W-6-1	30200	32500	40200	34300	Negligible
14	W-6-2	22600	29300	32200	28033	Negligible
15	W-6-3	26400	28500	36400	30433	Negligible



16	W-8-1	20700	28900	30400	26667	Negligible
17	W-8-2	36200	38900	39200	38100	Negligible
18	W-8-3	40300	46500	38300	41700	Negligible
19	C-5-1	130200	120300	110200	120233	Negligible
20	C-5-2	98400	103200	99700	100433	Negligible
21	C-5-3	105300	80700	90200	92067	Negligible
22	C-8-1	99300	90200	95700	95067	Negligible
23	C-8-2	102400	112300	90400	101700	Negligible
24	C-8-3	80300	87600	70200	79367	Negligible
25	C-10-1	87200	89300	90300	88933	Negligible
26	C-10-2	70200	78300	80300	76267	Negligible
27	C-10-3	110400	105200	99500	105033	Negligible
28	W-11-1	38600	36500	30200	35100	Negligible
29	W-11-2	32300	28400	29300	30000	Negligible
30	W-11-3	39400	42600	49200	43733	Negligible
31	W-12-1	32200	38700	26300	32400	Negligible
32	W-12-2	28300	26200	29400	27967	Negligible
33	W-12-3	30200	32400	38600	33733	Negligible
34	W-15-1	32300	29200	36300	32600	Negligible
35	W-15-2	22200	26300	28700	25733	Negligible
36	W-15-3	20300	29400	30200	26633	Negligible
37	C-11-1	110200	120300	99300	109933	Negligible
38	C-11-2	80400	88200	92500	87033	Negligible
39	C-11-3	112500	114400	110300	112400	Negligible
40	C-13-1	78600	79500	82200	80100	Negligible



41	C-13-2	88300	80200	90500	86333	Negligible
42	C-13-3	110200	122300	99400	110633	Negligible
43	F-1-1	40200	45800	49700	45233	Negligible
44	F-1-2	38400	26200	32500	32367	Negligible
45	F-1-3	22600	28300	29400	26767	Negligible
46	F-2-1	36300	38900	40300	38500	Negligible
47	F-2-2	49200	50400	58200	52600	Negligible
48	F-2-3	50200	55600	50200	52000	Negligible
Location :Steam Turbine TG -3						
1	C-1-1	112300	120400	110200	114300	Negligible
2	C-1-2	98200	99500	92400	96700	Negligible
3	C-1-3	70500	78200	79900	76200	Negligible
4	W-1-1	38600	32300	30200	33700	Negligible
5	W-1-2	28200	29500	32400	30033	Negligible
6	W-1-3	22700	28200	36300	29067	Negligible
7	W-4-1	32200	36700	39400	36100	Negligible
8	W-4-2	22300	28400	30200	26967	Negligible
9	W-4-3	40200	45600	49500	45100	Negligible
10	C-4-1	72200	78300	82200	77567	Negligible
11	C-4-2	92300	88700	89500	90167	Negligible
12	C-4-3	62200	68400	69900	66833	Negligible
13	W-7-1	40300	42500	49200	44000	Negligible
14	W-7-2	26400	28700	30500	28533	Negligible
15	W-7-3	22600	29300	32700	28200	Negligible
16	W-8-1	38700	39200	40200	39367	Negligible



17	W-8-2	42500	49300	50400	47400	Negligible
18	W-8-3	28300	29200	32500	30000	Negligible
19	W-9-1	20500	28900	29700	26367	Negligible
20	W-9-2	30200	36500	32200	32967	Negligible
21	W-9-3	38900	40200	42300	40467	Negligible
22	C-6-1	90300	95700	99400	95133	Negligible
23	C-6-2	82200	88500	70200	80300	Negligible
24	C-6-3	72500	68900	69300	70233	Negligible
25	C-8-1	92200	95600	98700	95500	Negligible
26	C-8-2	80200	88400	82300	83633	Negligible
27	C-8-3	72300	78600	79700	76867	Negligible
28	W-11-1	38300	42200	49500	43333	Negligible
29	W-11-2	36200	32300	28700	32400	Negligible
30	W-11-3	29300	26500	22400	26067	Negligible
31	W-12-1	40200	38900	39500	39533	Negligible
32	W-12-2	30200	28700	29900	29600	Negligible
33	W-12-3	38900	36200	40200	38433	Negligible
34	W-14-1	30200	36400	42200	36267	Negligible
35	W-14-2	28700	29200	32400	30100	Negligible
36	W-14-3	22600	28300	30200	27033	Negligible
37	C-9-1	100200	138300	112400	116967	Negligible
38	C-9-2	128500	99200	95300	107667	Negligible
39	C-9-3	89500	110500	99400	99800	Negligible
40	C-11-1	113200	120300	99700	111067	Negligible
41	C-11-2	99500	92200	82500	91400	Negligible



42	C-11-3	110200	80400	89200	93267	Negligible
43	F-1-1	28300	22400	30200	26967	Negligible
44	F-1-2	26300	29900	32500	29567	Negligible
45	F-1-3	36400	38500	39200	38033	Negligible
46	F-2-1	38200	40300	42500	40333	Negligible
47	F-2-2	26300	28400	36200	30300	Negligible
48	F-2-3	22200	30500	29400	27367	Negligible

6. RESULTS OF DEPTH OF CARBONATION TEST

Sl No.	Location	Depth of Carbonation (mm)	Permissible Value (mm)	Remarks
1	ST-1	20	Low-Moderate	Low
2	ST-2	15		Low
3	ST-3	30		Low

7. RESULTS OF CONCRETE CORE

Location	In-Situ Compressive Strength (N/mm ²)	Modulus of Elasticity of Concrete (GPa)
ST-1 FC-1	43.59	33.01
ST-2 FC-1	43.15	32.84
ST-3 FC-1	41.30	32.13
ST-3 C-1	39.52	31.43

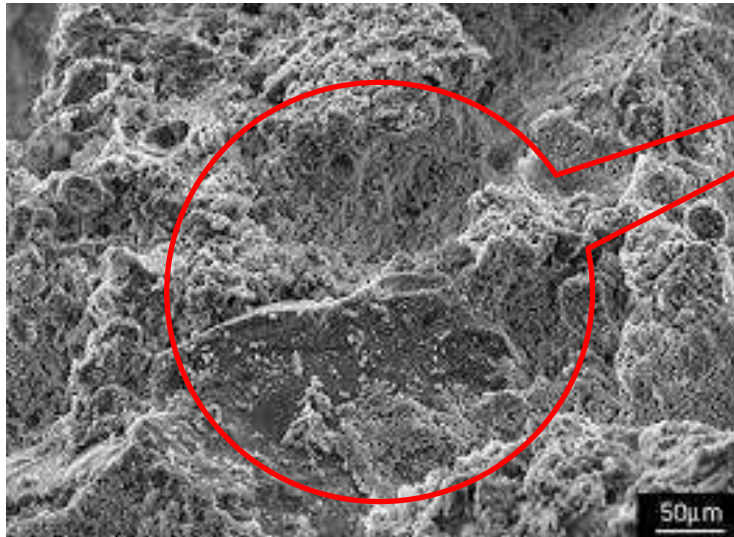
8. RESULTS OF CHLORIDE & pH TESTS OF CONCRETE CORE

SL. No.	Sample Type	Chloride Content (%)	Permissible value (IS 456 2000)	pH Value	Permissible Limit (IS 456 2000)	Remarks
---------	-------------	----------------------	---------------------------------	----------	---------------------------------	---------

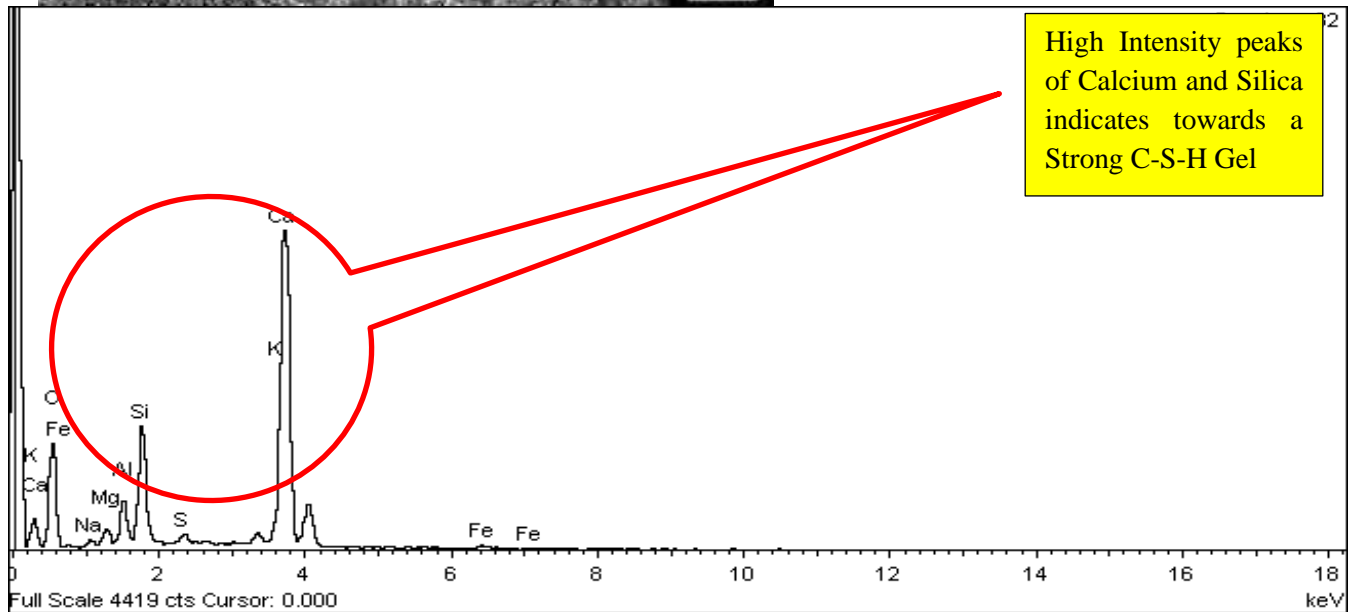


1	Concrete Core	0.32	0.6 % of Concrete Cement Content (Max)	11.1	Not Less Than 9	High
2		0.30		11.4		High
3		0.29		11.3		High

9. Results of Microstructural Studies :-



Dense Paste & Matrix is Shown SEM Images



High Intensity peaks of Calcium and Silica indicates towards a Strong C-S-H Gel



Vibration Test Results

Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (µm)	Temperature (°C)	CF Plus	Comment
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3(for RCC foundation)				
1	Building Name - Steam Turbine Building								
i)	Location: Stream Turbine Generator-1								
	At Exciter Machine	0.97	0.61	1.55	Good	4.20	46.9	0	Good
	At Exciter Foundation	0.19	0.00	0.38	OK	4.09	33.8	0	Good
	At Bearing Machine	0.75	0.00	1.47	Good	5.16	48.1	0	Good
	At Bearing Foundation	0.15	0.00	0.30	OK	3.39	37.1	0	Good
	At Generator Machine	2.57	0.95	1.07	Good	3.99	44.8	0	Good
	At Generator Foundation	0.31	0.00	0.40	OK	3.05	37.1	0	Good
	At Turbine Machine	1.89	14.93	1.72	Good	5.40	40.3	4	Good
	At Turbine Foundation	0.48	0.00	0.36	OK	3.13	36.4	0	Good
	At Condenser Machine	0.30	0.43	0.54	Good	3.61	35.1	0	Good
	At Condenser Foundation	0.06	0.00	0.21	OK	3.04	31.2	0	Good
ii)	Location: Stream Turbine Generator-2								
	At Exciter Machine	8.18	2.45	4.20	Satisfactory	7.49	52.9	1	Good
	At Exciter Foundation	1.06	0.00	1.64	OK	5.55	34.5	0	Good
	At Bearing Machine	2.03	0.00	2.54	Satisfactory	5.87	50.9	0	Good
	At Bearing Foundation	0.54	0.00	0.70	OK	3.58	37.4	0	Good



	At Generator Machine	1.53	0.41	2.09	Satisfactory	4.94	45.5	0	Good
	At Generator Foundation	0.79	0.00	1.04	OK	3.85	33.0	0	Good
	At Turbine Machine	3.31	9.08	2.56	Satisfactory	6.47	41.5	3	Good
	At Turbine Foundation	0.34	0.00	0.43	OK	3.68	37.1	0	Good
	At Condenser Machine	0.17	0.56	0.23	Good	3.35	37.1	0	Good
	At Condenser Foundation	0.07	0.00	0.20	OK	2.99	33.7	0	Good
iii)	Location: Stream Turbine Generator-3								
	At Exciter Machine	0.79	1.77	1.31	Good	4.87	58.5	0	Good
	At Exciter Foundation	0.35	0.00	0.67	OK	3.64	33.1	0	Good
	At Bearing Machine	0.32	0.00	0.72	Good	3.67	52.0	0	Good
	At Bearing Foundation	0.19	0.00	0.45	OK	3.44	35.3	0	Good
	At Generator Machine	2.92	0.91	2.05	Satisfactory	5.06	45.9	0	Good
	At Generator Foundation	0.53	0.00	0.70	OK	4.08	39.6	0	Good
	At Turbine Machine	0.94	8.37	1.22	Good	4.73	37.2	2	Good
	At Turbine Foundation	0.20	0.00	0.32	OK	3.47	38.0	0	Good
	At Condenser Machine	0.33	1.17	0.32	Good	2.97	33.8	0	Good
	At Condenser Foundation	0.08	0.00	0.16	OK	1.91	29.8	0	Good
iv)	Location: Boiler Feed Pump - 1B								
	At Machine	1.63	0.73	2.59	Satisfactory	10.31	28.6	0	Good
	At Foundation	0.09	0.00	0.24	OK	2.90	26.2	0	Good
v)	Location: Boiler Feed Pump - 2A								
	At Machine	1.35	0.53	2.77	Satisfactory	8.91	28.1	0	Good
	At Foundation	0.07	0.00	0.24	OK	3.33	24.4	0	Good
vi)	Location: Boiler Feed Pump - 3B								
	At Machine	1.97	0.46	2.51	Satisfactory	6.75	23.6	0	Good
	At Foundation	0.15	0.00	0.39	OK	3.28	19.6	0	Good



4.GAS BOOSTER STATION BUILDING



Vibration Test



Performed Tests: -



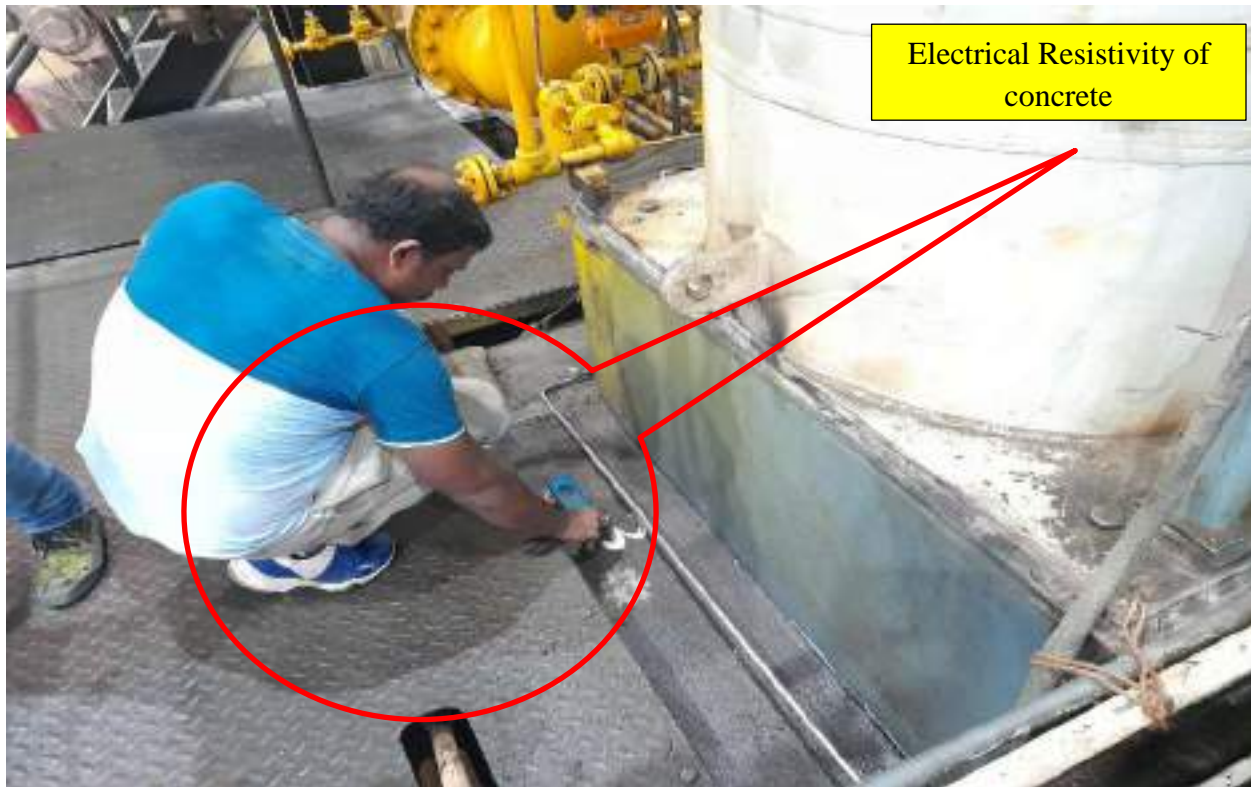


Ultrasonic Pulse Velocity of concrete



Rebound Hammer Test of concrete





Visual Inspection: -

1. Most of Steel ISMB Members are in good condition no sign of Flaw (Sagging, Corrosion, Paint Delamination)
2. Roof areas are covered with GI Sheet.



Vibration Test





TEST RESULTS



1. The Ultrasonic Thickness Precision Gauge Tests Results:

Name of the Building:- Gas Booster Station											
Location : Ground Floor											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-14	Web/Flange	10.24	10.22	10.12	10.15	10.59	10.23	3.56	C2 Low
2		C-15	Web/Flange	10.86	10.82	10.83	10.28	10.87	10.87	4.15	C2 Low
3		C-16	Web/Flange	10.11	10.15	10.19	10.10	10.05	10.06	5.29	C2 Low
4		C-17	Web/Flange	10.32	10.28	10.39	10.32	10.35	10.30	6.24	C2 Low
5		C-18	Web/Flange	10.32	10.28	10.30	10.25	10.38	10.30	6.48	C2 Low
6		C-19	Web/Flange	10.35	10.31	10.28	10.20	10.27	10.32	6.52	C2 Low
7		C-20	Web/Flange	10.42	10.44	10.39	10.37	10.34	10.32	6.78	C2 Low
8		C-21	Web/Flange	10.40	10.38	10.39	10.24	10.30	10.25	7.51	C2 Low
9		C-22	Web/Flange	10.38	10.32	10.28	10.38	10.38	10.36	3.48	C2 Low
10		C-23	Web/Flange	10.24	10.09	10.25	10.23	10.28	10.23	4.89	C2 Low
11		C-24	Web/Flange	10.29	10.28	10.30	10.30	10.28	10.25	3.78	C2 Low
12		C-25	Web/Flange	10.23	10.28	10.23	10.25	10.22	10.25	4.52	C2 Low
13		C-26	Web/Flange	10.20	10.22	10.25	10.30	10.29	10.28	3.22	C2 Low
14		C-27	Web/Flange	10.42	10.39	10.37	10.41	10.42	10.42	3.89	C2 Low
15		C-28	Web/Flange	10.34	10.31	10.38	10.32	10.30	10.39	3.76	C2 Low
16		C-29	Web/Flange	10.29	10.28	10.23	10.20	10.24	10.27	3.64	C2 Low



2.The Ultrasonic Pulse Velocity of steel Tests Results:

Name of the Building :- Gas Booster Station						
Location : Ground Floor						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) <i>(for Low Carbon Steel should not be less than 50 % of the desired industrial velocity)</i>
1	Column	C-14	Web/Flange	3528	5890	60%
2		C-15	Web/Flange	3725		63%
3		C-16	Web/Flange	4425		75%
4		C-17	Web/Flange	4326		73%
5		C-18	Web/Flange	3582		61%
6		C-19	Web/Flange	3725		63%
7		C-20	Web/Flange	4529		77%
8		C-21	Web/Flange	4326		73%
9		C-22	Web/Flange	3620		61%
10		C-23	Web/Flange	3529		60%
11		C-24	Web/Flange	3429		58%
12		C-25	Web/Flange	4025		68%
13		C-26	Web/Flange	4520		77%
14		C-27	Web/Flange	4325		73%
15		C-28	Web/Flange	3028		51%
16		C-29	Web/Flange	3852		65%



3. Schmidt Hammer Test Results: -

Site Name : ASSSAM GAS BASED POWER PLANT, NEEPCO							Date : 06.10.2021			
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)	
Name of the Structure : GAS BOOSTER STATION										
Location : GBS - 01										
1	Point - 01	V↓	32	33	34	32	34	33	36	
2			30	32	28	33	32	31	32	
3	Point - 02	V↓	28	30	32	30	32	30	32	
4			29	34	32	34	34	33	36	
5	Point - 03	V↓	34	32	33	32	34	33	36	
6			32	34	34	30	31	32	34	
7	Point - 04	V↓	31	33	34	32	35	33	36	
8			32	34	30	28	31	31	32	
9	Point - 05	V↓	30	32	34	33	35	33	36	
10			30	34	30	32	34	32	34	
11	Point - 06	V↓	32	34	30	31	37	33	36	
12			30	32	32	34	32	32	34	
Average Compressive Strength =								34.50		
Location : GBS - 02										
13	Point - 01	V↓	30	33	32	34	31	32	34	
14			34	32	30	32	28	31	32	
15	Point - 02	V↓	28	29	26	30	26	28	28	
16			39	38	32	34	38	36	42	
17	Point - 03	V↓	29	30	34	32	34	32	34	
18			30	28	32	30	32	30	32	



19	Point - 04	V↓	30	28	24	30	28	28	28
20			30	26	29	31	30	29	30
21	Point - 05	V↓	36	32	30	33	34	33	36
22			32	34	30	36	33	33	36
23	Point - 06	V↓	32	30	35	31	34	32	34
24			30	32	34	32	34	32	34

Average Compressive Strength = 33.33

Location : GBS - 03

25	Point - 01	V↓	30	28	32	34	32	31	32
26			32	34	30	32	32	32	34
27	Point - 02	V↓	34	32	28	36	37	35	40
28			32	34	32	28	30	31	32
29	Point - 03	V↓	34	30	32	30	28	31	32
30			36	32	30	34	32	33	36
31	Point - 04	V↓	34	30	36	32	37	34	38
32			34	38	32	32	34	34	38
33	Point - 05	V↓	32	30	28	32	34	31	32
34			32	28	32	34	32	32	34
35	Point - 06	V↓	30	28	36	32	30	31	32

Average Compressive Strength = 34.55

Location : GBS - 04

36	Point - 01	V↓	28	32	34	32	30	31	32
37			32	34	30	34	30	32	34
38	Point - 02	V↓	34	36	32	34	32	34	38
39			34	30	32	34	32	32	34
40	Point - 03	V↓	33	32	28	24	34	32	34



41			39	30	32	28	30	30	32
42	Point - 04	V↓	32	34	30	32	34	32	34
43			33	30	30	32	32	31	32
44	Point - 05	V↓	30	28	30	29	36	29	30
45			28	36	34	32	32	32	34
46	Point - 06	V↓	30	34	32	30	29	31	32
47			30	28	34	32	34	32	34
Average Compressive Strength =									33.33

4. Ultrasonic Pulse Velocity of Concrete Test Results :-

Site Name : ASSAM GASED BASED POWER PLANT, NEEPCO					
Name of the Structure : GAS BOOSTER STATION				Date : 06.10.2021	
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location : GBS - 01					
1	Point - 01	Indirect	300	2.562	Doubtful
2	Point - 02	Indirect	300	2.629	Doubtful
3	Point - 03	Indirect	300	3.259	Doubtful
4	Point - 04	Indirect	300	3.227	Doubtful
5	Point - 05	Indirect	300	3.260	Doubtful
6	Point - 06	Indirect	300	2.620	Doubtful
Average Velocity =				2.926	Doubtful
Location : GBS - 02					
7	Point - 01	Indirect	300	3.225	Doubtful



8	Point - 02	Indirect	300	2.729	Doubtful
9	Point - 03	Indirect	300	2.528	Doubtful
10	Point - 04	Indirect	300	3.245	Doubtful
11	Point - 05	Indirect	300	2.352	Doubtful
12	Point - 06	Indirect	300	3.289	Doubtful
Average Velocity =				2.895	Doubtful
Location : GBS - 03					
13	Point - 01	Indirect	300	2.625	Doubtful
14	Point - 02	Indirect	300	3.028	Doubtful
15	Point - 03	Indirect	300	2.439	Doubtful
16	Point - 04	Indirect	300	2.329	Doubtful
17	Point - 05	Indirect	300	2.325	Doubtful
18	Point - 06	Indirect	300	2.428	Doubtful
Average Velocity =				2.529	Doubtful
Location : GBS - 04					
19	Point - 01	Indirect	300	3.289	Doubtful
20	Point - 02	Indirect	300	2.892	Doubtful
21	Point - 03	Indirect	300	3.426	Doubtful
22	Point - 04	Indirect	300	3.625	Good
23	Point - 05	Indirect	300	2.852	Doubtful



24	Point - 06	Indirect	300	3.126	Doubtful
Average Velocity =				3.202	Doubtful

4. Electrical Resistivity of Concrete Test Results :-

Name of the Structure : Gas Booster Station						
Location : Foundation						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
GBS-1						
1	P-1-1	40200	46700	49300	45400	Negligible
2	P-1-2	38900	36300	39400	38200	Negligible
3	P-1-3	28200	26400	30200	28267	Negligible
4	P-4-1	26300	28200	32400	28967	Negligible
5	P-4-2	42200	40400	49300	43967	Negligible
6	P-4-3	38900	36300	40200	38467	Negligible
7	P-6-1	28300	26800	32900	29333	Negligible
8	P-6-2	38600	32500	39400	36833	Negligible
9	P-6-3	49300	50400	56200	51967	Negligible
GBS-2						
1	P-1-1	32300	28700	29300	30100	Negligible
2	P-1-2	22700	24300	38900	28633	Negligible
3	P-1-3	49200	59400	62200	56933	Negligible
4	P-3-1	72300	78500	80300	77033	Negligible
5	P-3-2	62200	60300	59200	60567	Negligible
6	P-3-3	49400	55600	60400	55133	Negligible
7	P-5-1	22200	36400	38900	32500	Negligible



8	P-5-2	52300	58500	59200	56667	Negligible
9	P-5-3	40500	42200	49400	44033	Negligible
GBS-3						
1	P-1-1	110200	99100	98200	102500	Negligible
2	P-1-2	80400	82500	79300	80733	Negligible
3	P-1-3	78200	88400	76200	80933	Negligible
4	P-3-1	76500	78900	62300	72567	Negligible
5	P-3-2	68400	62300	59400	63367	Negligible
6	P-3-3	56200	49200	46300	50567	Negligible
7	P-5-1	38900	36200	42400	39167	Negligible
8	P-5-2	50900	56700	59200	55600	Negligible
9	P-5-3	62300	68400	70500	67067	Negligible
GBS-4						
1	P-1-1	70200	78300	80900	76467	Negligible
2	P-1-2	62400	67200	59300	62967	Negligible
3	P-1-3	40500	45700	38600	41600	Negligible
4	P-4-1	30200	36300	39200	35233	Negligible
5	P-4-2	40400	46200	50300	45633	Negligible
6	P-4-3	58300	55400	49200	54300	Negligible
7	P-5-1	70300	73500	78900	74233	Negligible
8	P-5-2	62400	68200	65300	65300	Negligible
9	P-5-3	59200	49300	46700	51733	Negligible



Vibration Test Results

Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (μm)	Temperature (°C)	CF Plus	Comment	
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3 (for RCC foundation)					
4	Building : Gas Booster Station									
	i)	Location : Gas Compressor -01								
		At Engine	10.84	1.11	4.66	Unsatisfactory	12.49	79.6	2	Good
		At Engine Foundation	0.42	0.00	0.70	OK	4.90	25.0	0	Good
		At Compressor Machine	5.96	43.06	7.95	Unsatisfactory	41.68	90.2	13	Unsatisfactory
	At Compressor Foundation	0.29	1.81	0.52	OK	4.76	27.5	7	Satisfactory	
	ii)	Location : Gas Compressor -02								
		At Engine	10.16	0.81	5.43	Unsatisfactory	25.74	81.1	0	Good
		At Engine Foundation	0.32	0.00	0.41	OK	4.24	24.0	0	Good
		At Compressor Machine	5.24	23.68	7.49	Unsatisfactory	29.80	92.1	10	Satisfactory
	At Compressor Foundation	0.22	0.00	0.63	OK	6.22	28.0	0	Good	
	iii)	Location : Gas Compressor -04								
		At Engine	8.12	1.10	4.83	Unsatisfactory	22.23	79.5	1	Good
		At Engine Foundation	0.30	0.00	0.41	OK	4.38	22.9	0	Good
		At Compressor Machine	5.51	8.57	7.34	Unsatisfactory	35.87	75.4	9	Satisfactory
	At Compressor Foundation	0.22	0.00	0.44	OK	4.33	26.9	0	Good	



RAW WATER RESERVOIR



Performed Test:-





Electrical Resistivity Test



Core Sample collection





Carbonation Test with 0.2 % Phenolphthalein Solution



In-situ Compressive Strength Test



Concrete pH Test

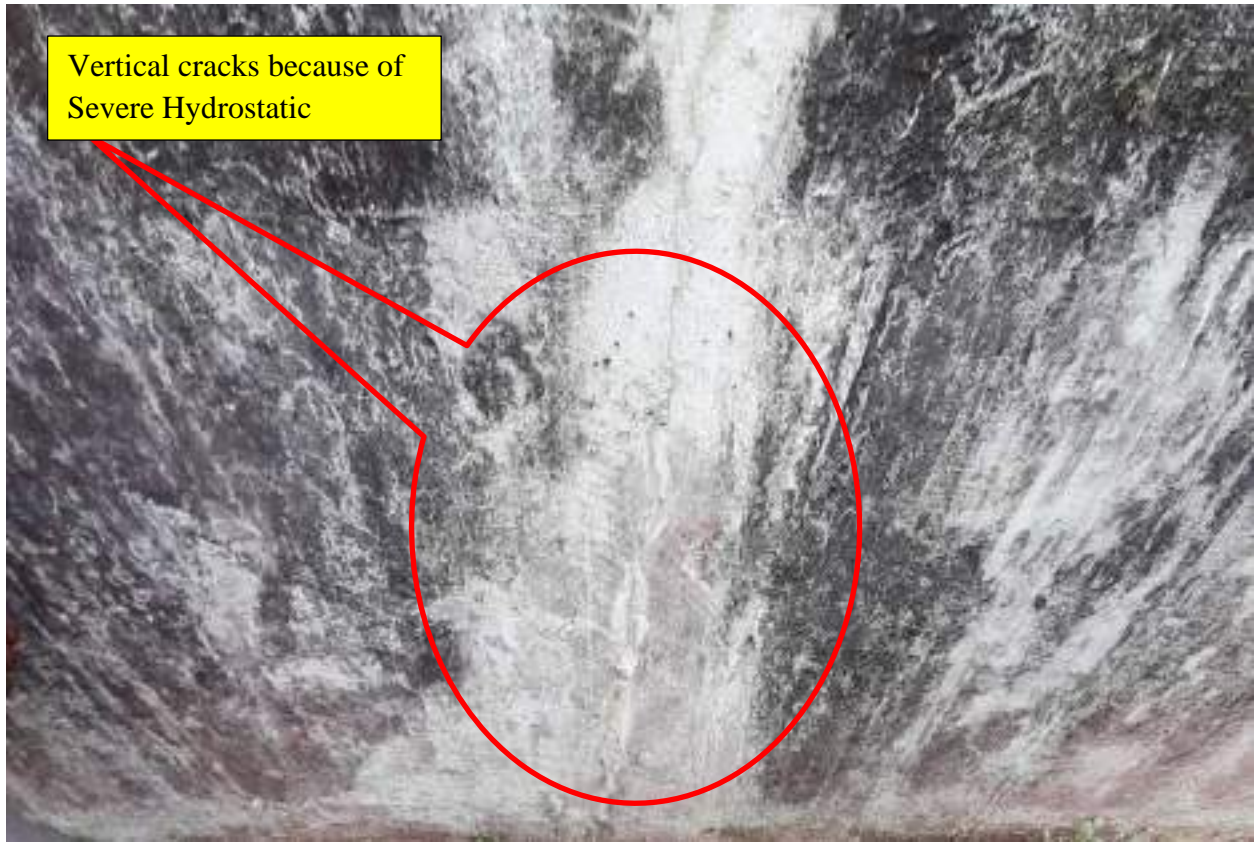


Visual Inspection: -

1. Many places of the Raw water reservoir concrete walls are facing water leakage problems
2. After long run of the water reservoir walls are now facing severe hydrostatic pressure.
3. Many places of the reservoir already pressure grouted with cement grout, yet some how the grouted places already weaken.
4. Wall concrete is also weakened by the years of wear and tear.
5. Further Repair and re-strengthening are required with Grouting and Jacketing
6. Some places Structural Steel are exposed and corroded which need to be treated
7. Some Places Concrete walls are facing water leakage problems which need to be treated
8. Some Places on the concrete surface crack has observed which need to be treated.
9. Restrengthening job through Cement Grouting is already done but these are not sustainable as compared to before.







Vertical cracks because of Severe Hydrostatic



Water leaking due to severe Hydrostatic pressure





Water leaking due to severe Hydrostatic pressure



Water leaking due to severe Hydrostatic pressure



TEST RESULTS



1. Schmidt Hammer Test Results: -

Site Name : ASSAM GAS BASED POWER PLANT, NEEPCO							Date: 01.10.21 - 02.10.21			
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)	
Name of the Structure: RAW Water Reservoir										
Location: OUTSIDE WALL										
19	Point - 10	H→|←	38	40	31	36	34	36	36	
20			32	33	30	35	32	32	30	
21	Point - 11	H→|←	38	30	32	37	33	34	32	
22			32	36	33	34	31	33	30	
23	Point - 12	H→|←	36	38	39	33	30	37	38	
24			39	32	33	34	36	35	34	
25	Point - 13	H→|←	36	37	36	35	32	35	34	
26			33	38	32	34	36	35	34	
27	Point - 14	H→|←	39	35	34	36	37	36	36	
28			38	32	33	30	34	33	30	
29	Point - 15	H→|←	33	34	36	39	32	35	34	
30			30	31	30	34	31	31	28	
31	Point - 16	H→|←	32	30	29	36	34	32	30	
32			31	33	34	28	35	32	30	
33	Point - 17	H→|←	40	39	42	30	38	40	44	
34			39	42	41	39	43	41	46	
35	Point - 18	H→|←	40	39	37	38	36	38	40	
36			37	38	42	40	34	38	40	
37	Point - 19	H→|←	44	40	42	39	40	41	46	
38			37	38	39	32	36	36	36	



39	Point - 20	H→←	28	36	30	33	30	31	28
40			31	32	36	31	32	32	30
41	Point - 21	H→←	33	31	32	34	36	33	30
42			37	39	34	30	32	34	32
43	Point - 22	H→←	30	32	39	36	35	34	32
44			32	33	30	32	34	32	30
45	Point - 23	H→←	34	40	36	37	42	38	40
46			7	39	41	36	40	36	36
47	Point - 24	H→←	45	43	40	39	44	42	48
48			40	39	45	41	42	41	46
49	Point - 25	H→←	32	39	38	36	40	37	38
50			33	36	37	34	35	35	34
51	Point - 26	H→←	39	38	30	32	36	35	34
52			35	32	34	39	37	35	34
53	Point - 27	H→←	30	34	36	37	30	33	30
54			36	37	35	32	34	35	34
55	Point - 28	H→←	38	36	36	39	32	36	36
56			34	35	30	37	35	34	32
57	Point - 29	H→←	36	34	32	34	39	35	34
58			37	35	34	38	40	37	38
59	Point - 30	H→←	34	37	39	32	31	35	34
60			39	36	35	34	40	37	38
61	Point - 31	H→←	40	37	32	34	41	37	38
62			39	32	38	36	33	36	36
63	Point - 32	H→←	44	43	39	46	39	42	48



64			40	41	38	40	42	40	44
65	Point - 33	H→←	44	46	40	41	39	42	48
66			40	38	46	42	40	41	46
67	Point - 34	H→←	43	47	42	40	39	42	48
68			40	39	38	42	43	40	44
69	Point - 35	H→←	34	38	40	41	36	38	40
70			37	39	42	40	36	39	42
71	Point - 36	H→←	40	34	35	33	34	35	34
72			38	39	41	36	37	38	40
73	Point - 37	H→←	39	37	36	35	34	36	36
74			36	32	34	30	33	33	30
75	Point - 38	H→←	44	39	40	36	38	39	42
76			42	41	38	37	36	39	42
77	Point - 39	H→←	46	39	38	33	34	36	36
78			39	40	38	41	40	40	44
79	Point - 40	H→←	40	38	36	37	8	36	36
80			42	40	39	36	39	39	42
81	Point - 41	H→←	40	42	39	37	38	39	42
82			39	36	37	39	40	38	40
83	Point - 42	H→←	42	40	46	43	41	42	48
84			40	43	41	42	44	42	48
85	Point - 43	H→←	41	42	43	39	40	41	46
86			39	38	37	41	42	39	42
87	Point - 44	H→←	38	34	35	36	39	36	36
88			40	33	37	38	35	37	38



89	Point - 45	H→H←	42	39	43	44	40	42	48
90			36	37	38	39	36	37	38
91	Point - 46	H→H←	30	38	32	36	34	34	32
92			39	37	33	34	35	36	36
93	Point - 47	H→H←	32	34	42	41	40	39	42
94			42	46	39	38	42	41	46
95	Point - 48	H→H←	38	39	40	41	42	40	44
96			39	37	36	37	38	37	38
97	Point - 49	H→H←	40	41	39	44	38	40	44
98			36	39	42	43	40	40	44
99	Point - 50	H→H←	39	38	42	40	41	40	44
100			36	37	38	42	39	38	40
101	Point - 51	H→H←	38	44	40	39	40	40	44
102			42	39	36	42	43	40	44
103	Point - 52	H→H←	38	34	30	36	39	37	38
104			40	32	36	32	33	33	30
105	Point - 53	H→H←	34	32	36	39	38	36	36
106			37	36	33	35	33	35	34
107	Point - 54	H→H←	39	42	44	40	41	41	46
108			38	40	36	39	42	39	42
109	Point - 55	H→H←	42	41	39	40	43	41	46
110			38	39	40	41	42	40	44
111	Point - 56	H→H←	39	40	41	42	43	41	46
112			36	37	38	39	40	38	40
113	Point - 57	H→H←	40	39	41	42	36	40	44



114			38	37	40	39	33	37	38
115	Point - 58	H→←	39	36	34	35	34	36	36
116			30	31	32	34	30	31	28
117	Point - 59	H→←	39	40	38	37	38	38	40
118			36	37	41	42	36	38	40
Average Compressive Strength =									38.44

2. Ultrasonic Pulse Velocity Test Results: -

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					
Name of the Structure: Raw Water Reservoir				Date : 01.10.21-02.10.21	
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity Km/sec	Remarks
Location: OUTSIDE WALL					
10	Point - 10	Indirect	300	4.054	Good
11	Point - 11	Indirect	300	4.093	Good
12	Point - 12	Indirect	300	3.801	Good
13	Point - 13	Indirect	300	3.760	Good
14	Point - 14	Indirect	300	3.810	Good
15	Point - 15	Indirect	300	4.005	Good
16	Point - 16	Indirect	300	3.508	Good
17	Point - 17	Indirect	300	3.967	Good
18	Point - 18	Indirect	300	3.587	Good
19	Point - 19	Indirect	300	3.644	Good
20	Point - 20	Indirect	300	4.292	Good
21	Point - 21	Indirect	300	3.730	Good
22	Point - 22	Indirect	300	3.415	Doubtful
23	Point - 23	Indirect	300	4.199	Good



24	Point - 24	Indirect	300	3.886	Good
25	Point - 25	Indirect	300	3.827	Good
26	Point - 26	Indirect	300	3.808	Good
27	Point - 27	Indirect	300	4.080	Good
28	Point - 28	Indirect	300	3.808	Good
29	Point - 29	Indirect	300	3.843	Good
30	Point - 30	Indirect	300	3.415	Doubtful
31	Point - 31	Indirect	300	3.927	Good
32	Point - 32	Indirect	300	3.510	Good
33	Point - 33	Indirect	300	3.367	Doubtful
34	Point - 34	Indirect	300	4.137	Good
35	Point - 35	Indirect	300	4.072	Good
36	Point - 36	Indirect	300	4.149	Good
37	Point - 37	Indirect	300	3.926	Good
38	Point - 38	Indirect	300	3.503	Good
39	Point - 39	Indirect	300	4.093	Good
40	Point - 40	Indirect	300	4.023	Good
41	Point - 41	Indirect	300	3.847	Good
42	Point - 42	Indirect	300	3.883	Good
43	Point - 44	Indirect	300	4.181	Good
44	Point - 45	Indirect	300	4.051	Good
45	Point - 46	Indirect	300	3.873	Good
46	Point - 47	Indirect	300	3.633	Good
47	Point - 48	Indirect	300	3.498	Doubtful
48	Point - 49	Indirect	300	3.816	Good
49	Point - 50	Indirect	300	3.521	Good
50	Point - 51	Indirect	300	3.967	Good



51	Point - 52	Indirect	300	3.663	Good
52	Point - 53	Indirect	300	3.715	Good
53	Point - 54	Indirect	300	3.926	Good
54	Point - 55	Indirect	300	3.868	Good
55	Point - 56	Indirect	300	3.769	Good
56	Point - 57	Indirect	300	3.916	Good
57	Point - 58	Indirect	300	3.847	Good
58	Point - 59	Indirect	300	3.587	Good
Average Velocity =				3.833	Good

3. Electrical Resistivity Test Results: -

Name of the Structure: Raw Water Reservoir						
Location: Wall						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	Wall-1-1	62500	64300	68500	65100	Negligible
2	Wall-1-2	62300	75600	61300	66400	Negligible
3	Wall-1-3	62600	71300	75600	69833	Negligible
4	Wall-4-1	105300	109600	112300	109067	Negligible
5	Wall-4-2	96300	76500	85900	86233	Negligible
6	Wall-4-3	72300	54500	98300	75033	Negligible
7	Wall-5-1	32300	29500	40100	33967	Negligible
8	Wall-5-2	48900	49300	38900	45700	Negligible
9	Wall-5-3	62300	46900	32300	47167	Negligible
10	Wall-7-1	34300	38700	56300	43100	Negligible
11	Wall-7-2	52300	36600	38900	42600	Negligible
12	Wall-7-3	39500	32600	62200	44767	Negligible



13	Wall-10-1	38900	39300	32700	36967	Negligible
14	Wall-10-2	36900	34500	38900	36767	Negligible
15	Wall-10-3	29900	38900	26300	31700	Negligible
16	Wall-12-1	109300	96700	98300	101433	Negligible
17	Wall-12-2	69700	52700	103200	75200	Negligible
18	Wall-12-3	46300	108400	103500	86067	Negligible
19	Wall-14-1	86900	80400	76300	81200	Negligible
20	Wall-14-2	85300	86700	88700	86900	Negligible
21	Wall-14-3	42700	38700	99700	60367	Negligible
22	Wall-16-1	112600	109600	112700	111633	Negligible
23	Wall-16-2	76800	73200	59800	69933	Negligible
24	Wall-16-3	52600	58300	64600	58500	Negligible
25	Wall-19-1	38900	36700	32300	35967	Negligible
26	Wall-19-2	106300	115800	112600	111567	Negligible
27	Wall-19-3	112900	114500	119300	115567	Negligible
28	Wall-21-1	34400	38600	33800	35600	Negligible
29	Wall-21-2	36200	46800	32900	38633	Negligible
30	Wall-21-3	43600	38300	29400	37100	Negligible
31	Wall-23-1	98300	78700	36800	71267	Negligible
32	Wall-23-2	35300	37800	39600	37567	Negligible
33	Wall-23-3	29200	37800	36900	34633	Negligible
34	Wall-25-1	36700	78300	67600	60867	Negligible
35	Wall-25-2	38300	62300	74800	58467	Negligible
36	Wall-25-3	74900	46300	49300	56833	Negligible
37	Wall-26-1	126300	105300	103200	111600	Negligible



38	Wall-26-2	105800	64500	68300	79533	Negligible
39	Wall-26-3	45300	78300	59400	61000	Negligible
40	Wall-28-1	37500	39600	31200	36100	Negligible
41	Wall-28-2	66400	65600	61300	64433	Negligible
42	Wall-28-3	62300	68300	60700	63767	Negligible
43	Wall-30-1	62200	98300	99200	86567	Negligible
44	Wall-30-2	61400	94500	98300	84733	Negligible
45	Wall-30-3	94500	64500	59500	72833	Negligible
46	Wall-26-1	91700	46300	52300	63433	Negligible
47	Wall-26-2	46900	59600	62300	56267	Negligible
48	Wall-26-3	78300	74400	39300	64000	Negligible
49	Wall-34-1	38200	74700	36500	49800	Negligible
50	Wall-34-2	34300	38700	38900	37300	Negligible
51	Wall-34-3	50600	52400	54900	52633	Negligible
52	Wall-36-1	61200	50300	56400	55967	Negligible
53	Wall-36-2	62500	61300	72900	65567	Negligible
54	Wall-36-3	41300	34900	29600	35267	Negligible
55	Wall-38-1	42400	43800	49300	45167	Negligible
56	Wall-38-2	58300	42600	34500	45133	Negligible
57	Wall-38-3	68400	67800	66900	67700	Negligible
58	Wall-40-1	78100	68300	98200	81533	Negligible
59	Wall-40-2	103100	99500	90200	97600	Negligible
60	Wall-40-3	106400	88700	62300	85800	Negligible
61	Wall-42-1	99600	38700	68300	68867	Negligible
62	Wall-42-2	36300	39200	38100	37867	Negligible



63	Wall-42-3	33200	42100	38200	37833	Negligible
64	Wall-44-1	90500	95600	78700	88267	Negligible
65	Wall-44-2	68200	33100	30400	43900	Negligible
66	Wall-44-3	36600	38300	30200	35033	Negligible
67	Wall-46-1	22700	26800	24300	24600	Negligible
68	Wall-46-2	23800	22300	38400	28167	Negligible
69	Wall-46-3	28600	30300	32600	30500	Negligible
70	Wall-48-1	39200	59200	62800	53733	Negligible
71	Wall-48-2	32900	42700	49900	41833	Negligible
72	Wall-48-3	30200	40500	50700	40467	Negligible
73	Wall-50-1	78900	67600	50300	65600	Negligible
74	Wall-50-2	99700	78200	38200	72033	Negligible
75	Wall-50-3	35400	36300	34300	35333	Negligible
76	Wall-52-1	38900	39200	67300	48467	Negligible
77	Wall-52-2	22800	26500	23600	24300	Negligible
78	Wall-52-3	34300	26800	38300	33133	Negligible
79	Wall-53-1	33600	34800	26300	31567	Negligible
80	Wall-53-2	27800	26300	29600	27900	Negligible
81	Wall-53-3	26500	24300	35200	28667	Negligible
82	Wall-54-1	42300	46800	48900	46000	Negligible
83	Wall-54-2	72900	74600	93800	80433	Negligible
84	Wall-54-3	61300	74500	78600	71467	Negligible
85	Wall-55-1	32300	34600	33800	33567	Negligible
86	Wall-55-2	38600	95800	62300	65567	Negligible
87	Wall-55-3	61500	45600	44600	50567	Negligible



88	Wall-56-1	38900	101800	147300	96000	Negligible
89	Wall-56-2	142300	107800	103200	117767	Negligible
90	Wall-56-3	78700	72300	85300	78767	Negligible
91	Wall-58-1	54300	46300	43300	47967	Negligible
92	Wall-58-2	42300	93200	39200	58233	Negligible
93	Wall-58-3	48300	62200	61200	57233	Negligible
94	Wall-59-1	39300	42700	62300	48100	Negligible
95	Wall-59-2	38200	60200	78200	58867	Negligible
96	Wall-59-3	32100	22200	36700	30333	Negligible
97	Wall-60-1	62300	65400	68300	65333	Negligible
98	Wall-60-2	56400	68300	64500	63067	Negligible
99	Wall-60-3	52400	54600	56800	54600	Negligible
100	Wall-60-4	38200	39700	42200	40033	Negligible



4.RESULTS OF DEPTH OF CARBONATION TEST

Sl No.	Location	Depth of Carbonation (mm)	Permissible Value (mm)	Remarks
1	RWR-1	30	Moderate-High	Moderate
2	RWR-2	41		High
3	RWR-3	35		Moderate
4	RWR-4	40		High
5	RWR-5	42		High
6	RWR-6	36		Moderate
7	RWR-7	43		High
8	RWR-8	44		High
9	RWR-9	43		High
10	RWR-10	46		High

5. RESULTS OF CONCRETE CORE

Location	In-Situ Compressive Strength (N/mm ²)	Modulus of Elasticity of Concrete (GPa)
RWR-1	42.32	32.53
RWR-2	45.26	33.64
RWR-3	36.74	30.31
RWR-4	41.32	32.14
RWR-5	38.15	30.88
RWR-6	39.64	31.48
RWR-7	40.59	31.86
RWR-8	42.67	32.66
RWR-9	43.78	33.08
RWR-10	43.26	32.89

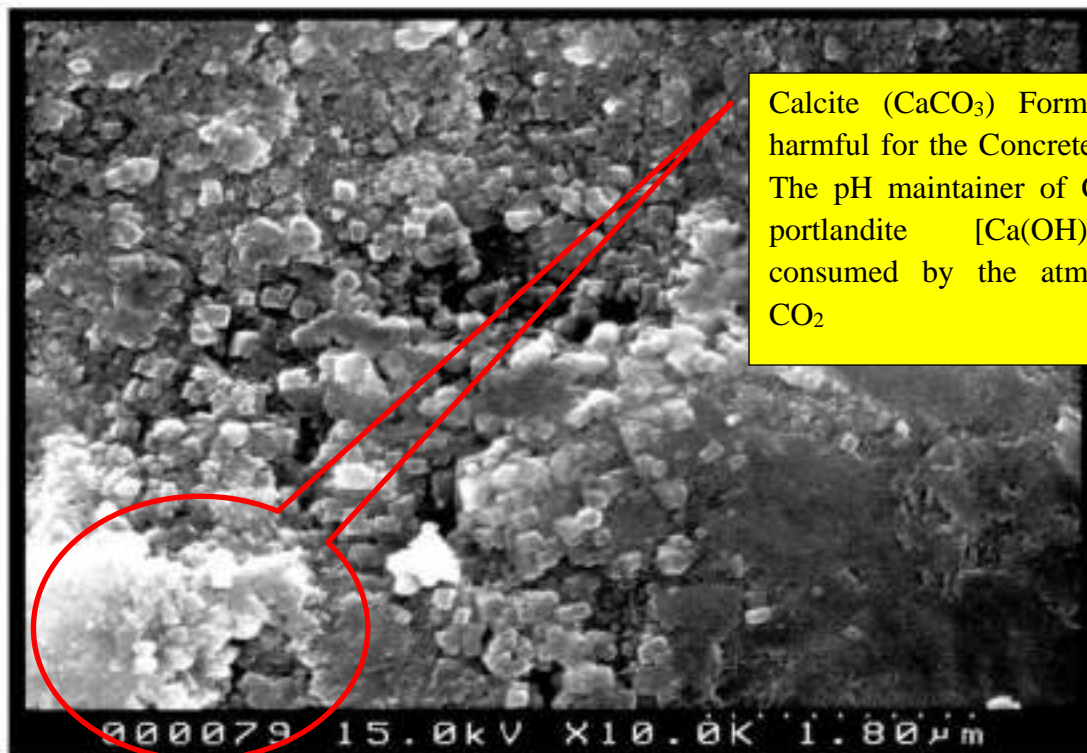


6. RESULTS OF CHLORIDE & pH TESTS OF CONCRETE CORE

SL. No.	Sample Type	Chloride Content (%)	Permissible value (IS 456 2000)	pH Value	Permissible Limit (IS 456 2000)	Remarks
1	Concrete Core	0.30	0.6 % of Concrete Cement Content (Max)	9.5	Not Less Than 9	Moderate
2		0.32		8.6		Low
3		0.26		8.9		Low
4		0.23		9.3		Moderate
5		0.26		9.3		Moderate
6		0.27		10.2		Moderate
7		0.24		9.6		Moderate
8		0.28		10.7		Moderate
9		0.33		8.8		Low
10		0.27		8.6		Low

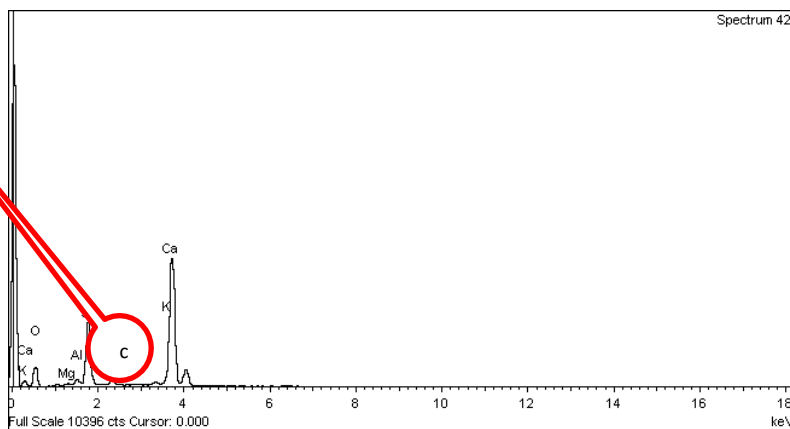


7. Results of Microstructural Studies :-



Calcite (CaCO_3) Formation is harmful for the Concrete matrix. The pH maintainer of Concrete portlandite [$\text{Ca}(\text{OH})_2$] is consumed by the atmospheric CO_2

Carbon Peak is obtained which indicates towards to carbonation.



COOLING TOWER



Performed Tests: -





Half Cell Potential Test



Electrical Resistivity Test



Concrete Core sample collection



Concrete Carbonated area





In-Situ
Compressive
Strength Test of
concrete



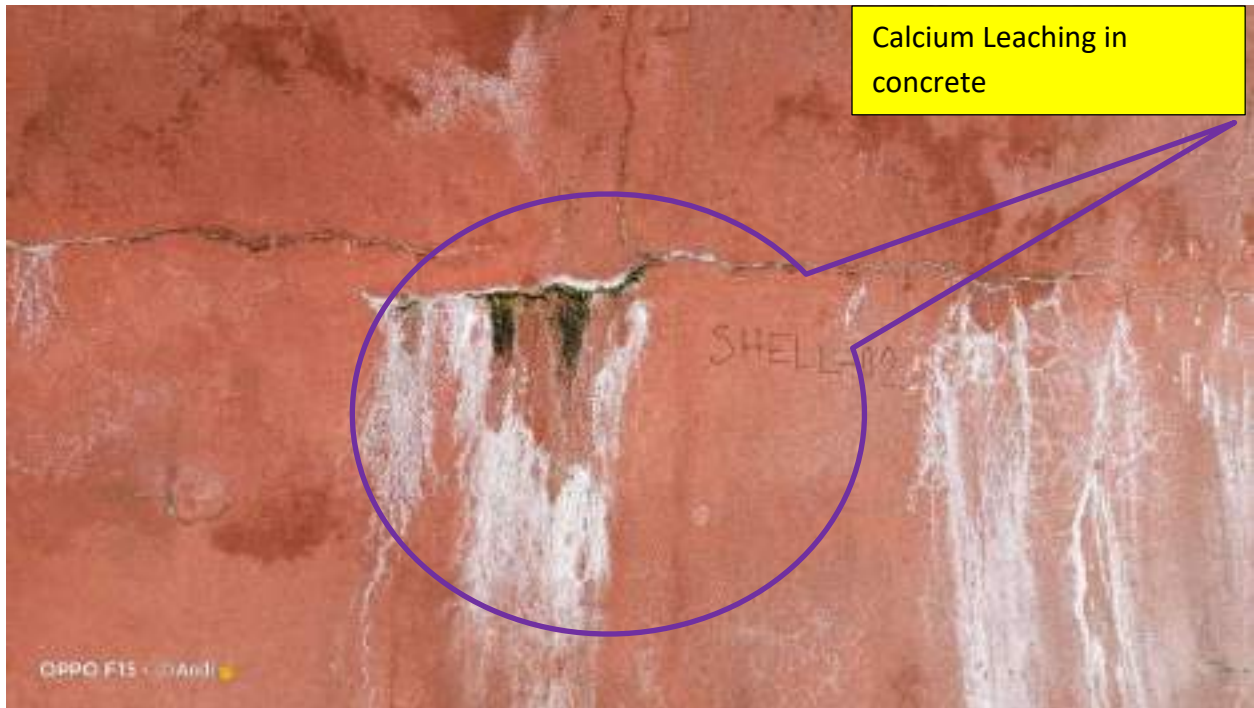
Concrete pH Test



Visual Inspection: -

1. Multiple Surface cracks are present on the Column, Beam, Floor and shell signifying distressed regions of concrete.
2. In many cases spalling and pop out of concrete has taken into the places.
3. Significant portions of the existing reinforcement of structure have been subjected to corroded due to environmental hazards resulting in the reduction of the original diameter of the reinforcement.
4. Swelling of the concrete signifying towards to the presence alkali-silica Hygroscopic Gel.
5. Less concrete cover also shown in many places.
6. Calcium Leaching indicates the cement dissolution which increases the porosity of the concrete structure.
7. Over all level of deterioration proceeding towards to Severe to Extreme.
8. Surface plaster has spalling out from many parts
9. Many parts of the concrete are affected due to algae.









Concrete Surface is delaminated and corroded reinforcement is exposed



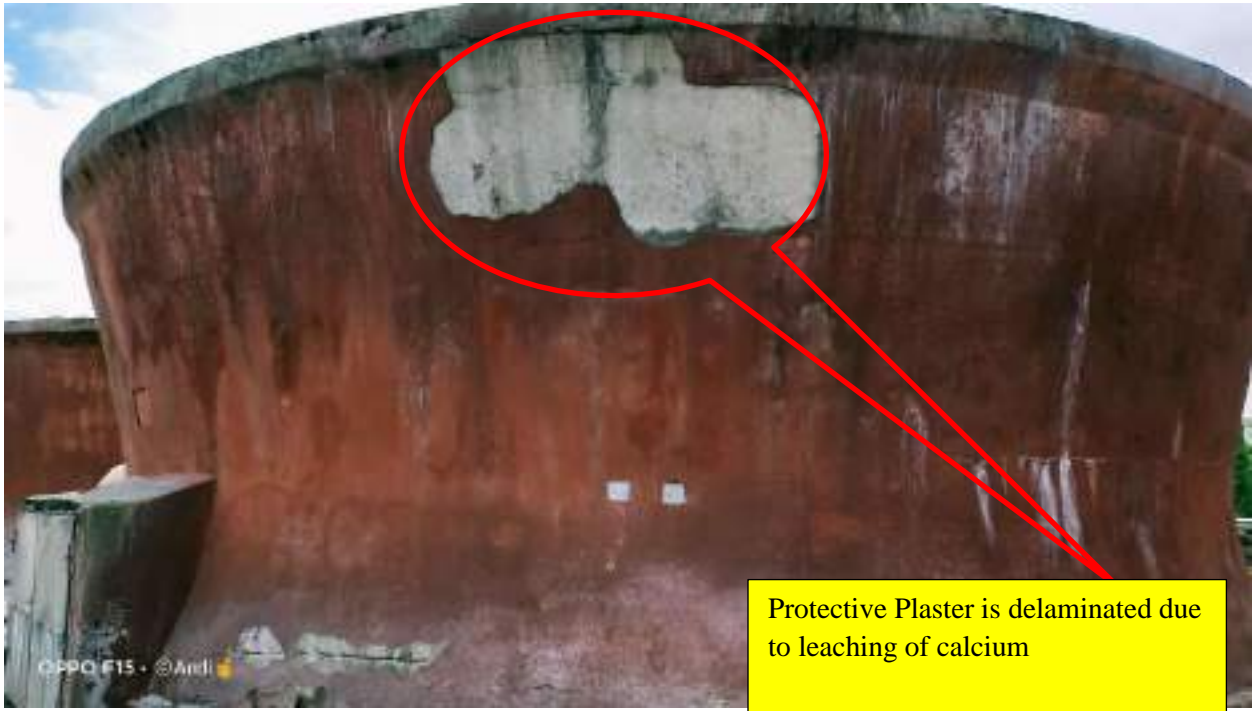


Concrete Surface is delaminated and corroded reinforcement is exposed





Concrete is pop out and reinforcement deterioration started



Protective Plaster is delaminated due to leaching of calcium











Concrete pop outs due to corroded

Severe Calcium





Spalling of concrete is observed due to corroded embedded reinforcement





Concrete pop outs are observed due to corroded embedded reinforcement





Swelling of concrete and map cracking patterns are also observed

Concrete Pop Outs





Swelling of concrete, map cracking and calcium leaching are also observed





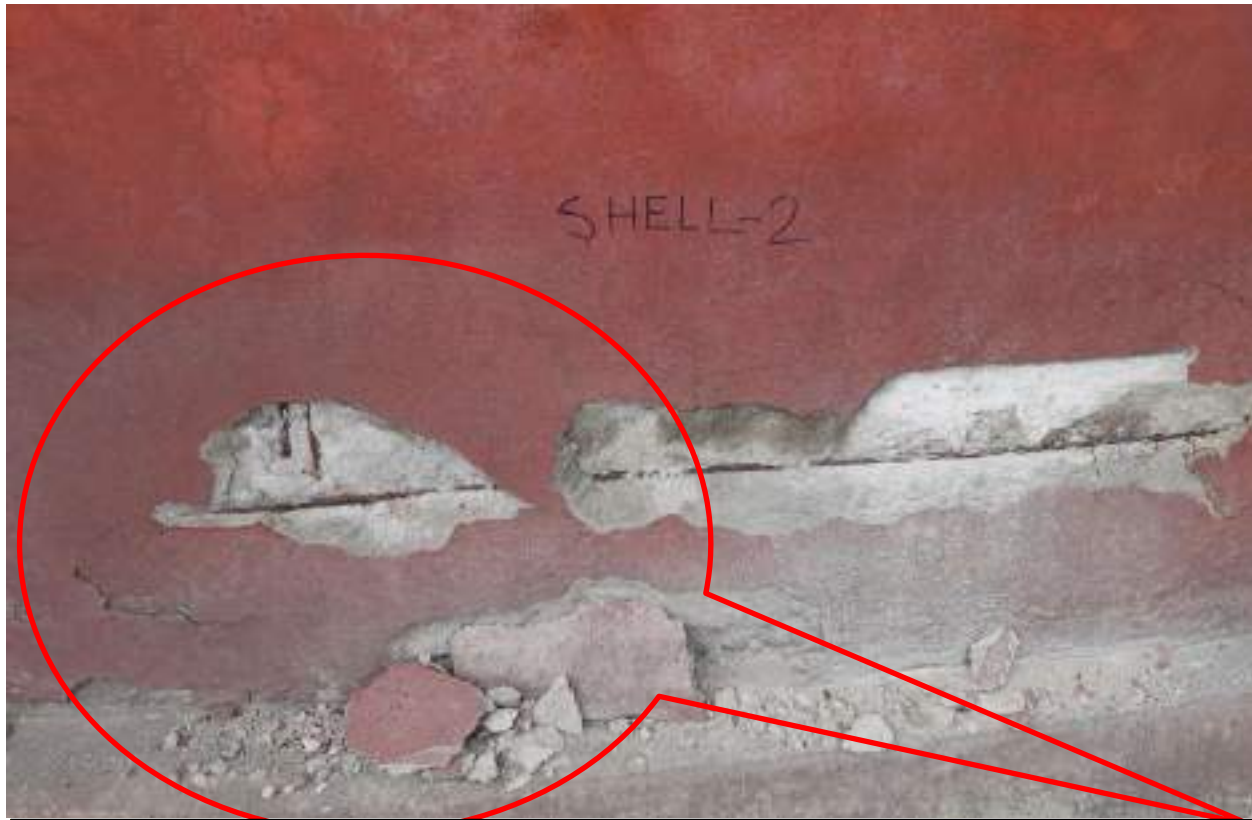
Swelling of concrete, map cracking and calcium leaching are also observed





Concrete is delaminated and corroded reinforcement is exposed





Concrete is delaminated and corroded reinforcement is exposed





Severe calcium leaching is observed





Spalling of concrete due to reinforcement corrosion



TEST RESULTS



vibration Test



1. Schmidt Hammer Test Results: -

Site Name : ASSSAM GAS BASED POWER PLANT, NEEPCO							Date : 28.09.21-29.09.21		
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure: COOLING TOWER									
Location : Ground Floor (Left Side)									
1	Column No.- L- 01 (numbering from frontside to backside of the structure)	H→←	36	40	44	42	40	40	44
2			38	36	43	41	42	40	44
3	Column No.- L- 02	H→←	33	31	34	35	36	34	32
4			40	41	33	38	39	40	44
5	Column No.- L- 03	H→←	30	32	34	37	36	34	32
6			34	38	34	32	30	34	32
7	Column No.- L- 04	H→←	34	33	32	38	40	35	34
8			36	34	38	36	32	35	34
9	Column No.- L- 05	H→←	41	38	40	36	37	38	40
10			36	34	38	42	40	38	40
11	Column No.- L- 06	H→←	36	38	42	36	34	37	38
12			34	40	37	35	33	36	36
13	Stair Long Column	H→←	42	40	41	43	40	41	46
14			38	44	42	42	39	41	46
15	Stair Short Column	H→←	42	43	46	34	42	43	50
16			45	40	42	40	41	42	48
Average Compressive Strength =								40.00	
Location : Ground Floor (Front Side)									
17	Column No.- F-01 (numbering from left side to right side of the structure)	H→←	39	38	36	34	33	36	36
18			40	34	32	36	38	36	36



19	Column No.- F-02	H→κ←	41	36	39	35	42	39	42
20			38	40	36	42	40	39	42
21	Column No.- F-03	H→κ←	42	38	36	44	38	40	44
22			41	43	39	37	36	39	42
23	Column No.- F-04	H→κ←	41	40	38	42	38	40	44
24			40	39	42	36	34	38	40
25	Column No.- F-05	H→κ←	38	36	35	38	32	36	36
26			40	42	38	39	40	40	44
27	Column No.- F-06	H→κ←	45	38	34	41	42	42	48
28			36	38	44	40	41	40	44
29	Column No.- F-07	H→κ←	45	39	40	41	36	40	44
30			36	34	44	42	40	41	46
31	Column No.- F-08	H→κ←	46	38	39	36	34	37	38
32			40	36	42	34	38	38	40
33	Column No.- F-09	H→κ←	38	43	39	36	34	38	40
34			41	42	36	40	38	39	42
35	Column No.- F-10	H→κ←	35	36	34	33	32	34	32
36			30	32	36	34	36	34	32
37	Column No.- F-11	H→κ←	36	33	30	36	34	34	32
38			38	32	35	33	31	34	32
39	Column No.- F-12	H→κ←	34	36	37	38	39	37	38
40			40	34	36	33	35	36	36
41	Column No.- F-13	H→κ←	41	34	38	34	36	37	38
42			37	33	36	40	41	37	38
43	Column No.- F-14	H→κ←	30	32	40	38	36	37	38



44			34	34	35	37	33	35	34
45	Column No.- F-15	H→←	32	30	32	36	33	33	30
46			38	38	33	34	39	36	36
47	Column No.- F-16	H→←	34	35	39	42	30	36	36
48			38	42	36	34	31	36	36
49	Column No.- F-17	H→←	44	40	35	36	38	37	38
50			40	32	33	41	40	39	42
51	Column No.- F-18	H→←	34	40	39	42	40	39	42
52			38	36	34	32	42	35	34
53	Column No.- F-19	H→←	37	33	34	30	35	34	32
54			36	34	30	34	36	34	32
55	Column No.- F-20	H→←	34	30	35	36	38	35	34
56			33	34	38	39	34	36	36
57	Column No.- F-21	H→←	45	40	39	36	32	38	40
58			34	36	38	33	30	34	32
59	Column No.- F-22	H→←	38	34	36	39	40	37	38
60			40	42	39	36	34	38	40
61	Column No.- F-23	H→←	30	32	31	34	36	33	30
62			38	36	34	32	30	34	32
63	Column No.- F-24	H→←	38	34	35	36	32	35	34
64			30	36	33	34	39	34	32
Average Compressive Strength = 37.58									
Location: Ground Floor (Right Side)									
65	Column No.- R-01 (numbering from frontside to backside of the structure)	H→←	35	34	39	34	32	35	34
66			36	38	43	40	41	40	44



67	Column No.- R-02	H→←	42	44	40	38	36	40	44
68			40	39	42	44	40	41	46
69	Column No.- R-03	H→←	42	44	46	40	38	42	48
70			36	36	38	42	40	38	40
71	Column No.- R-04	H→←	32	30	38	36	31	33	30
72			34	40	42	40	38	39	42
73	Column No.- R-05	H→←	34	42	40	43	34	39	42
74			40	41	38	39	43	40	44
75	Column No.- R-06	H→←	42	36	38	44	40	40	44
76			42	38	42	41	44	41	46
77	Stair long Column	H→←	36	40	38	36	42	38	40
78			38	32	34	39	40	37	38
79	Stair short Column	H→←	39	44	42	40	38	41	46
80			44	42	40	38	40	41	46
Average Compressive Strength = 42.13									
Location: Ground Floor (Back Side)									
81	Column No.- B-01 (numbering from left side to right side of the structure)	H→←	38	39	36	34	30	37	38
82			32	40	38	39	37	39	42
83	Column No.- B-02	H→←	44	42	37	36	34	37	38
84			40	39	38	32	35	37	38
85	Column No.- B-03	H→←	37	38	40	39	36	38	40
86			40	41	36	37	35	38	40
87	Column No.- B-04	H→←	39	36	37	38	32	36	36
88			36	34	33	39	37	36	36
89	Column No.- B-05	H→←	39	32	34	35	36	35	34



90			38	40	41	36	34	38	40
91	Column No.- B-06	H→κ←	40	35	34	37	30	37	38
92			32	36	32	33	32	33	30
93	Column No.- B-07	H→κ←	44	42	38	37	40	40	44
94			40	41	36	38	39	39	42
95	Column No.- B-08	H→κ←	34	39	37	36	32	36	36
96			35	33	39	34	36	35	34
97	Column No.- B-09	H→κ←	40	39	42	39	42	40	44
98			45	43	41	40	38	41	46
99	Column No.- B-10	H→κ←	40	41	43	39	40	41	46
100			44	42	44	38	41	42	48
101	Column No.- B-11	H→κ←	48	46	42	43	41	44	52
102			39	44	38	40	42	41	46
103	Column No.- B-12	H→κ←	42	41	44	46	46	44	52
104			39	40	42	43	45	42	48
105	Column No.- B-13	H→κ←	39	36	38	36	34	37	38
106			40	41	42	34	38	39	42
107	Column No.- B-14	H→κ←	39	42	39	44	42	41	46
108			40	44	43	40	45	42	48
109	Column No.- B-15	H→κ←	34	30	35	36	38	35	34
110			39	40	41	33	32	37	38
111	Column No.- B-16	H→κ←	44	43	38	34	36	39	42
112			32	33	34	38	39	35	34
113	Column No.- B-17	H→κ←	40	38	36	34	36	37	38
114			41	36	34	32	33	34	32



115	Column No.- B-18	H→←	44	32	34	36	40	37	38
116			42	40	41	34	32	39	42
117	Column No.- B-19	H→←	39	41	42	47	38	40	44
118			39	42	40	38	37	39	42
119	Column No.- B-20	H→←	34	30	32	31	32	32	30
120			36	37	36	34	35	36	36
121	Column No.- B-21	H→←	34	36	38	40	38	37	38
122			35	33	32	31	34	33	30
123	Column No.- B-22	H→←	42	40	39	37	35	39	42
124			40	41	40	39	36	39	42
125	Column No.- B-23	H→←	38	39	40	41	34	38	40
126			36	38	41	42	36	39	42
127	Column No.- B-24	H→←	39	44	39	40	38	40	44
128			36	34	36	35	33	35	34
Average Compressive Strength = 40.08									
Location : Roof Slab (Structural Shell number are started from Left side)									
129	Point - 01 (Left side of Shell-01)	V↓	34	38	35	39	40	37	44
130			37	36	34	36	38	36	42
131	Point - 02 (Left side of Shell-01)	V↓	34	35	36	39	38	36	42
132			39	40	41	36	32	39	48
133	Point - 03 (Left side of Shell-01)	V↓	32	34	36	38	34	35	40
134			36	39	40	41	40	39	48
135	Point - 04 (Front side of Shell-01)	V↓	35	39	37	42	41	39	48
136			39	36	35	32	39	36	42
137		V↓	37	39	40	36	38	38	46



138	Point - 05 (Front side of Shell-01 & Shell-02)		34	32	36	35	34	34	38
139	Point - 06 (Between Shell-01 & Shell-02)	V↓	36	37	38	40	39	38	46
140			38	39	36	37	42	38	46
141	Point - 07 (Back side of Shell-01 & Shell-02)	V↓	39	34	38	32	40	37	44
142			37	36	32	30	34	34	38
143	Point - 08 (Back side of Shell-01)	V↓	39	44	38	36	32	38	46
144			40	41	39	37	36	39	48
145	Point - 09 (Back side of Shell-02)	V↓	39	40	44	39	38	40	50
146			37	36	40	36	39	38	46
147	Point - 10 (Back side of Shell-02 & Shell-03)	V↓	42	44	40	39	38	41	50
148			36	37	42	41	39	39	48
149	Point - 11 (Back side of Shell-03)	V↓	37	39	40	42	36	39	48
150			42	40	45	39	35	42	52
151	Point - 12 (Between Shell-02 & Shell-03)	V↓	44	41	40	38	36	40	50
152			40	37	38	39	40	39	48
153	Point - 13 (Front side of Shell-02)	V↓	34	36	35	40	38	37	44
154			42	40	39	41	44	41	50
155	Point - 14 (Front side of Shell-02 & Shell-03)	V↓	41	42	43	34	39	41	50
156			37	36	36	35	38	36	42
157	Point - 15 (Frontside of Shell-03)	V↓	42	40	39	40	41	40	50
158			43	39	40	42	39	41	50
159	Point - 16 (Front side of Shell-03 & Shell-04)	V↓	40	42	43	39	36	40	50
160			41	39	38	37	41	39	48
161	Point - 17 (Between Shell-03 & Shell-04)	V↓	44	45	40	41	46	43	54
162			40	41	42	43	40	41	50



163	Point - 18 (Back side of Shell-03 & Shell-04)	V↓	38	40	41	35	37	38	46
164			39	38	36	40	43	39	48
165	Point - 19 (Back side of Shell-04)	V↓	36	39	40	41	37	39	48
166			38	34	36	37	38	37	44
167	Point - 20 (Back side of Shell-04 & Shell-05)	V↓	37	34	32	39	40	36	42
168			41	40	39	42	43	41	50
169	Point - 21 (Back side of Shell-05)	V↓	30	34	36	38	32	34	38
170			35	39	40	37	33	37	44
171	Point - 22 (Right side of Shell-04)	V↓	39	35	36	39	40	38	46
172			37	36	34	32	37	35	40
173	Point - 23 (Front side of Shell-04)	V↓	42	40	39	36	41	40	50
174			48	42	36	35	32	38	46
175	Point - 24 (Front side of Shell-05)	V↓	30	36	37	32	35	34	38
176			36	32	30	31	34	33	36
177	Point - 25 (Front side of Shell-05)	V↓	34	37	39	40	41	38	46
178			42	36	32	34	38	35	40
179	Point - 26 (Front side of Shell-05 & Shell-06)	V↓	37	33	32	43	39	35	40
180			40	41	39	40	37	39	48
181	Point - 27 (Between Shell-05 & Shell-06)	V↓	30	32	38	44	41	37	44
182			38	39	37	36	35	37	44
183	Point - 28 (Front side of Shell-06)	V↓	34	39	36	34	35	36	42
184			40	38	37	36	35	37	44
185	Point - 29 (Back side of Shell-05 & Shell-06)	V↓	34	30	39	36	40	37	44
186			41	38	36	35	34	37	44
187		V↓	30	34	39	40	41	39	48



188	Point - 30 (Back side of Shell-06)		34	38	36	42	40	38	46
189	Point - 31 (Back side of Shell-06 & Shell-07)	V↓	39	40	41	44	37	40	50
190			34	36	38	32	38	36	42
191	Point - 32 (Back side of Shell-06)	V↓	39	40	42	39	46	41	50
192			42	36	38	36	35	37	44
193	Point - 33 (Between of Shell-06 & Shell-07)	V↓	34	39	40	36	38	37	44
194			37	36	34	35	34	35	40
195	Point - 34 (Front side of Shell-06 & Shell-07)	V↓	40	37	36	35	39	37	44
196			39	38	40	34	32	37	44
197	Point - 35 (Front side of Shell-07)	V↓	46	42	40	44	39	42	52
198			32	34	37	38	36	35	40
199	Point - 36 (Front side of Shell-07 & Shell-08)	V↓	32	37	38	36	40	37	44
200			38	39	36	34	35	36	42
201	Point - 37 (Front side of Shell-08)	V↓	34	37	39	40	38	38	46
202			39	40	41	42	39	40	50
203	Point - 38 (Right side of Shell-08)	V↓	37	35	34	40	38	37	44
204			39	36	33	30	37	35	40
205	Point - 39 (Between of Shell-07 & Shell-08)	V↓	38	44	42	35	36	39	48
206			40	39	37	38	34	38	46
207	Point - 40 (Back side of Shell-07 & Shell-08)	V↓	38	37	36	35	34	36	42
208			32	30	40	37	36	35	40
209	Point - 41 (Back side of Shell-08)	V↓	36	39	40	35	41	38	46
210			37	32	34	36	39	36	42
211	Point - 42 (Right side of Shell-08)	V↓	38	37	36	39	40	38	46
212			36	35	34	33	32	34	38



Average Compressive Strength = 45.19									
Location : SPATK, SHELL-01 (Structural Shell number are started from Left side)									
213	Point- 01	H→κ←	36	38	32	34	30	34	32
214			34	37	35	34	32	34	32
215	Point- 02	H→κ←	38	40	39	36	37	38	40
216			32	34	36	32	34	34	32
217	Point- 03	H→κ←	32	30	29	34	30	31	28
218			28	32	36	30	26	29	24
219	Point- 04	H→κ←	32	29	30	31	32	31	28
220			28	30	34	35	31	32	30
Average Compressive Strength = 30.75									
Location : SPATK, SHELL-02									
221	Point- 01	H→κ←	34	38	41	40	43	41	46
222			43	37	38	32	34	35	34
223	Point- 02	H→κ←	30	34	32	36	38	34	32
224			32	33	35	32	34	33	30
225	Point- 03	H→κ←	36	38	39	37	36	37	38
226			32	34	34	33	39	34	32
227	Point- 04	H→κ←	38	34	36	32	30	34	32
228			34	40	38	37	36	37	38
Average Compressive Strength = 35.25									
Location : SPATK, SHELL-03									
229	Point- 01	H→κ←	37	38	36	35	33	36	36
230			32	30	37	40	35	34	32
231	Point- 02	H→κ←	34	36	37	33	31	34	32
232			34	35	32	34	35	34	32



233	Point- 03	H→κ←	33	39	37	40	38	37	38
234			34	36	34	35	43	35	34
235	Point- 04	H→κ←	36	34	33	37	38	36	36
236			32	36	38	36	33	35	34
Average Compressive Strength = 34.25									
Location : SPATK, SHELL-04									
237	Point- 01	H→κ←	40	38	36	34	37	37	38
238			30	40	39	37	38	39	42
239	Point- 02	H→κ←	40	38	34	37	36	37	38
240			39	37	6	34	34	34	32
241	Point- 03	H→κ←	37	38	36	34	32	35	34
242			33	35	39	36	34	35	34
243	Point- 04	H→κ←	34	30	32	37	35	34	32
244			36	38	40	38	34	37	38
Average Compressive Strength = 36.00									
Location : SPATK, SHELL-05									
245	Point- 01	H→κ←	34	35	37	36	40	36	36
246			38	39	34	39	41	38	40
247	Point- 02	H→κ←	45	40	41	39	43	42	48
248			40	38	37	37	40	38	40
249	Point- 03	H→κ←	44	39	42	36	37	40	44
250			39	32	33	35	36	35	34
251	Point- 04	H→κ←	30	33	39	40	37	37	38
252			40	39	36	33	39	37	38
Average Compressive Strength = 39.75									
Location : SPATK, SHELL-06									



253	Point- 01	H→κ←	39	42	41	44	42	42	48
254			39	38	40	37	36	38	40
255	Point- 02	H→κ←	36	39	43	40	41	40	44
256			37	38	40	41	36	38	40
257	Point- 03	H→κ←	36	44	42	40	39	40	44
258			37	33	35	36	37	36	36
259	Point- 04	H→κ←	38	40	39	37	33	37	38
260			36	37	41	42	38	39	42
Average Compressive Strength = 41.50									
Location : SPATK, SHELL-07									
261	Point- 01	H→κ←	39	41	40	34	33	37	38
262			30	32	36	37	39	35	34
263	Point- 02	H→κ←	38	44	43	41	40	41	46
264			42	40	42	39	41	41	46
265	Point- 03	H→κ←	40	39	38	34	42	39	42
266			43	38	37	36	39	39	42
267	Point- 04	H→κ←	37	39	42	40	41	40	44
268			38	37	39	42	36	38	40
Average Compressive Strength = 41.50									
Location : SPATK, SHELL-08									
269	Point- 01	H→κ←	42	45	43	41	37	42	48
270			38	37	36	32	39	36	36
271	Point- 02	H→κ←	39	40	46	39	38	39	42
272			38	42	41	36	33	38	40
273	Point- 03	H→κ←	44	38	36	37	39	38	40
274			42	39	40	41	38	40	44



275	Point- 04	H→←	39	42	41	38	39	40	44
276			40	40	39	37	38	39	42
Average Compressive Strength =									42.00

2. Ultrasonic Pulse velocity Test Results: -

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					
Name of the Structure: COOLING TOWER				Date : 28.09.21-29.09.21	
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: Roof Slab (Structural Shell number are started from Left side)					
1	Point - 01 (Left side of Shell-01)	Indirect	300	4.049	Good
2	Point - 02 (Left side of Shell-01)	Indirect	300	4.234	Good
3	Point - 03 (Left side of Shell-01)	Indirect	300	4.139	Good
4	Point - 04 (Front side of Shell-01)	Indirect	300	3.798	Good
5	Point - 05 (Front side of Shell-01 & Shell-02)	Indirect	300	3.997	Good
6	Point - 06 (Between Shell-01 & Shell-02)	Indirect	300	4.142	Good
7	Point - 07 (Back side of Shell-01 & Shell-02)	Indirect	300	3.802	Good
8	Point - 08 (Back side of Shell-01)	Indirect	300	3.851	Good
9	Point - 09 (Back side of Shell-02)	Indirect	300	4.032	Good
10	Point - 10 (Back side of Shell-02 & Shell-03)	Indirect	300	3.759	Good
11	Point - 11 (Back side of Shell-03)	Indirect	300	4.115	Good
12	Point - 12 (Between Shell-02 & Shell-03)	Indirect	300	3.943	Good



13	Point - 15 (Front side of Shell-03)	Indirect	300	3.249	Doubtful
14	Point - 16 (Front side of Shell-03 & Shell-04)	Indirect	300	3.521	Good
15	Point - 17 (Between Shell-03 & Shell-04)	Indirect	300	3.549	Good
16	Point - 18 (Back side of Shell-03 & Shell-04)	Indirect	300	3.526	Good
17	Point - 19 (Back side of Shell-04)	Indirect	300	3.970	Good
18	Point - 20 (Back side of Shell-04 & Shell- 05)	Indirect	300	4.003	Good
19	Point - 21 (Back side of Shell- 05)	Indirect	300	3.749	Good
20	Point - 22 (Right side of Shell- 04)	Indirect	300	3.529	Good
21	Point - 23 (Front side of Shell- 04)	Indirect	300	3.601	Good
22	Point - 24 (Front side of Shell- 05)	Indirect	300	4.394	Good
23	Point - 25 (Front side of Shell- 05)	Indirect	300	3.311	Doubtful
24	Point - 26 (Front side of Shell- 05 & Shell-06)	Indirect	300	3.827	Good
25	Point - 27 (Between Shell- 05 & Shell-06)	Indirect	300	3.440	Doubtful
26	Point - 28 (Front side of Shell-06)	Indirect	300	3.946	Good
27	Point - 29 (Back side of Shell- 05 & Shell-06)	Indirect	300	3.876	Good
28	Point - 30 (Backside of Shell-06)	Indirect	300	3.802	Good
29	Point - 31 (Back side of Shell-06 & Shell-07)	Indirect	300	3.246	Doubtful
30	Point - 32 (Back side of Shell-06)	Indirect	300	3.866	Good



31	Point - 33 (Between of Shell-06 & Shell-07)	Indirect	300	3.649	Good
32	Point - 34 (Front side of Shell-06 & Shell-07)	Indirect	300	3.594	Good
33	Point - 35 (Front side of Shell-07)	Indirect	300	4.060	Good
34	Point - 36 (Front side of Shell-07 & Shell-08)	Indirect	300	3.709	Good
35	Point - 37 (Front side of Shell-08)	Indirect	300	3.892	Good
36	Point - 38 (Right side of Shell-08)	Indirect	300	3.497	Doubtful
37	Point - 39 (Between of Shell-07 & Shell-08)	Indirect	300	4.049	Good
38	Point - 40 (Back side of Shell-07 & Shell-08)	Indirect	300	3.633	Good
39	Point - 41 (Back side of Shell-08)	Indirect	300	3.947	Good
40	Point - 42 (Right side of Shell-08)	Indirect	300	3.249	Doubtful
Average Velocity =				3.789	Good
Location: SPATK, SHELL-01 (Structural Shell number are started from Left side)					
41	Point - 01	Indirect	300	3.249	Doubtful
42	Point - 02	Indirect	300	3.542	Good
43	Point - 03	Indirect	300	4.539	Excellent
44	Point - 04	Indirect	300	3.452	Doubtful
Average Velocity =				3.696	Good
Location: SPATK, SHELL-02					
45	Point - 01	Indirect	300	3.584	Good
46	Point - 02	Indirect	300	4.166	Good
47	Point - 03	Indirect	300	4.506	Excellent
48	Point - 04	Indirect	300	3.979	Good



Average Velocity = 4.059 Good					
Location: SPATK, SHELL-03					
49	Point - 01	Indirect	300	3.375	Doubtful
50	Point - 02	Indirect	300	3.769	Good
51	Point - 03	Indirect	300	3.604	Good
52	Point - 04	Indirect	300	4.792	Excellent
Average Velocity = 3.885 Good					
Location: SPATK, SHELL-04					
53	Point - 01	Indirect	300	3.576	Good
54	Point - 02	Indirect	300	4.28	Good
55	Point - 03	Indirect	300	3.802	Good
56	Point - 04	Indirect	300	4.184	Good
Average Velocity = 3.961 Good					
Location: SPATK, SHELL-05					
57	Point - 01	Indirect	300	4.197	Good
58	Point - 02	Indirect	300	3.975	Good
59	Point - 03	Indirect	300	4.396	Good
60	Point - 04	Indirect	300	3.911	Good
Average Velocity = 4.120 Good					
Location: SPATK, SHELL-06					
61	Point - 01	Indirect	300	4.518	Excellent
62	Point - 02	Indirect	300	4.36	Good
63	Point - 03	Indirect	300	4.622	Excellent
64	Point - 04	Indirect	300	4.382	Good
Average Velocity = 4.471 Good					
Location: SPATK, SHELL-07					



65	Point - 01	Indirect	300	4.335	Good
66	Point - 02	Indirect	300	4.231	Good
67	Point - 03	Indirect	300	4.452	Good
68	Point - 04	Indirect	300	3.827	Good
Average Velocity = 4.211					Good
Location : SPATK, SHELL-08					
69	Point - 01	Indirect	300	4.376	Good
70	Point - 02	Indirect	300	4.518	Excellent
71	Point - 03	Indirect	300	4.373	Good
72	Point - 04	Indirect	300	3.745	Good
Average Velocity = 4.253					Good

3. Electrical Resistivity Test Results: -

Name of the Structure: Cooling Tower						
Location: Various Parts						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	Back Side	170000	140000	135000	148333	Negligible
2	Front Shell-1	100000	110000	117000	109000	Negligible
3	Back of Shell-1	160000	130000	122000	137333	Negligible
4	Front of Shell-2	61000	72000	59000	64000	Negligible
5	Back of Shell-2	36000	40000	30000	35333	Negligible
6	Front of Shell-3	35000	50000	52000	45667	Negligible
7	Back of Shell-3	79000	88000	110000	92333	Negligible
8	Front of Shell-4	80000	107000	67000	84667	Negligible
9	Back of Shell-4	170000	180000	192000	180667	Negligible
10	Front of Shell-5	121000	228000	205000	184667	Negligible



11	Back of Shell-5	140000	159000	132000	143667	Negligible
12	Front of Shell-6	40000	60000	45000	48333	Negligible
13	Back of Shell-6	129000	89000	115000	111000	Negligible
14	Front Shell-7	202000	110000	149000	153667	Negligible
15	Back Shell-7	103000	60000	90000	84333	Negligible
16	Front Shell-8	60000	75000	100000	78333	Negligible
17	Back Shell-8	170000	140000	135000	148333	Negligible
18	Shell-01	370000	202000	312000	294667	Negligible
19	Shell-01	100000	70000	91000	87000	Negligible
20	Shell-02	39000	42000	37000	39333	Negligible
21	Shell-02	30000	51000	42000	41000	Negligible
22	Shell-03	182200	110000	121000	137733	Negligible
23	Shell-03	90000	92000	79000	87000	Negligible
24	Shell-04	118000	140000	95000	117667	Negligible
25	Shell-04	85000	92000	101000	92667	Negligible
26	Shell-05	104000	93000	121000	106000	Negligible
27	Shell-05	90000	101000	82000	91000	Negligible
28	Shell-06	45000	62000	39000	48667	Negligible
29	Shell-06	38000	57000	51000	48667	Negligible
30	Shell-07	37000	51000	45000	44333	Negligible
31	Shell-07	33000	43000	59000	45000	Negligible
32	Shell-08	38000	52000	63000	51000	Negligible
33	Shell-08	60000	52000	42000	51333	Negligible



4. Half Cell Potential Test Results: -

Cooling Tower						Date : 29.09.2021
Sl No.	Location	Profometer Reading (-mV)			Average Reading (-mV)	Criteria for corrosion condition of Rebar in concrete as per IS 516 (Part-5/Sec-2) 2021
1	Shell-01	-65	-79	-63	-69.00	Low (There is a < 90% probability that reinforcing steel corrosion is occurring in that area at time of measurement.)
2	Shell-02	-80	-85	-81	-82.00	
3	Shell-02	-92	-55	-67	-71.33	
4	Shell-03	-108	-96	-89	-97.67	
5	Shell-04	-49	-56	-61	-55.33	
6	Shell-05	-102	-98	-119	-106.33	
7	Shell-06	-51	-62	-55	-56.00	
8	Shell-07	-70	-63	-59	-64.00	
9	Shell-08	-78	-68	-82	-76.00	
10	RHS Side of Shell-04	-57	-52	-63	-57.33	

5.RESULTS OF DEPTH OF CARBONATION TEST

Sl No.	Location	Depth of Carbonation (mm)	Permissible Value (mm)	Remarks
1	SC-1	40	Moderate-High	High
2	SC-2	45		High
3	SC-3	47		High
4	SC-4	39		High
5	SC-5	33		Moderate
6	SC-6	38		High
7	SC-7	43		High
8	SC-8	48		High
9	FC-1	44		High
10	FC-2	43		High
11	FC-3	46		High



10. RESULTS OF CONCRETE CORE

Location	In-Situ Compressive Strength (N/mm ²)	Modulus of Elasticity of Concrete (GPa)
CT-1 SC-1	45.40	33.69
CT-1 SC-2	35.55	29.81
CT-1 SC-3	43.12	32.83
CT-2 SC-1	48.73	34.90
CT-2 SC-2	32.65	28.57
CT-2 SC-3	40.32	31.75
CT-3 SC-1	44.52	33.36
CT-3 SC-2	34.68	29.44
CT-3 SC-3	49.53	35.19
CT-4 SC-1	42.20	32.48
CT-4 SC-2	39.98	31.61
CT-4 SC-3	59.19	38.47
CT-5 SC-1	26.49	25.73
CT-5 SC-2	38.90	31.18
CT-5 SC-3	33.81	29.07
CT-6 SC-1	32.06	28.31
CT-6 SC-2	36.44	30.18
CT-6 SC-3	50.64	35.58
CT-7 SC-1	45.12	33.59
CT-7 SC-2	43.09	32.82
CT-7 SC-3	44.15	33.22
CT-8 SC-1	36.21	30.09
CT-8 SC-2	45.81	33.84
CT-8 SC-3	42.13	32.45
CT-1 FC-1	37.02	30.42
CT-4 FC-4	45.71	33.80
CT-7 FC-1	40.78	31.93
CT-7 FC-2	45.18	33.61
CT-8 FC-1	30.16	27.46
CT-8 FC-2	38.17	30.89
CT7-8 FC-1	32.23	28.39
CT7-8 FC-2	39.79	31.54

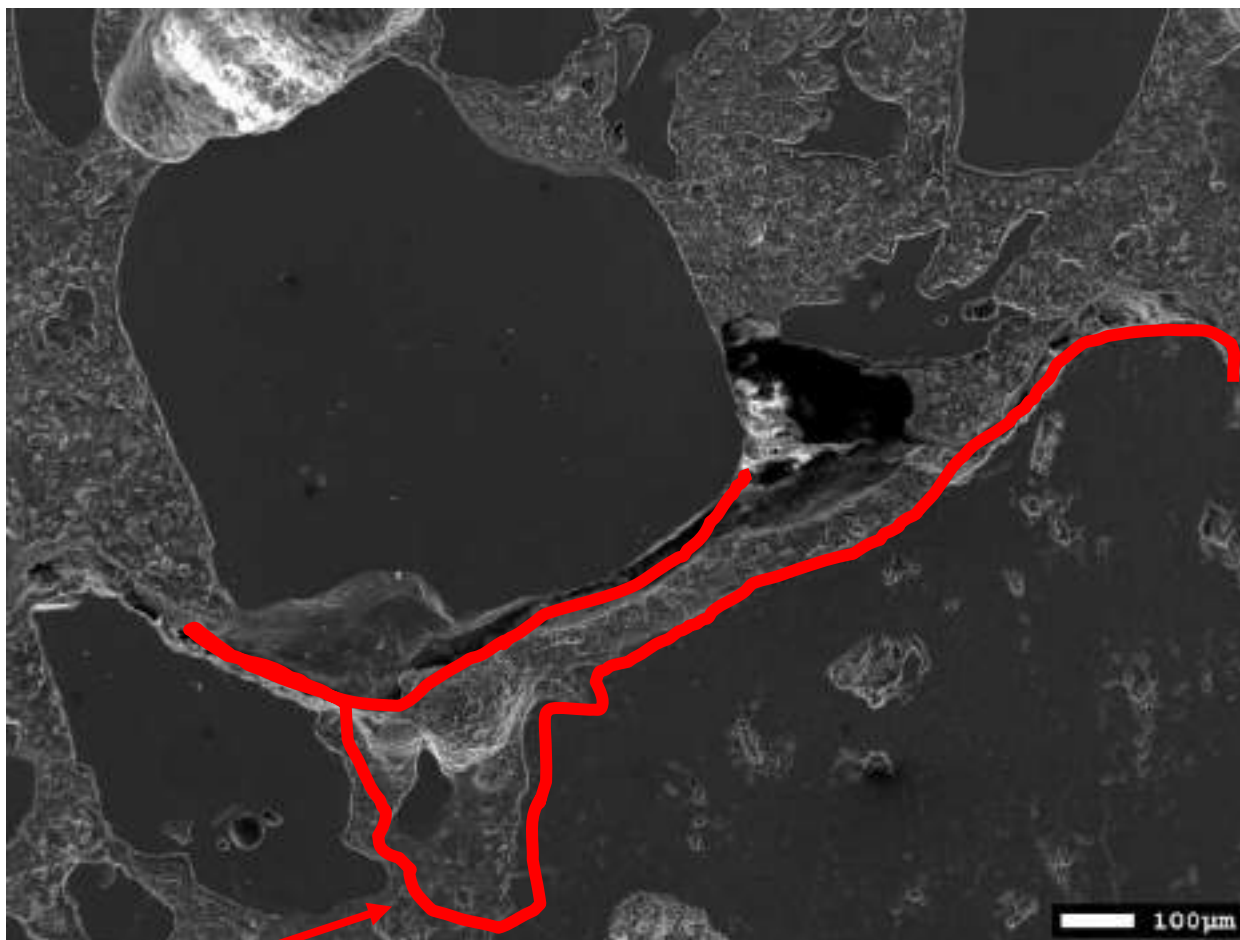


7. RESULTS OF CHLORIDE & pH TESTS OF CONCRETE CORE

SL. No.	Sample Type	Chloride Content (%)	Permissible value (IS 456 2000)	pH Value	Permissible Limit (IS 456 2000)	Remarks
1	Concrete Core	0.31	0.6 % of Concrete Cement Content (Max)	8.4	Not Less Than 9	Low
2		0.30		8.5		Low
3		0.25		9.1		Moderate
4		0.27		8.4		Low
5		0.28		8.6		Low
6		0.28		8.2		Low
7		0.29		9.4		Moderate
8		0.26		8.7		Low
9		0.34		8.6		Low
10		0.25		9.3		Low
		0.27		9.1		Low

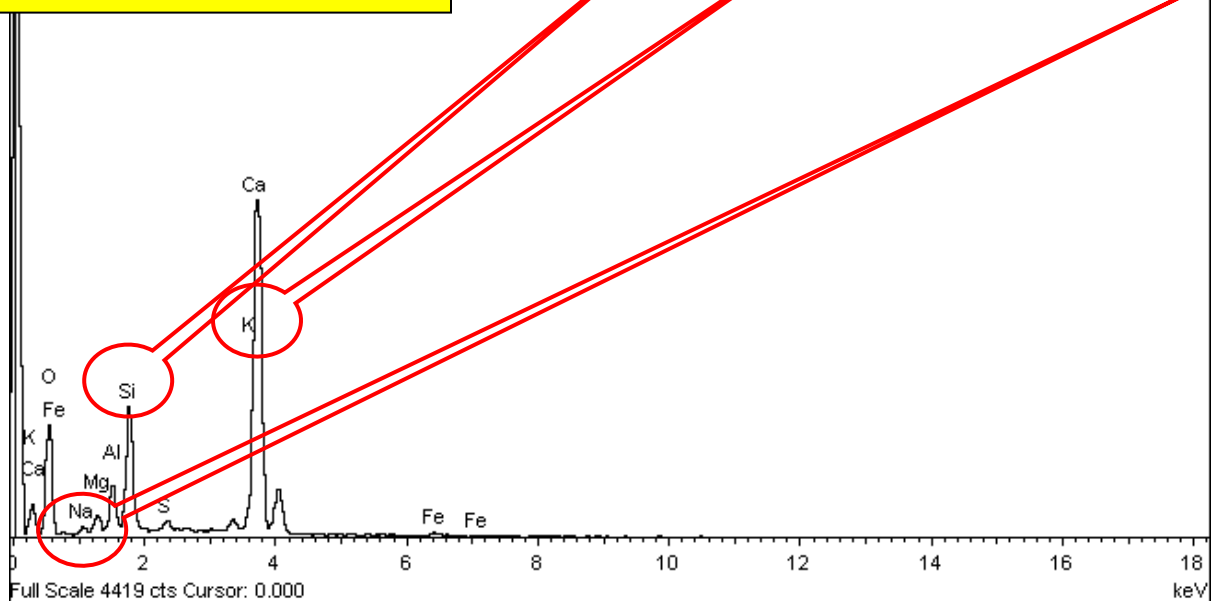


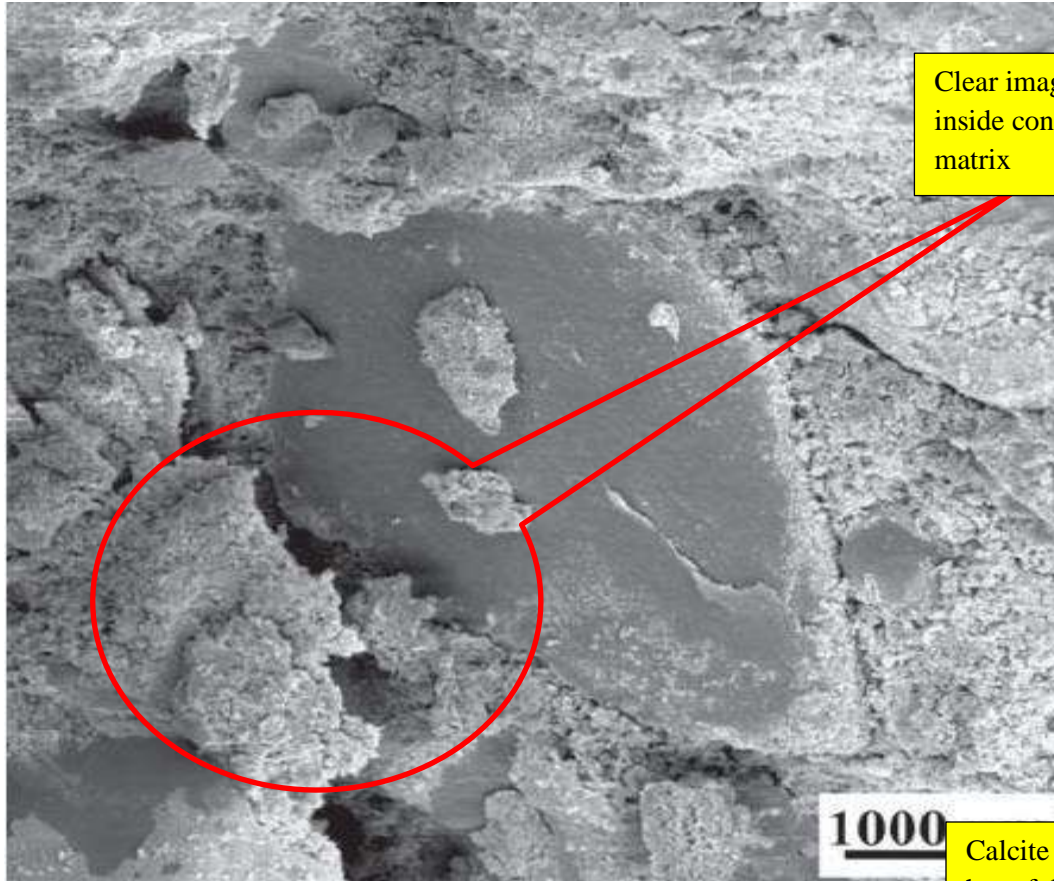
11. Microstructural Studies of concrete:-



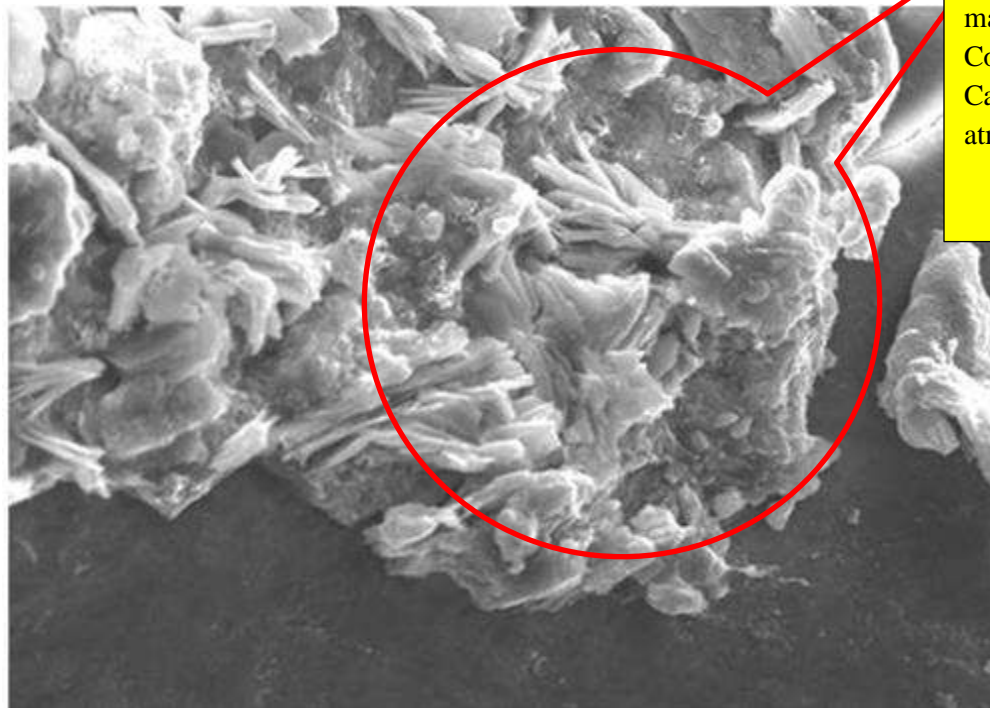
Alkali –Silica-gel through barrier

Edx Spectrum shown strong peak of Si-Na-K





Clear image of calcium leaching inside concrete aggregate paste matrix



Calcite (CaCO_3) Formation is harmful for the Concrete matrix. The pH maintainer of Concrete portlandite [$\text{Ca}(\text{OH})_2$] is consumed by the atmospheric CO_2



DESILTING BASINS



Performed Tests: -





Extracting Core Samples



In-situ Compressive Strength





pH Testing of Concrete



Visual Inspection: -

1. Many places of the Desilting Basins concrete walls have no sign delamination, cracks, spalling or water leakage.
2. After long run of the desilting basins walls are now facing severe hydrostatic pressure.
3. Periodically maintenance required.



TEST RESULTS



1. Schmidt Hammer Test Results: -

Site Name : ASSAM GAS BASED POWER PLANT, NEEPCO							Date : 01.10.21 - 02.10.21			
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)	
Name of the Structure: DESILTING BASIN										
Location: OUTSIDE WALL										
1	Point - 01	H→←	28	42	43	47	40	42	48	
2			47	48	40	41	42	44	52	
3	Point - 02	H→←	35	30	37	38	32	34	32	
4			33	35	32	33	34	33	30	
5	Point - 03	H→←	42	40	38	36	37	39	42	
6			38	39	42	41	40	40	44	
7	Point - 04	H→←	45	40	39	38	42	41	46	
8			41	43	38	39	40	40	44	
9	Point - 05	H→←	40	38	36	32	35	36	36	
10			33	34	32	35	37	34	32	
11	Point - 06	H→←	42	40	38	32	30	37	38	
12			36	30	31	37	34	34	32	
13	Point - 07	H→←	30	33	36	39	30	32	30	
14			31	32	34	36	32	33	30	
15	Point - 08	H→←	30	29	32	34	30	31	28	
16			33	31	30	32	33	32	30	
17	Point - 09	H→←	36	30	32	31	39	32	30	
18			34	35	33	38	32	34	32	
119	Point - 60	H→←	42	40	39	44	40	41	46	
120			44	41	45	43	38	42	48	
121	Point - 61	H→←	39	38	36	39	40	38	40	
122			36	37	34	38	41	37	38	
Average Compressive Strength =								37.64		



2. Ultrasonic Pulse Velocity Test Results: -

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					
Name of the Structure: DESILTING BASIN				Date : 01.10.21-02.10.21	
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: OUTSIDE WALL					
1	Point - 01	Indirect	300	3.808	Good
2	Point - 02	Indirect	300	3.604	Good
3	Point - 03	Indirect	300	3.413	Doubtful
4	Point - 04	Indirect	300	3.925	Good
5	Point - 05	Indirect	300	3.714	Good
6	Point - 06	Indirect	300	3.671	Good
7	Point - 07	Indirect	300	4.087	Good
8	Point - 08	Indirect	300	3.487	Doubtful
9	Point - 09	Indirect	300	4.014	Good
59	Point - 60	Indirect	300	3.695	Good
60	Point - 61	Indirect	300	3.528	Good
Average Velocity =				3.722	Good



3. RESULTS OF DEPTH OF CARBONATION TEST

Sl No.	Location	Depth of Carbonation (mm)	Permissible Value (mm)	Remarks
1	DB-1	25	Low-Moderate	Low
2	DB-2	20		Low
3	DB-3	22		Low

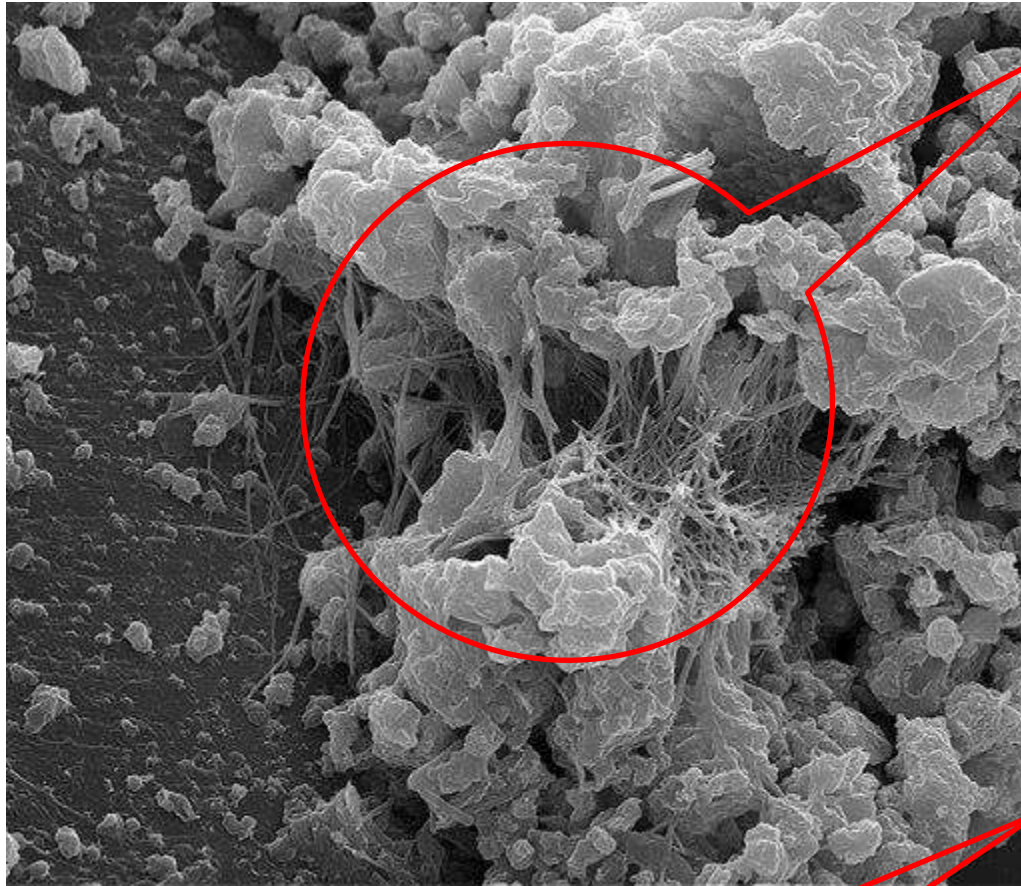
4. RESULTS OF CONCRETE CORE

Location	In-Situ Compressive Strength (N/mm ²)	Modulus of Elasticity of Concrete (GPa)
DB-1-1	40.91	31.98
DB-1-2	41.37	32.16
DB-2-1	42.22	32.49
DB-2-2	40.45	31.80
DB-3-1	43.29	32.90
DB-3-2	42.18	32.47

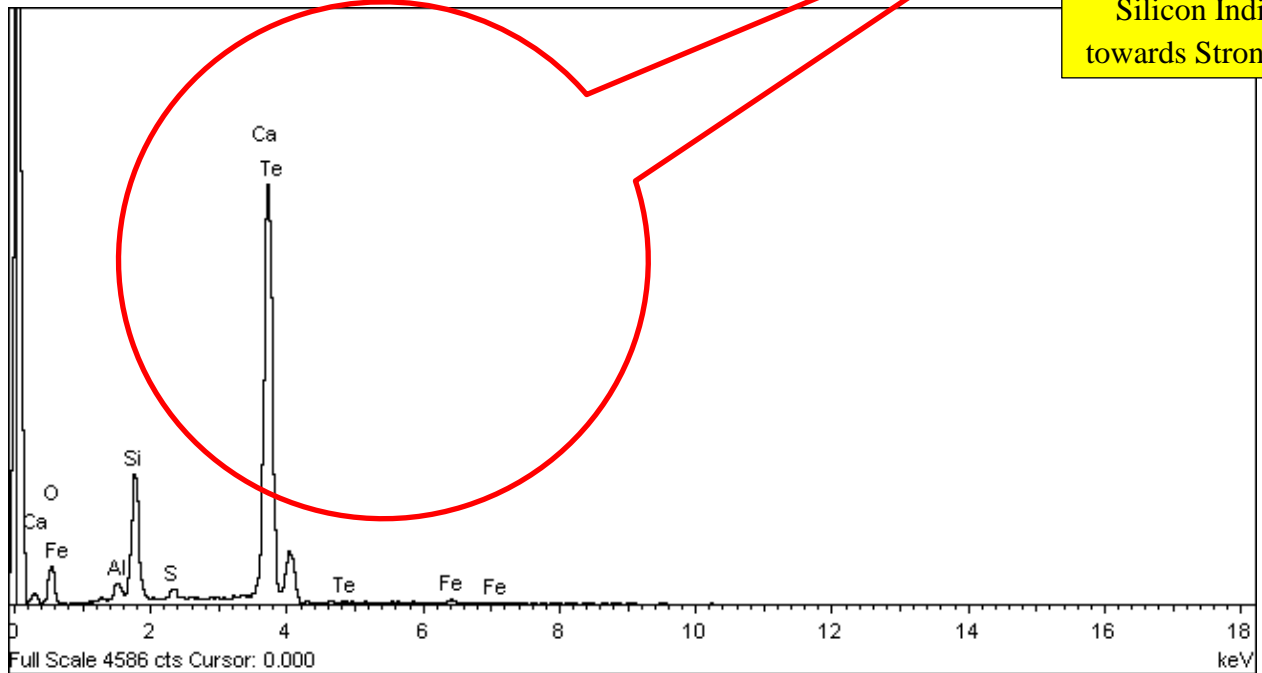
5. RESULTS OF CHLORIDE & pH TESTS OF CONCRETE CORE

SL. No.	Sample Type	Chloride Content (%)	Permissible value (IS 456 2000)	pH Value	Permissible Limit (IS 456 2000)	Remarks
1	Concrete Core	0.29	0.6 % of Concrete Cement Content (Max)	11.3	Not Less Than 9	High
2		0.33		10.5		Moderate
3		0.25		11.6		High



Microstructural Studies: -

Dense Paste & Matrix
has shown in SEM
Images



High intensity Peaks
of Calcium and
Silicon Indicates
towards Strong [C-S-



CLARIFIED WATER STORAGE TANK



Performed Tests: -

Construction Engineering Department, Jadavpur University Salt-Lake Campus Kolkata-700106





Core Sample Extraction

Concrete Carbonation Test with 0.2 % phenolphthalein solution



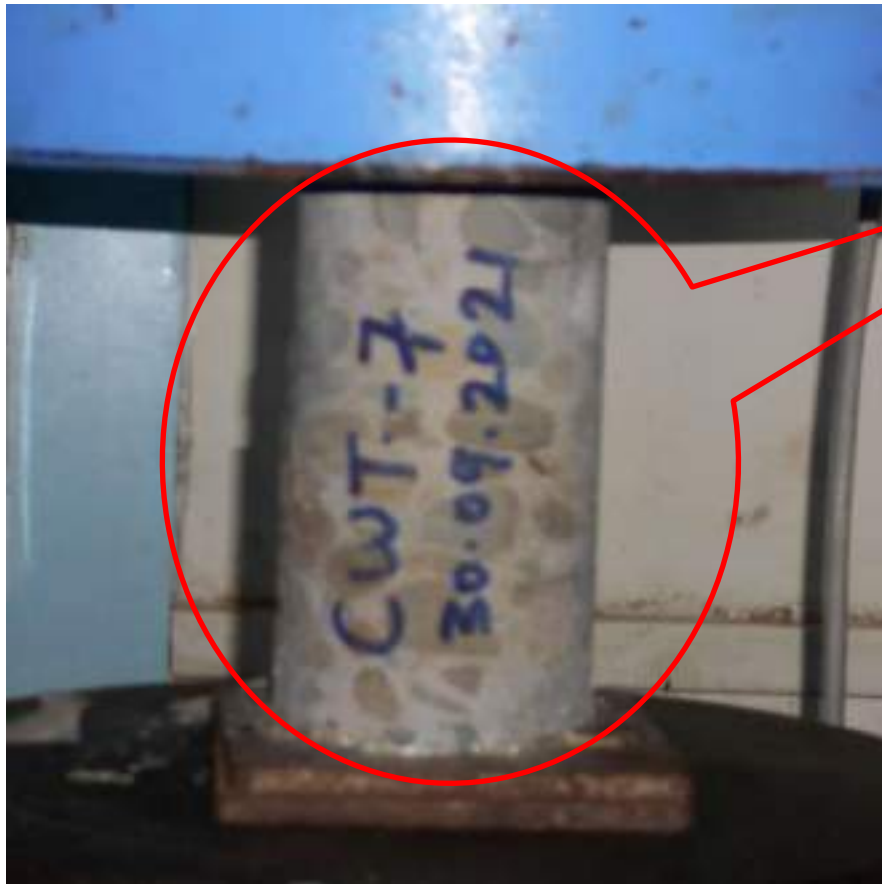


Half Cell Potential Test





Electrical Resistivity



In-Situ
Compressive
Strength Test





Concrete pH Test



Vibration Test



Visual Inspection: -

1. Many places of the Clarified water Storage Tank concrete walls are facing water leakage problems
2. After long run of the Clarified water Storage Tank walls are now facing severe hydrostatic pressure.
3. Many places of the reservoir already pressure grouted with cementitious grout. Somehow the grouting is not sustainable
4. Wall concrete is also weakened by the years of wear and tear.
5. Further Repair and re-strengthening are required with Grouting and Jacketing or wrapping.



Crack is observed due to corrosion of reinforcement

6. There are sever corrosion on the reinforcement, as a results cracks appeared which need to treated immediately.







Repairing bulge is observed

Shear cracks which is already grouted







Concrete Pop Out

Leakage of water at grouted places due to severe hydrostatic pressure





Grouted material started leaching out from the region of distress



Grouted material started leaching out from the region of distress



Water Leakage at wall column junction point due to severe hydrostatic pressure





TEST RESULTS



1. Schmidt Hammer Test Results: -

Site Name: ASSSAM GAS BASED POWER PLANT, NEEPCO							Date : 30.09.2021			
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)	
Name of the Structure: CLARIFIED WATER STORAGE TANK										
Location: Column										
1	Column No.- R- 01	V↓	32	35	32	28	36	33	36	
2			30	32	33	39	32	32	34	
3	Column No.- R- 02	V↓	30	32	31	33	34	32	34	
4			31	30	32	34	30	31	32	
5	Column No.- R- 03	V↓	34	30	32	33	31	32	34	
6			36	34	30	28	29	31	32	
7	Column No.- R- 04	V↓	30	33	39	31	28	31	32	
8			31	32	35	34	29	32	34	
9	Column No.- R- 05	V↓	33	30	34	29	30	31	32	
10			32	33	29	30	32	31	32	
11	Column No.- R- 06	V↓	34	30	31	32	29	31	32	
12			28	37	36	35	34	36	42	
13	Column No.- R- 07	V↓	33	34	35	33	30	33	36	
14			31	32	29	30	31	31	32	
15	Column No.- R- 08	V↓	33	30	32	35	36	33	36	
16			32	33	30	31	32	32	34	
17	Column No.- R- 09	V↓	30	31	34	33	36	33	36	
18			32	33	36	30	32	33	36	
19	Column No.- B- 01	V↓	37	30	32	33	34	33	36	



20			36	31	33	30	40	33	36
21	Column No.- B- 02	V↓	34	32	30	36	34	33	36
22			31	30	33	32	36	32	34
23	Column No.- B- 03	V↓	30	33	36	37	38	35	40
24			28	29	30	36	32	31	32
25	Column No.- B- 04	V↓	38	36	35	39	40	38	46
26			36	32	33	34	37	34	38
27	Column No.- B- 05	V↓	33	36	40	38	37	37	44
28			34	38	37	30	36	35	40
29	Column No.- B- 06	V↓	30	32	33	34	30	32	34
30			32	33	30	31	29	31	32
31	Column No.- B- 07	V↓	35	36	37	34	35	35	40
32			37	38	39	30	32	37	44
33	Column No.- B- 08	V↓	37	32	33	35	36	35	40
34			30	31	30	32	29	30	32
35	Column No.- B- 09	V↓	30	32	33	34	30	32	34
36			29	33	28	30	31	30	32
37	Column No.- B- 10	V↓	32	36	30	31	33	32	34
38			30	32	36	33	32	33	36
39	Column No.- B- 11	V↓	33	39	33	35	34	35	40
40			29	30	31	32	33	31	32
41	Column No.- L- 01	V↓	30	31	32	33	30	31	32
42			31	32	33	34	31	32	34
43	Column No.- L- 02	V↓	35	32	29	28	26	30	32
44			30	31	28	30	29	30	32



45	Column No.- L- 03	V↓	30	31	32	29	28	30	32
46			32	33	30	28	29	30	32
47	Column No.- L- 04	V↓	28	33	32	36	34	33	36
48			29	30	31	32	33	31	32
49	Column No.- L- 05	V↓	30	31	28	29	30	30	32
50			32	33	31	30	29	31	32
51	Column No.- L- 06	V↓	30	29	28	30	36	29	30
52			33	32	36	31	29	32	34
53	Column No.- L- 07	V↓	32	30	29	30	31	30	32
54			29	28	30	32	30	30	32
55	Column No.- L- 08	V↓	32	30	29	28	26	29	30
56			30	31	30	29	28	30	32
57	Column No.- L- 09	V↓	29	28	30	31	32	30	32
58			30	29	31	29	28	29	30
59	Column No.- L- 10	V↓	32	30	33	34	35	33	36
60			36	32	28	29	3	29	30
61	Column No.- L- 11	V↓	30	39	36	35	39	37	44
62			31	32	34	33	30	32	34
63	Column No.- F- 01	V↓	31	32	29	30	35	31	32
64			34	30	32	31	32	32	34
65	Column No.- F- 02	V↓	33	30	31	29	30	31	32
66			32	33	33	33	34	33	36
67	Column No.- F- 03	V↓	30	31	29	34	35	32	34
68			37	36	34	32	33	34	38
69	Column No.- F- 04	V↓	30	29	30	31	33	31	32



70			28	30	31	29	28	29	30
71	Column No.- F- 05	V↓	34	30	35	29	28	31	32
72			36	32	31	30	36	33	36
73	Column No.- F- 06	V↓	30	31	33	29	28	30	32
74			32	30	32	30	29	31	32
75	Column No.- F- 07	V↓	32	30	29	28	31	30	32
76			29	28	27	30	26	28	28
77	Column No.- F- 08	V↓	32	33	35	30	31	32	34
78			34	36	37	32	29	34	38
79	Column No.- F- 09	V↓	36	34	29	28	27	30	32
80			26	27	30	31	32	29	30
81	Column No.- F- 10	V↓	37	36	38	30	32	35	40
82			33	35	34	29	31	32	34
83	Column No.- F- 11	V↓	30	32	29	28	33	30	32
84			28	30	31	36	32	31	32
Average Compressive Strength = 34.31									
Location: Roof Slab									
85	Point - 01	V↓	30	31	32	28	29	30	32
86			27	28	30	31	33	30	32
87	Point - 02	V↓	32	33	35	36	30	33	36
88			32	34	33	37	38	35	40
89	Point - 03	V↓	30	35	34	33	36	34	38
90			31	32	33	32	33	32	34
91	Point - 04	V↓	32	33	32	33	34	33	36
92			35	36	34	30	31	33	36



93	Point - 05	V↓	35	34	30	31	32	32	34
94			29	32	40	34	35	33	36
95	Point - 06	V↓	30	38	34	36	37	35	40
96			32	33	36	32	31	33	36
97	Point - 07	V↓	30	31	33	37	38	34	38
98			39	33	30	31	30	31	32
99	Point - 08	V↓	30	34	32	33	31	32	34
100			29	30	33	34	32	32	34
101	Point - 09	V↓	30	31	32	32	33	32	34
102			34	35	36	30	29	33	36
103	Point - 10	V↓	35	37	36	35	38	36	42
104			29	30	32	33	34	32	34
105	Point - 11	V↓	30	32	33	38	36	34	38
106			31	34	35	36	30	33	36
107	Point - 12	V↓	32	33	30	29	31	31	32
108			30	34	36	32	33	33	36
109	Point - 13	V↓	32	36	34	35	37	35	40
110			34	35	30	31	32	32	34
111	Point - 14	V↓	32	29	34	36	37	34	38
112			39	40	32	33	34	36	42
113	Point - 15	V↓	30	32	34	34	33	33	36
114			31	36	32	30	31	32	34
115	Point - 16	V↓	33	30	32	31	30	31	32
116			29	28	31	32	36	31	32
117	Point - 17	V↓	28	30	31	32	33	31	32



118			34	35	36	33	28	35	40
119	Point - 18	V↓	30	29	28	29	32	30	32
120			33	34	31	30	32	32	34
121	Point - 19	V↓	30	32	31	29	28	30	32
122			29	30	32	30	30	30	32
123	Point - 20	V↓	28	30	29	31	32	30	32
124			30	29	31	32	30	30	32
125	Point - 21	V↓	30	31	32	29	28	30	32
126			29	30	33	34	36	32	34
127	Point - 22	V↓	32	30	31	36	37	33	36
128			38	30	32	29	28	30	32
129	Point - 23	V↓	30	32	34	37	36	34	38
130			28	29	30	31	32	30	32
131	Point - 24	V↓	34	31	32	33	35	33	36
132			30	32	33	34	30	32	34
Average Compressive Strength = 35.08									
Location : RCC WALL									
133	Point- F-01	H→|←	39	40	36	37	38	38	40
134			42	41	42	39	40	41	46
135	Point- F-02	H→|←	34	35	40	37	38	37	38
136			36	39	40	41	39	39	42
137	Point- F-03	H→|←	32	33	34	31	32	32	30
138			30	35	36	30	31	32	30
139	Point- F-04	H→|←	40	41	39	38	37	39	42
140			36	45	36	37	35	36	36



141	Point- F-05	H→←	37	38	40	35	36	37	38
142			39	41	42	36	34	38	40
143	Point- F-06	H→←	38	40	36	37	38	38	40
144			40	45	42	39	40	41	46
145	Point- F-07	H→←	37	39	40	38	44	40	44
146			42	46	39	40	41	42	48
147	Point- F-08	H→←	40	41	39	42	39	40	44
148			38	39	40	41	43	40	44
149	Point- F-09	H→←	34	37	38	33	40	36	36
150			39	38	40	41	39	39	42
151	Point- F-10	H→←	30	37	36	33	34	34	32
152			32	36	34	32	30	33	30
153	Point- L-01	H→←	34	37	39	40	41	38	40
154			34	33	32	30	31	32	30
155	Point- L-02	H→←	30	32	36	35	37	34	32
156			32	33	32	38	36	34	32
157	Point- L-03	H→←	30	29	28	27	30	29	24
158			31	28	27	26	25	27	20
159	Point- L-04	H→←	37	36	35	38	32	36	36
160			34	35	30	37	38	35	34
161	Point- L-05	H→←	40	39	42	37	39	39	42
162			43	42	40	39	36	40	44
163	Point- L-06	H→←	36	37	30	32	30	33	30
164			28	29	31	30	33	30	26
165	Point- L-07	H→←	34	32	30	28	26	30	26



166			27	29	32	31	3	28	22
167	Point- L-08	H→←	32	36	38	37	40	37	38
168			41	32	36	38	39	39	42
169	Point- L-09	H→←	37	35	38	39	40	38	40
170			41	39	37	36	35	38	40
171	Point- L-10	H→←	32	38	38	40	36	37	38
172			39	34	35	36	32	35	34
173	Point- B - 01	H→←	34	32	35	36	37	35	34
174			40	38	34	34	33	36	36
175	Point- B - 02	H→←	44	32	38	36	34	35	34
176			33	37	39	35	36	36	36
177	Point- B - 03	H→←	34	35	36	30	37	34	32
178			38	39	36	35	38	37	38
179	Point- B - 04	H→←	37	30	34	35	32	34	32
180			33	34	36	39	30	34	32
181	Point- B - 05	H→←	34	36	37	30	32	34	32
182			33	34	38	36	30	34	32
183	Point- B - 06	H→←	37	38	32	33	34	35	34
184			36	39	40	37	41	39	42
185	Point- B - 07	H→←	38	38	41	34	35	37	38
186			34	35	37	38	36	36	36
187	Point- B - 08	H→←	40	38	34	35	37	37	38
188			38	39	41	40	42	40	44
189	Point- B - 09	H→←	40	42	41	39	38	40	44
190			38	39	40	38	37	38	40



191	Point- B - 10	H→←	39	40	36	37	36	38	40
192			34	35	38	39	40	37	38
193	Point- B - 11	H→←	39	38	40	34	35	37	38
194			36	37	41	42	36	38	40
195	Point- B - 12	H→←	40	38	39	34	37	38	40
196			38	39	41	39	36	39	42
197	Point- R - 01	H→←	31	39	40	42	39	40	44
198			38	37	36	33	34	36	36
199	Point- R - 02	H→←	39	40	44	41	38	40	44
200			36	37	40	39	41	39	42
201	Point- R - 03	H→←	37	34	33	38	40	36	36
202			41	36	34	39	36	37	38
203	Point- R - 04	H→←	31	33	37	30	39	34	32
204			36	37	38	40	41	38	40
205	Point- R - 05	H→←	36	34	35	37	39	36	36
206			40	39	37	36	32	37	38
207	Point- R - 06	H→←	30	36	40	38	39	38	40
208			41	42	39	37	36	39	42
209	Point- R - 07	H→←	37	36	35	38	40	37	38
210			41	39	38	36	32	39	42
211	Point- R - 08	H→←	45	39	40	42	38	41	46
212			36	35	34	33	32	34	32
Average Compressive Strength =									37.20



2. Ultrasonic Pulse Velocity Test Results :-

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					
Name of the Structure: CLARIFIED WATER STORAGE TANK				Date : 30.09.2021	
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: Column					
1	Column No.- R- 01	Direct	1000	4.216	Good
2	Column No.- R- 02	Direct	850	4.418	Good
3	Column No.- R- 03	Direct	850	4.098	Good
4	Column No.- R- 04	Direct	850	4.148	Good
5	Column No.- R- 05	Direct	850	4.169	Good
6	Column No.- R- 06	Direct	850	4.278	Good
7	Column No.- R- 07	Direct	850	4.069	Good
8	Column No.- R- 08	Direct	850	4.226	Good
9	Column No.- R- 09	Direct	1000	4.034	Good
10	Column No.- B- 01	Direct	1000	4.284	Good
11	Column No.- B- 02	Direct	300	3.834	Good
12	Column No.- B- 03	Direct	850	4.557	Excellent
13	Column No.- B- 04	Direct	100	4.303	Good
14	Column No.- B- 05	Direct	850	4.715	Excellent
15	Column No.- B- 06	Direct	850	4.593	Excellent



16	Column No.- B- 07	Direct	1000	4.314	Good
17	Column No.- B- 08	Direct	850	4.176	Good
18	Column No.- B- 09	Direct	850	4.522	Excellent
19	Column No.- B- 10	Direct	850	4.299	Good
20	Column No.- B- 11	Direct	850	4.522	Excellent
21	Column No.- L- 01	Direct	1000	4.230	Good
22	Column No.- L- 02	Direct	850	4.242	Good
23	Column No.- L- 03	Direct	850	4.195	Good
24	Column No.- L- 04	Direct	850	4.118	Good
25	Column No.- L- 05	Direct	850	4.454	Good
26	Column No.- L- 06	Direct	850	3.621	Good
27	Column No.- L- 07	Direct	850	3.916	Good
28	Column No.- L- 08	Direct	850	4.316	Good
29	Column No.- L- 09	Direct	850	4.596	Excellent
30	Column No.- L- 10	Direct	850	4.790	Excellent
31	Column No.- L- 11	Direct	1000	4.206	Good
32	Column No.- F- 01	Indirect	300	4.010	Good
33	Column No.- F- 02	Direct	850	4.263	Good
34	Column No.- F- 03	Direct	850	4.271	Good
35	Column No.- F- 04	Direct	850	4.296	Good



36	Column No.- F- 05	Direct	850	4.118	Good
37	Column No.- F- 06	Direct	1000	4.294	Good
38	Column No.- F- 07	Direct	850	4.297	Good
39	Column No.- F- 08	Direct	850	4.299	Good
40	Column No.- F- 09	Direct	850	4.424	Good
41	Column No.- F- 10	Direct	1000	3.939	Good
42	Column No.- F- 11	Indirect	300	4.338	Good
Average Velocity =				4.262	Good
Location : Roof Slab					
43	Point - 01	Indirect	300	3.671	Good
44	Point - 02	Indirect	300	3.808	Good
45	Point - 03	Indirect	300	4.219	Good
46	Point - 04	Indirect	300	3.930	Good
47	Point - 05	Indirect	300	3.719	Good
48	Point - 06	Indirect	300	3.591	Good
49	Point - 07	Indirect	300	3.671	Good
50	Point - 08	Indirect	300	3.553	Good
51	Point - 09	Indirect	300	3.597	Good
52	Point - 10	Indirect	300	3.175	Doubtful



53	Point - 11	Indirect	300	3.903	Good
54	Point - 12	Indirect	300	3.516	Good
55	Point - 13	Indirect	300	3.883	Good
56	Point - 14	Indirect	300	3.396	Doubtful
57	Point - 15	Indirect	300	3.596	Good
58	Point - 16	Indirect	300	3.611	Good
59	Point - 17	Indirect	300	3.673	Good
60	Point - 18	Indirect	300	3.587	Good
61	Point - 19	Indirect	300	3.863	Good
62	Point - 20	Indirect	300	3.383	Doubtful
63	Point - 21	Indirect	300	3.735	Good
64	Point - 22	Indirect	300	3.922	Good
65	Point - 23	Indirect	300	3.851	Good
66	Point - 24	Indirect	300	3.639	Good
Average Velocity =				3.687	Good
Location : RCC WALL					
67	Point- F-01	Indirect	300	3.603	Good
68	Point- F-02	Indirect	300	4.305	Good
69	Point- F-03	Indirect	300	3.981	Good



70	Point- F-04	Indirect	300	3.905	Good
71	Point- F-05	Indirect	300	4.334	Good
72	Point- F-06	Indirect	300	4.395	Good
73	Point- F-07	Indirect	300	3.927	Good
74	Point- F-08	Indirect	300	3.551	Good
75	Point- F-09	Indirect	300	4.071	Good
76	Point- F-10	Indirect	300	3.418	Doubtful
77	Point- L-01	Indirect	300	4.058	Good
78	Point- L-02	Indirect	300	3.658	Good
79	Point- L-03	Indirect	300	3.334	Doubtful
80	Point- L-04	Indirect	300	3.231	Doubtful
81	Point- L-05	Indirect	300	3.347	Doubtful
82	Point- L-06	Indirect	300	3.264	Doubtful
83	Point- L-07	Indirect	300	3.394	Doubtful
84	Point- L-08	Indirect	300	3.512	Good
85	Point- L-09	Indirect	300	3.416	Doubtful
86	Point- L-10	Indirect	300	4.231	Good
87	Point- B-01	Indirect	300	4.132	Good



88	Point- B-02	Indirect	300	3.800	Good
89	Point- B-03	Indirect	300	3.316	Doubtful
90	Point- B-04	Indirect	300	3.808	Good
91	Point- B-05	Indirect	300	3.386	Doubtful
92	Point- B-06	Indirect	300	3.364	Doubtful
93	Point- B-07	Indirect	300	3.518	Good
94	Point- B-08	Indirect	300	3.953	Good
95	Point- B-09	Indirect	300	3.379	Doubtful
96	Point- B-10	Indirect	300	4.055	Good
97	Point- B-11	Indirect	300	4.373	Good
98	Point- B-12	Indirect	300	4.184	Good
99	Point- R-01	Indirect	300	3.772	Good
100	Point- R-02	Indirect	300	3.451	Doubtful
101	Point- R-03	Indirect	300	3.722	Good
102	Point- R-04	Indirect	300	4.045	Good
103	Point- R-05	Indirect	300	3.744	Good
104	Point- R-06	Indirect	300	3.600	Good
105	Point- R-07	Indirect	300	3.851	Good



106	Point- R-08	Indirect	300	3.628	Good
Average Velocity =				3.750	Good

3. Electrical Resistivity Test Results: -

Name of the Structure: Clarified Water Storage Tank						
Location : Various Parts						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	F-1-1	112000	110000	97600	106533	Negligible
2	F-1-2	126000	122000	124000	124000	Negligible
3	F-1-3	113000	125000	103000	113667	Negligible
4	F-1-4	121000	130000	130200	127067	Negligible
5	F-1-5	85400	53300	30100	56267	Negligible
6	F-1-6	79400	76500	89200	81700	Negligible
7	F-2-1	188900	156400	142500	162600	Negligible
8	F-2-2	111000	145600	184200	146933	Negligible
9	F-2-3	163400	164100	181900	169800	Negligible
10	F-2-4	90100	71600	126200	95967	Negligible
11	F-2-5	84700	137600	143600	121967	Negligible
12	F-2-6	175500	126200	109800	137167	Negligible
13	F-3-1	138200	126400	132500	132367	Negligible
14	F-3-2	126200	97400	132400	118667	Negligible
15	F-3-3	162600	200300	198700	187200	Negligible
16	F-3-4	105200	109400	136200	116933	Negligible
17	F-3-5	198700	126800	175600	167033	Negligible
18	F-3-6	162200	204100	126800	164367	Negligible



19	F-4-1	145600	123200	161300	143367	Negligible
20	F-4-2	133700	98400	105200	112433	Negligible
21	F-4-3	136400	96800	134700	122633	Negligible
22	F-4-4	190700	162300	154200	169067	Negligible
23	F-4-5	142400	136200	196300	158300	Negligible
24	F-4-6	178600	205000	96500	160033	Negligible
25	F-5-1	115600	96400	104100	105367	Negligible
26	F-5-2	39700	75700	35200	50200	Negligible
27	F-5-3	62400	52300	48600	54433	Negligible
28	F-5-4	32300	45200	98400	58633	Negligible
29	F-5-5	40600	38700	45500	41600	Negligible
30	F-5-6	62700	75800	39200	59233	Negligible
31	F-6-1	85300	77400	65600	76100	Negligible
32	F-6-2	92600	104400	98700	98567	Negligible
33	F-6-3	85700	34800	123400	81300	Negligible
34	F-6-4	25600	72400	176400	91467	Negligible
35	F-6-5	126800	123400	121200	123800	Negligible
36	F-6-6	143900	133400	122200	133167	Negligible
37	F-7-1	96700	56600	115400	89567	Negligible
38	F-7-2	98700	126400	78500	101200	Negligible
39	F-7-3	95500	36700	72400	68200	Negligible
40	F-7-4	147200	100000	162400	136533	Negligible
41	F-7-5	137700	142900	30100	103567	Negligible
42	F-7-6	74500	72900	97100	81500	Negligible
43	F-8-1	98400	72200	66200	78933	Negligible



44	F-8-2	39500	126200	96500	87400	Negligible
45	F-8-3	98200	49400	60200	69267	Negligible
46	F-8-4	82400	58900	51900	64400	Negligible
47	F-8-5	83400	94200	62200	79933	Negligible
48	F-8-6	80200	90100	101200	90500	Negligible
49	F-9-1	98500	82300	129100	103300	Negligible
50	F-9-2	145200	142700	174200	154033	Negligible
51	F-9-3	68300	128400	68200	88300	Negligible
52	F-9-4	131400	68600	81200	93733	Negligible
53	F-9-5	131400	68600	81200	93733	Negligible
54	F-9-6	74800	142900	126200	114633	Negligible
55	F-10-1	98700	74200	96400	89767	Negligible
56	F-10-2	85700	65200	175200	108700	Negligible
57	F-10-3	72200	80100	96100	82800	Negligible
58	F-10-4	74200	68700	38200	60367	Negligible
59	F-10-5	65500	62500	52700	60233	Negligible
60	F-10-6	75800	71200	81500	76167	Negligible
61	L-1-1	93400	92700	94800	93633	Negligible
62	L-1-2	75500	60200	105200	80300	Negligible
63	L-1-3	165200	129200	133400	142600	Negligible
64	L-1-4	71300	53400	62700	62467	Negligible
65	L-1-5	85800	72800	95400	84667	Negligible
66	L-1-6	85800	72800	95400	84667	Negligible
67	L-2-1	129500	126200	116800	124167	#REF!
68	L-2-2	122200	95600	166300	128033	Negligible



69	L-2-3	121700	131300	128600	127200	Negligible
70	L-2-4	152200	165700	174800	164233	Negligible
71	L-2-5	148700	139800	105100	131200	Negligible
72	L-2-6	130200	139200	105100	124833	Negligible
73	L-3-1	91400	59700	74800	75300	Negligible
74	L-3-2	95900	85800	91260	90987	Negligible
75	L-3-3	39100	38700	86800	54867	Negligible
76	L-3-4	131400	122800	130300	128167	Negligible
77	L-3-5	138400	120800	105600	121600	Negligible
78	L-3-6	129200	132300	134800	132100	Negligible
79	L-4-1	98700	74800	58700	77400	Negligible
80	L-4-2	74800	56400	94400	75200	Negligible
81	L-4-3	85800	74800	95400	85333	Negligible
82	L-4-4	98400	62400	64700	75167	Negligible
83	L-4-5	78800	85200	72400	78800	Negligible
84	L-4-6	98500	88600	75200	87433	Negligible
85	L-5-1	85400	68500	92400	82100	Negligible
86	L-5-2	54400	68500	65400	62767	Negligible
87	L-5-3	74500	68500	92400	78467	Negligible
88	L-5-4	95200	68700	74800	79567	Negligible
89	L-5-5	91200	43400	39400	58000	Negligible
90	L-5-6	39600	59200	65200	54667	Negligible
91	L-6-1	34700	28700	45500	36300	Negligible
92	L-6-2	46600	29800	38900	38433	Negligible
93	L-6-3	34400	39500	68500	47467	Negligible



94	L-6-4	92400	74500	59400	75433	Negligible
95	L-6-5	54800	92400	58700	68633	Negligible
96	L-6-6	66800	54400	74800	65333	Negligible
97	L-7-1	36700	38200	35700	36867	Negligible
98	L-7-2	72200	34200	39800	48733	Negligible
99	L-7-3	25700	92200	38400	52100	Negligible
100	L-7-4	74200	58200	68400	66933	Negligible
101	L-7-5	98800	62700	73400	78300	Negligible
102	L-7-6	74800	55700	48800	59767	Negligible
103	L-8-1	38500	42400	59800	46900	Negligible
104	L-8-2	46700	65400	68800	60300	Negligible
105	L-8-3	32400	39800	62800	45000	Negligible
106	L-8-4	41300	85400	62200	62967	Negligible
107	L-8-5	58800	62300	95200	72100	Negligible
108	L-8-6	78200	88300	42300	69600	Negligible
109	L-9-1	77400	66800	94800	79667	Negligible
110	L-9-2	88700	72500	93400	84867	Negligible
111	L-9-3	62800	98200	45500	68833	Negligible
112	L-9-4	38200	32800	38900	36633	Negligible
113	L-9-5	39400	54800	62200	52133	Negligible
114	L-9-6	46500	74800	94200	71833	Negligible
115	L-10-1	79600	96200	118200	98000	Negligible
116	L-10-2	61700	38200	85200	61700	Negligible
117	L-10-3	98500	62300	78200	79667	Negligible
118	L-10-4	46600	38200	145200	76667	Negligible



119	L-10-5	138500	117700	74500	110233	Negligible
120	L-10-6	61700	109200	138700	103200	Negligible
121	L-11-1	40100	34700	74600	49800	Negligible
122	L-11-2	65200	74400	56200	65267	Negligible
123	L-11-3	55100	66400	88900	70133	Negligible
124	B-1-1	71300	31400	40900	47867	Negligible
125	B-1-2	43400	38700	44260	42120	Negligible
126	B-1-3	38400	54600	52800	48600	Negligible
127	B-1-4	74400	85800	43200	67800	Negligible
128	B-1-5	62700	68900	58800	63467	Negligible
129	B-1-6	32600	47500	44600	41567	Negligible
130	B-2-1	28600	30600	40400	33200	Negligible
131	B-2-2	58300	62200	48200	56233	Negligible
132	B-2-3	94500	74500	68200	79067	Negligible
133	B-2-4	155400	174400	139800	156533	Negligible
134	B-2-5	160200	174800	145200	160067	Negligible
135	B-2-6	140800	148200	142800	143933	Negligible
136	B-3-1	39500	58200	38900	45533	Negligible
137	B-3-2	69200	56500	61500	62400	Negligible
138	B-3-3	62600	74500	38800	58633	Negligible
139	B-3-4	89200	44400	91400	75000	Negligible
140	B-3-5	69200	56500	61500	62400	Negligible
141	B-3-6	62600	74500	38800	58633	Negligible
142	B-4-1	89200	44400	91400	75000	Negligible
143	B-4-2	86300	82600	45600	71500	Negligible



144	B-4-3	82300	80200	72600	78367	Negligible
145	B-4-4	105400	103200	48500	85700	Negligible
146	B-4-5	72200	58400	69400	66667	Negligible
147	B-4-6	62300	90400	94500	82400	Negligible
148	B-5-1	126300	116400	122600	121767	Negligible
149	B-5-2	110800	109600	94500	104967	Negligible
150	B-5-3	85600	82800	42600	70333	Negligible
151	B-5-4	114100	122600	132400	123033	Negligible
152	B-5-5	119600	120120	126800	122173	Negligible
153	B-5-6	123900	124120	128400	125473	Negligible
154	B-6-1	44600	47700	48200	46833	Negligible
155	B-6-2	72500	94600	90100	85733	Negligible
156	B-6-3	49300	85600	79600	71500	Negligible
157	B-6-4	133700	122400	127300	127800	Negligible
158	B-6-5	122400	132200	145400	133333	Negligible
159	B-6-6	123200	138300	120500	127333	Negligible
160	B-7-1	40600	42270	48300	43723	Negligible
161	B-7-2	49500	39800	56300	48533	Negligible
162	B-7-3	62300	70600	80300	71067	Negligible
163	B-7-4	103700	112300	126400	114133	Negligible
164	B-7-5	117500	112800	113600	114633	Negligible
165	B-7-6	114300	118500	126300	119700	Negligible
166	B-8-1	63500	56800	57800	59367	Negligible
167	B-8-2	55300	60600	48300	54733	Negligible
168	B-8-3	52800	56300	48500	52533	Negligible



169	B-8-4	150300	159200	148300	152600	Negligible
170	B-8-5	122600	158400	146700	142567	Negligible
171	B-8-6	158300	140300	156400	151667	Negligible
172	B-9-1	48400	62600	45300	52100	Negligible
173	B-9-2	62300	58400	46500	55733	Negligible
174	B-9-3	44800	50600	46200	47200	Negligible
175	B-9-4	119500	162700	118500	133567	Negligible
176	B-9-5	156800	120200	150700	142567	Negligible
177	B-9-6	94800	112300	94500	100533	Negligible
178	B-10-1	47500	49400	48900	48600	Negligible
179	B-10-2	50200	52300	59900	54133	Negligible
180	B-10-3	50200	46300	62500	53000	Negligible
181	B-10-4	136300	148500	130400	138400	Negligible
182	B-10-5	172300	146500	138200	152333	Negligible
183	B-10-6	134300	146500	145500	142100	Negligible
184	B-11-1	94600	98300	62600	85167	Negligible
185	B-11-2	94500	97400	58300	83400	Negligible
186	B-11-3	59500	72300	56600	62800	Negligible
187	B-11-4	115600	138200	137400	130400	Negligible
188	B-11-5	133700	122100	121600	125800	Negligible
189	B-11-6	125200	124100	118400	122567	Negligible
190	B-12-1	126500	138200	127200	130633	Negligible
191	B-12-2	119800	109400	128800	119333	Negligible
192	B-12-3	193400	129400	130400	151067	Negligible
193	B-12-4	117600	116700	166800	133700	Negligible



194	B-12-5	156200	162300	160300	159600	Negligible
195	B-12-6	146800	126300	128400	133833	Negligible
196	R-1-1	105300	106300	108900	106833	Negligible
197	R-1-2	122300	119500	117300	119700	Negligible
198	R-1-3	114500	119500	117300	117100	Negligible
199	R-1-4	181300	146300	181400	169667	Negligible
200	R-1-5	133200	172200	156300	153900	Negligible
201	R-1-6	128500	120300	172400	140400	Negligible
202	R-2-1	122400	132500	120400	125100	Negligible
203	R-2-2	130600	156200	130200	139000	Negligible
204	R-2-3	120500	102300	105200	109333	Negligible
205	R-2-4	108400	156500	163200	142700	Negligible
206	R-2-5	162700	51500	160400	124867	Negligible
207	R-2-6	146200	138700	126700	137200	Negligible
208	R-3-1	82300	85400	90600	86100	Negligible
209	R-3-2	59300	81300	70400	70333	Negligible
210	R-3-3	72300	92600	81400	82100	Negligible
211	R-3-4	138600	146200	160300	148367	Negligible
212	R-3-5	144500	146200	160300	150333	Negligible
213	R-3-6	185400	162400	174600	174133	Negligible
214	R-4-1	94500	68300	72600	78467	Negligible
215	R-4-2	84600	42300	58600	61833	Negligible
216	R-4-3	72300	64600	55800	64233	Negligible
217	R-4-4	109300	110700	112800	110933	Negligible
218	R-4-5	112900	174700	114700	134100	Negligible



219	R-4-6	115500	172900	146300	144900	Negligible
220	R-5-1	62400	54900	51900	56400	Negligible
221	R-5-2	39500	45800	44600	43300	Negligible
222	R-5-3	63300	42400	56900	54200	Negligible
223	R-5-4	116300	156500	154800	142533	Negligible
224	R-5-5	160800	154300	156900	157333	Negligible
225	R-5-6	160400	148600	157800	155600	Negligible
226	R-6-1	74600	70200	69200	71333	Negligible
227	R-6-2	58500	72400	38200	56367	Negligible
228	R-6-3	58100	64100	67100	63100	Negligible
229	R-6-4	108300	146200	126400	126967	Negligible
230	R-6-5	119800	112400	126300	119500	Negligible
231	R-6-6	129200	147200	156700	144367	Negligible
232	R-7-1	154300	72400	69100	98600	Negligible
233	R-7-2	81400	84600	72300	79433	Negligible
234	R-7-3	58300	62200	80600	67033	Negligible
235	R-7-4	98300	95600	57800	83900	Negligible
236	R-7-5	54300	48900	42600	48600	Negligible
237	R-7-6	74500	58900	72300	68567	Negligible
238	R-8-1	90300	58400	79400	76033	Negligible
239	R-8-2	91300	94300	99300	94967	Negligible
240	R-8-3	58300	46400	58200	54300	Negligible
241	R-8-4	102500	111200	98300	104000	Negligible
242	R-8-5	120500	130200	110500	120400	Negligible
243	R-8-6	92200	120300	111200	107900	Negligible



244	Slab-1-1	38900	26200	30400	31833	Negligible
245	Slab-1-2	22300	34600	37800	31567	Negligible
246	Slab-1-3	45300	39200	42600	42367	Negligible
247	Slab-2-1	32200	38600	40200	37000	Negligible
248	Slab-2-2	39300	36700	38300	38100	Negligible
249	Slab-2-3	32200	38200	30600	33667	Negligible
250	Slab-3-1	46300	38900	72700	52633	Negligible
251	Slab-3-2	42600	50900	60800	51433	Negligible
252	Slab-3-3	61600	62800	58300	60900	Negligible
253	Slab-4-1	72400	46600	48560	55853	Negligible
254	Slab-4-2	62300	67400	51600	60433	Negligible
255	Slab-4-3	93600	72300	68400	78100	Negligible
256	Slab-5-1	45600	58300	38600	47500	Negligible
257	Slab-5-2	46300	94500	85600	75467	Negligible
258	Slab-5-3	77300	88900	83600	83267	Negligible
259	Slab-6-1	56300	63400	68900	62867	Negligible
260	Slab-6-2	62600	76600	66500	68567	Negligible
261	Slab-6-3	68300	60500	58300	62367	Negligible
262	Slab-7-1	93600	98300	60800	84233	Negligible
263	Slab-7-2	70300	74600	87400	77433	Negligible
264	Slab-7-3	68300	64600	46400	59767	Negligible
265	Slab-8-1	45600	77700	87300	70200	Negligible
266	Slab-8-2	82800	94600	99300	92233	Negligible
267	Slab-8-3	97800	58600	69800	75400	Negligible
268	Slab-9-1	38300	42600	34300	38400	Negligible



269	Slab-9-2	36600	37300	34800	36233	Negligible
270	Slab-9-3	46300	52400	60300	53000	Negligible
271	Slab-10-1	62400	64300	67800	64833	Negligible
272	Slab-10-2	75300	76800	85800	79300	Negligible
273	Slab-10-3	29600	34800	32600	32333	Negligible
274	Slab-11-1	37200	34300	42400	37967	Negligible
274	Slab-11-2	46800	66300	46500	53200	Negligible
274	Slab-11-3	58200	64500	72300	65000	Negligible
274	Slab-12-1	77800	85400	84300	82500	Negligible
274	Slab-12-2	94500	98300	88600	93800	Negligible
274	Slab-12-3	77300	70400	74800	74167	Negligible
274	Slab-13-1	52300	62400	64600	59767	Negligible
274	Slab-13-2	68300	67500	45600	60467	Negligible
274	Slab-13-3	44800	56300	58400	53167	Negligible
274	Slab-14-1	70600	73400	75800	73267	Negligible
274	Slab-14-2	78600	68300	63900	70267	Negligible
274	Slab-14-3	74800	46900	56300	59333	Negligible
274	Slab-15-1	42400	48600	55300	48767	Negligible
274	Slab-15-2	56800	66600	61300	61567	Negligible
275	Slab-15-3	68400	66900	64300	66533	Negligible
276	Slab-16-1	48300	42600	56300	49067	Negligible
277	Slab-16-2	58400	64900	75300	66200	Negligible
278	Slab-16-3	78400	74900	73500	75600	Negligible
279	Slab-17-1	80600	74300	68400	74433	Negligible
280	Slab-17-2	62300	98300	60400	73667	Negligible



281	Slab-17-3	62300	61500	68600	64133	Negligible
282	Slab-18-1	81300	84500	86300	84033	Negligible
283	Slab-18-2	87900	94600	98300	93600	Negligible
284	Slab-18-3	95600	58600	62300	72167	Negligible
285	Slab-19-1	64300	51300	46400	54000	Negligible
286	Slab-19-2	44300	56400	57800	52833	Negligible
287	Slab-19-3	45400	44300	47400	45700	Negligible
288	Slab-20-1	28300	38600	34500	33800	Negligible
289	Slab-20-2	37600	74600	47800	53333	Negligible
290	Slab-20-3	52300	66500	61600	60133	Negligible
291	Slab-21-1	74900	78300	74800	76000	Negligible
292	Slab-21-2	75600	88300	92600	85500	Negligible
293	Slab-21-3	92800	94900	98300	95333	Negligible
294	Slab-22-1	66300	67800	75900	70000	Negligible
295	Slab-22-2	98300	97600	94500	96800	Negligible
296	Slab-22-3	97800	85300	82800	88633	Negligible
297	Slab-23-1	74300	75600	94300	81400	Negligible
298	Slab-23-2	46900	58400	72300	59200	Negligible
299	Slab-23-3	46600	72600	75800	65000	Negligible
300	Slab-24-1	98400	74300	76800	83167	Negligible
301	Slab-24-2	98900	92600	58600	83367	Negligible
302	Slab-24-3	45600	98300	54600	66167	Negligible



4. Half Cell Potential Test Results: -

Cooling Tower						Date : 29.09.2021
Sl No.	Location	Profometer Reading (-mV)			Average Reading (-mV)	Criteria for corrosion condition of Rebar in concrete as per IS 516 (Part-5/Sec-2) 2021
1	Shell-01	-350	-337	-389	-358.67	High (There is a > 90% probability that reinforcing steel corrosion is occurring in that area at time of measurement.)
2	Shell-02	-378	-356	-372	-368.67	
3	Shell-02	-365	-382	-367	-371.33	

5.RESULTS OF DEPTH OF CARBONATION TEST

Sl No.	Location	Depth of Carbonation (mm)	Permissible Value (mm)	Remarks
1	CWT-1	25	Low-Moderate	Low
2	CWT-2	26		Low
3	CWT-3	20		Low
4	CWT-4	15		Low
5	CWT-5	18		Low
6	CWT-6	30		Low
7	CWT-7	21		Low
8	CWT-8	23		Low
9	CWT-9	24		Low
10	CWT-10	27		Low
11	CWT-11	22		Low
12	CWT-12	23		Low
13	CWT-13	21		Low
14	CWT-14	24		Low



7. RESULTS OF CONCRETE CORE

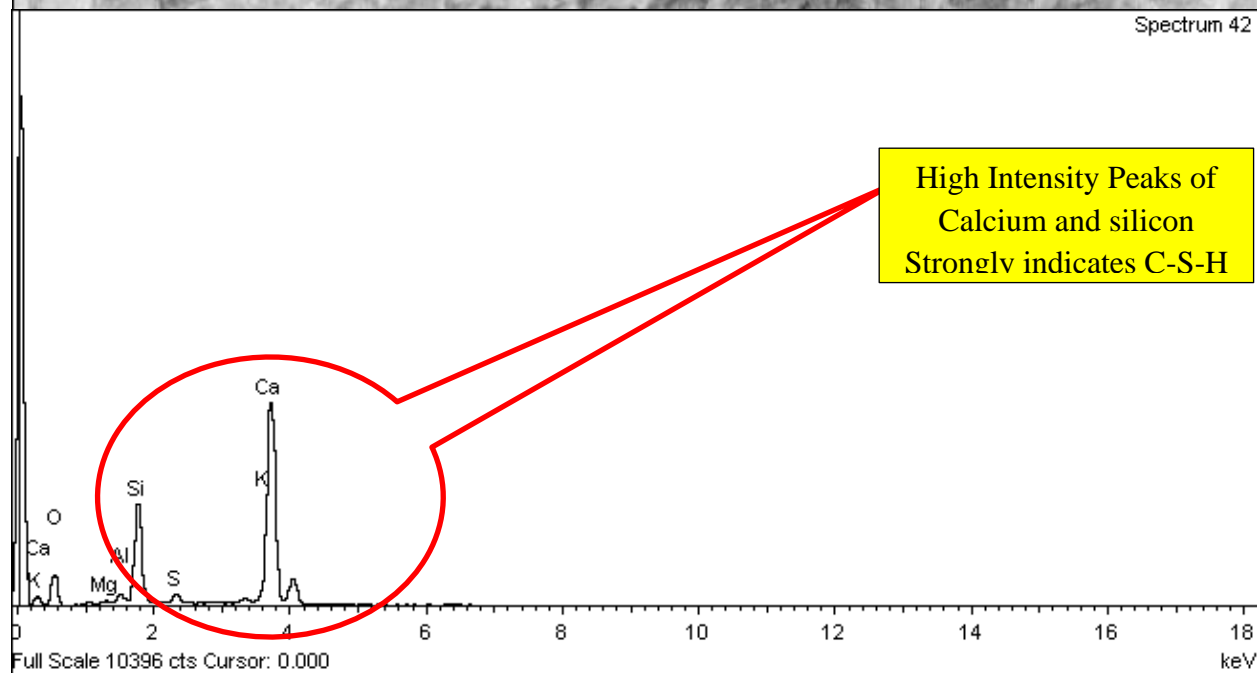
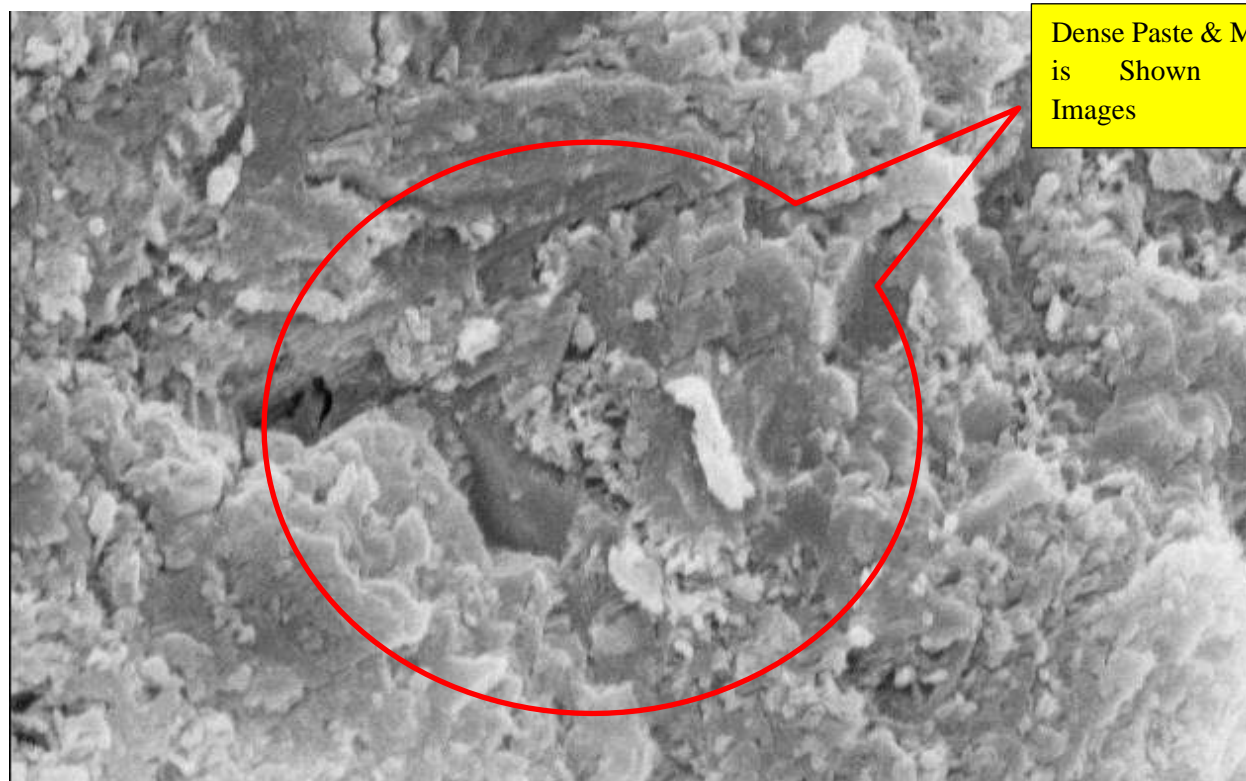
Location	In-Situ Compressive Strength (N/mm ²)	Modulus of Elasticity of Concrete (GPa)
CWT-1	43.21	32.87
CWT-2	44.56	33.38
CWT-3	49.32	35.11
CWT-4	48.22	34.72
CWT-5	47.30	34.39
CWT-6	40.69	31.89
CWT-7	45.73	33.81
CWT-8	46.29	34.02
CWT-9	45.33	33.66
CWT-10	41.32	32.14
CWT-11	40.56	31.84
CWT-12	41.78	32.32
CWT-13	40.68	31.89
CWT-14	43.58	33.01

7. RESULTS OF CHLORIDE & pH TESTS OF CONCRETE CORE

SL. No.	Sample Type	Chloride Content (%)	Permissible value (IS 456 2000)	pH Value	Permissible Limit (IS 456 2000)	Remarks
1	Concrete Core	0.30	0.6 % of Concrete Cement Content (Max)	11.2	Not Less Than 9	High
2		0.22		10.5		Moderate
3		0.21		11.3		High
4		0.24		11.8		High
5		0.26		10.9		Moderate



8. Microstructural Studies :-

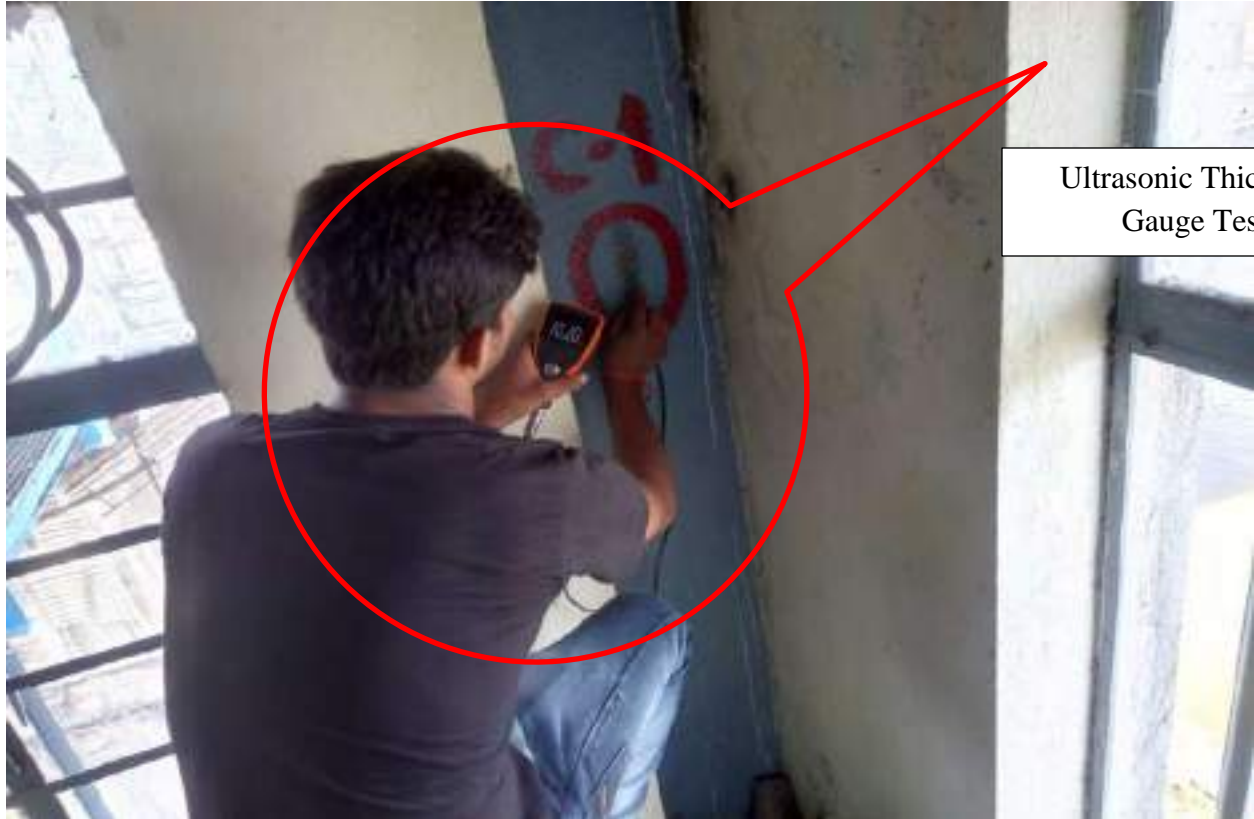


INTAKE WELL AND PUMP HOUSE AGBP AT FAKHIAL GHAT, JOYPUR



Performed Tests:-





Ultrasonic Thickness Gauge Test



Vibration Test



Visual Inspection: -

1. Most of Steel ISMB Members are in good condition no sign of Flaw (Sagging, Corrosion, Paint Delamination)
2. RCC Parts have no sign structural deterioration or delamination.
3. Parodically maintenance required.





TEST RESULTS



1. Schmidt Hammer Test Results:-

Site Name: ASSAM GAS BASED POWER PLANT, NEEPCO									Date : 07.10.21
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure: Fakhial Ghat Intake									
Location: Intake Pier									
90	Point- 01	H→←	46	42	40	48	42	44	52
91	Point- 02	H→←	40	42	41	39	42	41	46
92	Point- 03	H→←	40	41	39	38	39	39	42
93	Point- 04	H→←	44	45	46	40	39	43	50
94	Point- 05	H→←	38	30	38	42	40	40	44
95	Point- 06	H→←	41	42	43	39	41	41	46
96	Point- 07	H→←	40	39	38	40	42	40	44
97	Point- 08	H→←	46	42	40	38	36	39	42
98	Point- 09	H→←	42	44	43	39	41	42	48
99	Point- 10	H→←	40	39	38	40	42	40	44
100	Point- 11	H→←	44	39	36	37	40	39	42
101	Point- 12	H→←	36	37	35	39	41	38	40
102	Point- 13	H→←	40	41	38	40	39	40	44
103	Point- 14	H→←	38	37	36	41	35	37	38
104	Point- 15	H→←	39	40	41	38	36	39	42
105	Point- 16	H→←	38	36	37	46	41	38	40
106	Point- 17	H→←	42	40	38	39	40	40	44
107	Point- 18	H→←	40	41	39	46	42	42	48
108	Point- 19	H→←	36	32	33	39	40	36	36
109	Point- 20	H→←	41	42	37	38	42	40	44



110	Point- 21	H→κ←	40	43	39	36	38	39	42
111	Point- 22	H→κ←	39	38	37	35	31	36	36
112	Point- 23	H→κ←	32	33	34	35	36	34	32
113	Point- 24	H→κ←	39	38	40	41	39	39	42
114	Point- 25	H→κ←	37	38	39	36	37	37	38
115	Point- 26	H→κ←	38	39	37	33	38	37	38
116	Point- 27	H→κ←	39	40	41	32	34	39	42
117	Point- 28	H→κ←	36	37	38	39	40	38	40
118	Point- 29	H→κ←	41	42	40	36	37	39	42
119	Point- 30	H→κ←	38	39	36	35	39	37	38
120	Point- 31	H→κ←	39	32	36	37	38	36	36
121	Point- 32	H→κ←	38	34	35	40	39	37	38
122	Point- 33	H→κ←	40	41	40	39	38	40	44
123	Point- 34	H→κ←	37	38	39	40	41	39	42
124	Point- 35	H→κ←	39	36	37	38	42	38	40
125	Point- 36	H→κ←	36	37	39	40	41	39	42
126	Point- 37	H→κ←	42	40	43	38	36	40	44
127	Point- 38	H→κ←	40	39	40	39	40	40	44
128	Point- 39	H→κ←	46	42	43	38	37	41	46
129	Point- 40	H→κ←	36	37	42	40	38	39	42
130	Point- 41	H→κ←	39	40	41	36	37	39	42
131	Point- 42	H→κ←	32	40	42	44	36	39	42
132	Point- 43	H→κ←	32	34	36	39	38	36	36
133	Point- 44	H→κ←	40	41	37	35	39	38	40
134	Point- 45	H→κ←	36	37	34	38	33	36	36



135	Point- 46	H→κ←	33	34	35	39	40	36	36
136	Point- 47	H→κ←	41	37	38	39	42	39	42
137	Point- 48	H→κ←	42	41	39	38	41	40	44
138	Point- 49	H→κ←	43	38	46	36	37	39	42
139	Point- 50	H→κ←	39	38	40	41	36	39	42
140	Point- 51	H→κ←	37	39	42	36	35	38	40
141	Point- 52	H→κ←	34	39	40	41	39	39	42
142	Point- 53	H→κ←	41	42	46	39	36	40	44
143	Point- 54	H→κ←	34	33	37	38	39	36	36
144	Point- 55	H→κ←	40	33	36	35	34	36	36
145	Point- 56	H→κ←	35	36	37	39	40	37	38
146	Point- 57	H→κ←	41	42	39	38	35	39	42
147	Point- 58	H→κ←	39	36	37	39	33	37	38
148	Point- 59	H→κ←	34	39	38	32	34	35	34
149	Point- 60	H→κ←	36	34	43	39	38	38	40
150	Point- 61	H→κ←	36	37	39	38	40	38	40
151	Point- 62	H→κ←	41	42	38	36	39	39	42
152	Point- 63	H→κ←	40	38	37	35	34	37	38
153	Point- 64	H→κ←	41	42	38	39	40	40	44
154	Point- 65	H→κ←	42	43	39	39	42	41	46
155	Point- 66	H→κ←	40	46	42	38	36	39	42
156	Point- 67	H→κ←	41	42	39	36	39	39	42
157	Point- 68	H→κ←	39	38	40	42	44	41	46
158	Point- 69	H→κ←	45	40	41	39	41	41	46
159	Point- 70	H→κ←	46	40	38	36	37	38	40



160	Point- 71	H→κ←	37	46	44	40	48	45	54
161	Point- 72	H→κ←	44	40	41	38	39	40	44
162	Point- 73	H→κ←	40	50	39	48	41	42	48
163	Point- 74	H→κ←	36	38	36	40	42	38	40
164	Point- 75	H→κ←	45	44	39	38	36	40	44
165	Point- 76	H→κ←	37	41	43	40	38	40	44
166	Point- 77	H→κ←	41	40	38	39	42	40	44
167	Point- 78	H→κ←	39	41	39	40	43	40	44
168	Point- 79	H→κ←	40	39	40	42	39	40	44
169	Point- 80	H→κ←	38	36	37	41	42	39	42
170	Point- 81	H→κ←	40	39	38	38	45	40	44
171	Point- 82	H→κ←	41	36	39	40	42	40	44
172	Point- 83	H→κ←	40	39	38	36	39	38	40
173	Point- 84	H→κ←	41	42	40	42	38	41	46
174	Point- 85	H→κ←	36	37	39	40	41	39	42
175	Point- 86	H→κ←	38	39	40	41	36	39	42
176	Point- 87	H→κ←	37	38	41	39	42	39	42
177	Point- 88	H→κ←	43	44	46	40	39	42	48
178	Point- 89	H→κ←	38	37	39	42	41	39	42
179	Point- 90	H→κ←	36	39	40	41	40	39	42
180	Point- 91	H→κ←	39	41	42	45	39	41	46
181	Point- 92	H→κ←	38	37	39	40	41	39	42
182	Point- 93	H→κ←	42	43	40	42	40	41	46
183	Point- 94	H→κ←	42	44	38	39	37	40	44
Average Compressive Strength =									42.13



2. Ultrasonic Pulse Velocity Test Results :-

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					Date : 07.10.2021
Name of the Structure: FAKHAIL GHAT BRIDGE					
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: Intake Pier					
45	Point- 01 & 02	Indirect	400	3.387	Doubtful
46	Point- 03 & 04	Indirect	400	3.944	Good
47	Point- 05 & 06	Indirect	400	3.621	Good
48	Point-07 & 08	Indirect	400	3.521	Good
49	Point- 09 & 10	Indirect	400	3.268	Doubtful
50	Point- 11 & 12	Indirect	400	3.129	Doubtful
51	Point- 13 & 14	Indirect	400	3.009	Doubtful
52	Point-15 & 16	Indirect	400	3.471	Doubtful
53	Point- 17 & 18	Indirect	400	3.440	Doubtful
54	Point- 19 & 20	Indirect	400	3.588	Good
55	Point- 21 & 22	Indirect	400	3.330	Doubtful
56	Point- 23 & 24	Indirect	400	3.466	Doubtful
57	Point- 25 & 26	Indirect	400	3.426	Doubtful
58	Point- 31 & 32	Indirect	400	3.582	Good
59	Point- 33 & 34	Indirect	400	3.729	Good
60	Point- 35 & 36	Indirect	400	3.421	Doubtful
61	Point- 37 & 38	Indirect	400	3.561	Good
62	Point- 39 & 40	Indirect	400	3.009	Doubtful
63	Point- 41 & 42	Indirect	400	3.205	Doubtful
64	Point- 43 & 44	Indirect	400	3.312	Doubtful
65	Point- 45 & 46	Indirect	400	3.526	Good
66	Point- 47 & 48	Indirect	400	3.172	Doubtful



67	Point- 49 & 50	Indirect	400	3.305	Doubtful
68	Point- 51 & 52	Indirect	400	3.952	Good
69	Point- 53 & 54	Indirect	400	3.603	Good
70	Point- 55 & 56	Indirect	400	3.193	Doubtful
71	Point- 57 & 58	Indirect	400	3.600	Good
72	Point- 59 & 60	Indirect	400	3.521	Good
73	Point- 61 & 62	Indirect	400	3.320	Doubtful
74	Point- 63 & 64	Indirect	400	3.469	Doubtful
75	Point- 65 & 66	Indirect	400	3.313	Doubtful
76	Point- 67 & 68	Indirect	400	3.129	Doubtful
77	Point- 69 & 70	Indirect	400	3.621	Good
78	Point- 71 & 72	Indirect	400	3.702	Good
79	Point- 73 & 74	Indirect	400	3.004	Doubtful
80	Point- 75 & 76	Indirect	400	3.559	Good
81	Point- 77 & 78	Indirect	400	3.303	Doubtful
82	Point- 79 & 80	Indirect	400	3.129	Doubtful
83	Point- 81 & 82	Indirect	400	3.948	Good
84	Point- 83 & 84	Indirect	400	3.551	Good
85	Point- 85 & 86	Indirect	400	3.421	Doubtful
86	Point- 87 & 88	Indirect	400	3.625	Good
87	Point- 89 & 90	Indirect	400	3.931	Good
88	Point- 91 & 92	Indirect	400	3.724	Good
89	Point- 93 & 94	Indirect	400	3.226	Doubtful
Average Compressive Strength =				3.450	Doubtful



3. Electrical Resistivity Test Results: -

Name of the Structure: INTAKE WELL at FAKHIAL GHAT						
Location: Various Parts						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	Intake Well-1	104700	126500	111300	114167	Negligible
2	Intake Well-2	54700	123400	112600	96900	Negligible
3	Intake Well-3	111200	112300	135600	119700	Negligible
4	Intake Well-4	80300	123400	65400	89700	Negligible
5	Intake Well-5	60800	108400	72300	80500	Negligible
6	Intake Well-6	65700	105300	165300	112100	Negligible
7	Intake Well-7	114800	106500	104300	108533	Negligible
8	Intake Well-8	140500	107500	106400	118133	Negligible

4. Ultrasonic Thickness Precision Gauge Test :-

Name of the Building: - Intake Welcome Pump House											
Location: - Pump House											
SL No.	Member Type	Location	Tested Part of Tank	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μ m) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-1	Web/Flange	10.20	10.23	10.26	10.29	10.09	10.26	10.32	C2 Low
2		C-2	Web/Flange	9.34	9.28	9.34	9.38	9.08	9.28	11.26	C2 Low
3		C-3	Web/Flange	7.19	7.70	7.20	7.30	7.20	7.35	15.32	C2 Low
4		C-4	Web/Flange	6.81	6.77	6.29	6.72	6.29	6.82	16.27	C2 Low
5		C-5	Web/Flange	8.35	8.39	8.20	8.24	8.32	8.34	12.59	C2 Low



5. Ultrasonic Pulse Velocity Test of Steel :-

Name of the Building :- Intake Welcome Pump House						
Location :- Pump House						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	D-1	Web/Flange	2954	5890	50%
2		D-2	Web/Flange	2934		50%
3		D-3	Web/Flange	3250		55%
4		D-4	Web/Flange	3720		63%
5		D-5	Web/Flange	2972		50%



EFFLUENT TREATMENT PLANT



Performed Tests:-



Visual Inspection: -

1. No cracks, no delamination or deterioration is observed
2. Water retaining structures (Sludge Thickener) Some Minor concrete spalling and reinforcement corrosion
3. Parodically maintenance required.



4. Damp has been observed in some places
5. Steel has been exposed and partially corroded in some places.
6. few cracks are observed on the structure
7. Surface plaster has spalling from many places which need to be replaster.
8. On the equalization tank minor cracks has observed.
9. On the sludge thicker portion steel has been exposed and corroded which need to be repair immediately.
10. Water proofing treatment is need to be provided for future stability of the structure on the sludge thicker portion.









1. Schmidt Hammer Test Results:-

Site Name: ASSAM GAS BASED POWER PLANT, NEEPCO								Date : 02.10.21	
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure: Effluent Treatment Plant									
Location: Sludge Thickner (Outside Wall)									
1	Point- 01	H→←	30	32	36	34	30	32	30
2		H→←	31	29	28	30	29	29	24
3	Point- 02	H→←	32	30	32	34	35	33	30
4		H→←	36	32	33	34	36	34	32
5	Point- 03	H→←	34	32	36	37	35	35	34
6		H→←	34	35	33	34	30	33	30
7	Point- 04	H→←	34	32	35	36	38	35	34
8		H→←	35	33	37	35	33	35	34
9	Point- 05	H→←	32	33	34	33	36	34	32
10		H→←	30	32	33	34	33	32	30
11	Point- 06	H→←	32	35	30	33	34	33	30
12		H→←	33	36	32	34	35	34	32
13	Point- 07	H→←	34	33	32	30	33	32	30
14		H→←	32	34	37	38	34	35	34
Average Compressive Strength =								31.14	
Clarifluclator (Outside Wall)									
1	Point- 01	H→←	38	36	34	39	32	36	36
2		H→←	34	36	35	37	36	36	36
3	Point- 02	H→←	38	34	36	33	35	35	34
4		H→←	37	38	37	35	39	37	38



5	Point- 03	H→κ←	34	37	38	35	36	36	36
6		H→κ←	34	33	35	34	35	34	32
7	Point- 04	H→κ←	39	35	34	39	32	36	36
8		H→κ←	30	38	39	40	47	39	42
9	Point- 05	H→κ←	35	38	36	40	37	37	38
10		H→κ←	36	34	33	34	34	34	32
11	Point- 06	H→κ←	32	33	37	35	32	34	32
12		H→κ←	34	36	33	34	38	35	34
13	Point- 07	H→κ←	39	34	32	37	39	36	36
14		H→κ←	38	40	39	38	37	38	40
15	Point- 08	H→κ←	34	37	36	34	31	34	32
16		H→κ←	35	39	38	40	42	39	42
Average Compressive Strength =									36.00

Equalization Tank (Outside Wall)

1	Point- 01	H→κ←	32	34	36	37	30	34	32
2		H→κ←	28	39	34	35	34	36	36
3	Point- 02	H→κ←	30	32	31	33	36	32	30
4		H→κ←	38	40	36	34	32	36	36
5	Point- 03	H→κ←	32	33	39	38	30	34	32
6		H→κ←	39	32	34	33	35	35	34
7	Point- 04	H→κ←	36	34	35	36	39	36	36
8		H→κ←	38	33	34	32	34	34	32
9	Point- 05	H→κ←	37	34	35	36	30	34	32
10		H→κ←	32	34	33	35	37	34	32
11	Point- 06	H→κ←	30	32	34	36	38	34	32



12		H→K←	40	33	35	32	36	35	34
13	Point- 07	H→K←	37	32	34	36	34	35	34
14		H→K←	32	34	40	39	37	36	36
15	Point- 08	H→K←	40	41	39	36	35	38	40
16		H→K←	34	33	32	33	40	33	30
17	Point- 09	H→K←	36	32	33	39	38	36	36
18		H→K←	38	36	34	37	36	36	36
19	Point- 10	H→K←	37	35	34	33	36	35	34
20		H→K←	34	34	30	32	37	33	30
21	Point- 11	H→K←	40	39	37	38	36	38	40
22		H→K←	38	36	35	34	32	35	34
23	Point- 12	H→K←	39	38	34	32	33	35	34
24		H→K←	34	36	35	37	39	36	36
25	Point- 13	H→K←	34	33	34	37	35	35	34
26		H→K←	37	39	38	36	34	37	38
27	Point- 14	H→K←	33	34	35	32	33	33	30
28		H→K←	34	36	33	30	34	33	30
29	Point- 15	H→K←	40	39	38	37	36	38	40
30		H→K←	34	33	36	35	32	34	32
31	Point- 16	H→K←	33	34	35	36	34	34	32
32		H→K←	39	38	36	34	33	36	36
33	Point- 17	H→K←	36	34	39	32	33	35	34
34		H→K←	34	37	38	36	37	36	36
35	Point- 18	H→K←	39	38	36	34	35	36	36
36		H→K←	32	33	34	30	32	32	30



37	Point- 19	H→κ←	39	40	37	38	36	38	40
38		H→κ←	38	41	32	34	35	36	36
39	Point- 20	H→κ←	36	34	37	39	38	37	38
40		H→κ←	34	32	33	36	40	35	34
41	Point- 21	H→κ←	39	38	37	35	34	37	38
42		H→κ←	35	34	30	33	34	33	30
Average Compressive Strength =									34.33

ETP Building (Ground Floor)

1	Column-01	H→κ←	37	36	34	35	38	36	36
2		H→κ←	39	40	36	34	35	37	38
3	Column-02	H→κ←	34	35	36	37	36	36	36
4		H→κ←	32	33	34	35	30	33	30
5	Column-03	H→κ←	33	34	36	35	39	35	34
6		H→κ←	38	37	34	32	34	35	34
7	Column-04	H→κ←	36	34	36	39	38	37	38
8		H→κ←	37	36	34	34	39	36	36
9	Column-05	H→κ←	39	34	35	36	34	36	36
10		H→κ←	39	38	41	42	39	40	44
11	Column-06	H→κ←	38	37	36	34	32	35	34
12		H→κ←	33	34	35	39	36	35	34
13	Column-07	H→κ←	34	37	36	38	40	37	38
14		H→κ←	41	39	37	39	41	39	42
15	Column-08	H→κ←	35	34	36	35	36	35	34
16		H→κ←	39	40	41	37	38	39	42
17	Column-09	H→κ←	39	38	37	36	32	36	36



18		H→κ←	34	36	34	35	32	34	32
19	Column-10	H→κ←	40	41	38	36	37	38	40
20		H→κ←	38	36	37	38	36	37	38
21	Column-11	H→κ←	36	37	39	40	42	39	42
22		H→κ←	35	34	33	39	38	36	36
23	Column-12	H→κ←	32	30	36	30	32	32	30
24		H→κ←	34	32	33	32	31	32	30
25	Column-13	H→κ←	34	30	32	36	35	33	30
26		H→κ←	36	37	38	39	40	38	40
27	Column-14	H→κ←	39	40	39	37	38	39	42
28		H→κ←	36	37	36	38	39	37	38
29	Column-15	H→κ←	34	35	32	33	34	34	32
30		H→κ←	36	34	37	38	35	36	36
31	Column-16	H→κ←	34	35	36	34	39	36	36
32		H→κ←	40	39	38	33	34	37	38
33	Column-17	H→κ←	36	38	39	40	41	39	42
34		H→κ←	37	39	40	36	35	37	38
35	Column-18	H→κ←	38	38	37	36	34	37	38
36		H→κ←	35	34	30	32	37	34	32
37	Column-19	H→κ←	40	39	38	37	36	38	40
38		H→κ←	35	34	33	32	34	34	32
39	Column-20	H→κ←	37	38	39	40	36	38	40
40		H→κ←	34	35	36	34	35	35	34
41	Column-21	H→κ←	39	40	41	32	38	40	44
42		H→κ←	36	37	36	34	35	36	36



41	Column-22	H→←	39	38	37	36	35	37	38
42		H→←	34	33	30	39	34	34	32
Average Compressive Strength = 36.55									

ETP Building (1st Floor-Centrifuge Room)

1	Column-04	H→←	30	32	31	36	34	33	30
2		H→←	38	32	30	28	31	30	26
3	Column-05	H→←	36	34	32	33	34	34	32
4		H→←	38	35	36	34	35	36	36
5	Column-06	H→←	37	38	32	34	34	35	34
6		H→←	33	30	34	35	36	34	32
7	Column-07	H→←	32	30	34	36	32	33	30
8		H→←	28	29	32	33	34	31	28
9	Column-12	H→←	30	39	32	30	29	30	26
10		H→←	32	33	28	29	32	31	28
11	Column-13	H→←	36	30	32	31	34	33	30
12		H→←	34	31	36	35	33	34	32
13	Column-14	H→←	38	30	32	34	38	34	32
14		H→←	36	37	38	36	32	36	36
15	Column-15	H→←	34	32	38	40	36	36	36
16		H→←	32	30	34	35	34	33	30
17	Column-16	H→←	38	36	35	33	36	36	36
18		H→←	34	38	30	34	37	35	34
Average Compressive Strength = 31.56									

Roof Slab Portion



287	Point -01	V↓	30	32	31	28	29	30	32
288		V↓	31	29	28	30	26	29	30
289	Point -02	V↓	27	30	29	31	27	29	30
290		V↓	28	29	32	33	30	30	32
291	Point -03	V↓	31	32	36	29	28	31	32
292		V↓	30	31	32	34	30	31	32
287	Point -04	V↓	33	29	28	30	31	30	32
288		V↓	29	30	31	32	31	31	32
289	Point -05	V↓	28	31	29	30	31	30	32
290		V↓	31	29	30	28	27	29	30
291	Point -06	V↓	30	29	28	27	29	29	30
292		V↓	31	30	29	32	31	31	32
Average Compressive Strength =									31.33

ETP Building (Ground Floor)

1	Beam between Col-7 & Col-8	H→←	32	34	36	33	34	34	32
2		H→←	37	38	34	36	35	36	36
3	Beam between Col-6 & Col-7	H→←	36	25	36	38	40	38	40
4		H→←	39	37	35	34	36	36	36
5	Beam between Col-5 & Col-6	H→←	40	34	37	36	35	36	36
6		H→←	34	36	32	34	39	35	34
7	Beam between Col-4 & Col-5	H→←	36	37	38	33	36	36	36
8		H→←	34	35	36	37	38	36	36
9	Beam between Col-15 & Col-16	H→←	37	38	34	36	32	35	34
10		H→←	34	35	30	32	34	33	30



11	Beam between Col-14 & Col-16	H→κ←	39	36	39	34	33	36	36
12		H→κ←	30	32	36	37	38	35	34
13	Beam between Col-13 & Col-14	H→κ←	34	35	37	39	38	37	38
14		H→κ←	32	34	30	32	34	32	30
15	Beam between Col-5 & Col-14	H→κ←	37	36	34	35	34	35	34
16		H→κ←	36	39	40	38	36	38	40
17	Beam between Col-13 & Col-6	H→κ←	35	36	34	35	34	35	34
18		H→κ←	37	38	32	34	35	35	34
13	Beam between Col-12 & Col-13	H→κ←	39	38	32	30	31	34	32
14		H→κ←	32	30	29	32	33	31	28
15	Beam between Col-7 & Col-12	H→κ←	34	36	32	32	36	34	32
16		H→κ←	37	38	34	33	35	35	34
17	Beam between Col-12 & Col-11	H→κ←	36	39	40	31	32	36	36
18		H→κ←	34	35	37	39	32	35	34
17	Beam between Col-08 & Col-11	H→κ←	35	36	33	36	32	34	32
18		H→κ←	34	35	39	38	36	36	36
Average Compressive Strength =								35.00	



2. Ultrasonic Pulse Velocity Test Results: -

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					Date : 07.10.2021
Name of the Structure: Effluent Treatment Plant					
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location : Sludge Thickener (Outside Wall)					
1	Point-1	Indirect	300	3.413	Doubtful
2	Point-2	Indirect	300	3.604	Good
3	Point-3	Indirect	300	4.014	Good
4	Point-4	Indirect	300	4.194	Good
5	Point-5	Indirect	300	3.932	Good
6	Point-6	Indirect	300	3.620	Good
7	Point-7	Indirect	300	3.490	Doubtful
Average UPV =				3.752	Good
Location: Clarifloculator (Outside Wall)					
1	Point-1	Indirect	300	3.921	Good
2	Point-2	Indirect	300	3.463	Doubtful
3	Point-3	Indirect	300	3.733	Good
4	Point-4	Indirect	300	3.860	Good
5	Point-5	Indirect	300	3.643	Good
6	Point-6	Indirect	300	3.962	Good
7	Point-7	Indirect	300	3.882	Good
8	Point-8	Indirect	300	3.996	Good
Average UPV =				3.808	Good
Location: Equalization Tank (Outside Wall)					
1	Point-1	Indirect	300	3.802	Good



2	Point-2	Indirect	300	4.261	Good
3	Point-3	Indirect	300	3.951	Good
4	Point-4	Indirect	300	3.621	Good
5	Point-5	Indirect	300	3.881	Good
6	Point-6	Indirect	300	4.014	Good
7	Point-7	Indirect	300	3.571	Good
8	Point-8	Indirect	300	3.613	Good
9	Point-9	Indirect	300	4.021	Good
10	Point-10	Indirect	300	4.072	Good
11	Point-11	Indirect	300	3.663	Good
12	Point-12	Indirect	300	3.783	Good
13	Point-13	Indirect	300	3.815	Good
14	Point-14	Indirect	300	3.610	Good
15	Point-15	Indirect	300	3.426	Doubtful
16	Point-16	Indirect	300	3.605	Good
17	Point-17	Indirect	300	3.619	Good
18	Point-18	Indirect	300	3.419	Doubtful
19	Point-19	Indirect	300	3.827	Good
20	Point-20	Indirect	300	3.525	Good
21	Point-21	Indirect	300	4.054	Good
Average UPV =				3.769	Good
Location : ETP Building (Ground Floor)					
1	Column No-1	Direct	500	3.912	Good
2	Column No-2	Direct	500	3.709	Good
3	Column No-3	Direct	500	3.716	Good



4	Column No-4	Direct	500	3.614	Good
5	Column No-5	Direct	500	4.230	Good
6	Column No-6	Direct	500	3.595	Good
7	Column No-7	Direct	500	4.324	Good
8	Column No-8	Direct	500	3.416	Doubtful
9	Column No-9	Direct	500	3.720	Good
10	Column No-10	Direct	500	3.669	Good
11	Column No-11	Direct	500	4.170	Good
12	Column No-12	Direct	500	3.594	Good
13	Column No-13	Direct	500	3.924	Good
14	Column No-14	Direct	500	4.136	Good
15	Column No-15	Direct	500	3.992	Good
16	Column No-16	Direct	500	3.790	Good
17	Column No-17	Direct	500	3.774	Good
18	Column No-18	Direct	500	3.546	Good
19	Column No-19	Direct	500	3.943	Good
20	Column No-20	Direct	500	3.716	Good
21	Column No-21	Direct	500	4.009	Good
22	Column No-22	Direct	500	3.821	Good
Average UPV =				3.833	Good
Location : ETP Building (1st Floor-Centrifuge Room)					
1	Column No-4	Indirect	300	3.623	Good
2	Column No-5	Indirect	300	3.448	Doubtful
3	Column No-6	Indirect	300	3.623	Good
4	Column No-7	Indirect	300	3.519	Good



5	Column No-12	Indirect	300	3.261	Doubtful
6	Column No-13	Indirect	300	3.901	Good
7	Column No-14	Indirect	300	3.544	Good
8	Column No-15	Indirect	300	3.905	Good
9	Column No-16	Indirect	300	4.008	Good
Average UPV =				3.648	Good
Location : ETP Building (Roof Slab Portion)					
1	Point-01	Indirect	300	3.472	Doubtful
2	Point-02	Indirect	300	3.621	Good
3	Point-03	Indirect	300	3.519	Good
4	Point-04	Indirect	300	3.576	Good
5	Point-05	Indirect	300	3.671	Good
6	Point-06	Indirect	300	3.519	Good
Average UPV =				3.563	Good
Location : ETP Building (Ground Floor)					
1	Beam between Col-7 & Col-8	Indirect	300	3.495	Doubtful
2	Beam between Col-6 & Col-7	Indirect	300	3.872	Good
3	Beam between Col-5 & Col-6	Indirect	300	3.716	Good
4	Beam between Col-4 & Col-5	Indirect	300	3.992	Good
5	Beam between Col-15 & Col-16	Indirect	300	3.662	Good
6	Beam between Col-14 & Col-16	Indirect	300	3.513	Good
7	Beam between Col-13 & Col-14	Indirect	300	3.449	Doubtful
8	Beam between Col-5 & Col-14	Indirect	300	4.002	Good
9	Beam between Col-13 & Col-6	Indirect	300	3.990	Good
10	Beam between Col-12 & Col-13	Indirect	300	3.359	Doubtful



11	Beam between Col-7 & Col-12	Indirect	300	3.991	Good
12	Beam between Col-12 & Col-11	Indirect	300	3.665	Good
13	Beam between Col-08 & Col-11	Indirect	300	3.510	Good
Average UPV =				3.709	Good



Vibration test results

Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (µm)	Temperature (°C)	CF Plus	Comment
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3(for RCC foundation)				
6	Building Name: Effluent Treatment Plant Building								
	Centrifuge PUMP - 01 (At Machine)	1.67	53.94	3.42	Satisfactory	10.55	18.7	10	Satisfactory
	Centrifuge PUMP - 01 (At Foundation)	0.11	0.00	0.28	OK	4.20	18.3	0	Good



425 METER LONG RCC BRIDGE AT FAKHIAL GHAT, JOYPUR



Performed Tests :-





Visual Inspection:-

1. No cracks, no delamination or deterioration is observed
2. Periodically maintenance required.







1. Schmidt Hammer Test Results:-

Site Name: ASSAM GAS BASED POWER PLANT, NEEPCO									Date : 07.10.21
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure: FAKHAIL GHAT BRIDGE									
Location: Pier near Intake Gate									
1	Point- 01	H→↯←	32	36	38	39	40	37	38
2	Point- 02	H→↯←	41	42	39	32	36	40	44
3	Point- 03	H→↯←	37	38	39	40	38	38	40
4	Point- 04	H→↯←	36	34	32	39	40	36	36
5	Point- 05	H→↯←	41	36	38	34	37	37	38
6	Point- 06	H→↯←	35	33	34	35	36	35	34
7	Point- 07	H→↯←	40	39	38	37	35	38	40
8	Point- 08	H→↯←	32	33	34	35	36	34	32
9	Point- 09	H→↯←	37	38	39	37	38	38	40
10	Point- 10	H→↯←	32	42	41	36	39	40	44
11	Point- 11	H→↯←	40	38	37	39	40	39	42
12	Point- 12	H→↯←	41	39	42	36	37	39	42
13	Point- 13	H→↯←	38	36	37	34	34	36	36
14	Point- 14	H→↯←	36	37	35	33	34	35	34
15	Point- 15	H→↯←	37	38	39	34	35	37	38
16	Point- 16	H→↯←	36	37	38	39	40	38	40
17	Point- 17	H→↯←	41	42	39	37	33	40	44
18	Point- 18	H→↯←	39	36	37	35	34	36	36
19	Point- 19	H→↯←	40	41	38	36	37	38	40
20	Point- 20	H→↯←	38	39	36	37	38	38	40



21	Point- 21	H→κ←	39	34	35	36	40	37	38
22	Point- 22	H→κ←	41	42	39	38	37	39	42
23	Point- 23	H→κ←	38	37	36	35	34	36	36
24	Point- 24	H→κ←	32	36	37	38	39	36	36
25	Point- 25	H→κ←	40	39	42	40	36	39	42
26	Point- 26	H→κ←	35	33	34	36	37	35	34
27	Point- 27	H→κ←	38	32	36	37	38	36	36
28	Point- 28	H→κ←	36	30	31	32	33	32	30
29	Point- 29	H→κ←	34	35	36	34	39	36	36
30	Point- 30	H→κ←	40	39	34	35	37	37	38
31	Point- 31	H→κ←	38	40	39	36	37	38	40
32	Point- 32	H→κ←	36	42	38	37	32	37	38
33	Point- 33	H→κ←	34	33	36	37	38	36	36
34	Point- 34	H→κ←	39	30	32	34	33	32	30
35	Point- 35	H→κ←	32	33	34	36	37	34	32
36	Point- 36	H→κ←	38	39	38	39	40	39	42
37	Point- 37	H→κ←	41	42	39	37	36	39	42
38	Point- 38	H→κ←	35	34	37	30	31	33	30
39	Point- 39	H→κ←	32	36	32	39	37	35	34
40	Point- 40	H→κ←	40	41	42	39	38	40	44
41	Point- 41	H→κ←	32	33	34	36	37	34	32
42	Point- 42	H→κ←	38	38	37	36	32	36	36
43	Point- 43	H→κ←	34	35	36	30	39	35	34
44	Point- 44	H→κ←	40	41	42	38	36	39	42
45	Point- 45	H→κ←	37	38	39	40	41	39	42



46	Point- 46	H→K←	37	38	39	41	40	39	42
47	Point- 47	H→K←	36	34	37	38	36	36	36
48	Point- 48	H→K←	37	32	34	36	38	35	34
49	Point- 49	H→K←	34	32	30	38	39	35	34
50	Point- 50	H→K←	41	44	46	39	42	42	48
51	Point- 51	H→K←	40	39	36	38	40	39	42
52	Point- 52	H→K←	42	41	39	38	39	40	44
53	Point- 53	H→K←	38	42	35	39	40	39	42
54	Point- 54	H→K←	41	43	44	45	38	42	48
55	Point- 55	H→K←	37	36	35	30	32	34	32
56	Point- 56	H→K←	39	40	41	38	36	39	42
57	Point- 57	H→K←	40	42	39	36	38	39	42
58	Point- 58	H→K←	39	40	38	37	36	38	40
59	Point- 59	H→K←	40	41	42	38	39	40	44
60	Point- 60	H→K←	42	43	40	39	37	40	44
61	Point- 61	H→K←	32	39	38	40	41	40	44
62	Point- 62	H→K←	39	38	37	36	38	38	40
63	Point- 63	H→K←	40	42	39	38	37	39	42
64	Point- 64	H→K←	36	35	34	39	38	36	36
65	Point- 65	H→K←	40	41	39	40	41	40	44
66	Point- 66	H→K←	39	38	37	38	39	38	40
67	Point- 67	H→K←	42	43	44	40	36	41	46
68	Point- 68	H→K←	37	38	36	37	38	37	38
69	Point- 69	H→K←	39	40	41	42	39	40	44
70	Point- 70	H→K←	40	41	39	40	38	40	44



71	Point- 71	H→←	38	36	37	39	41	38	40
72	Point- 72	H→←	42	43	39	40	38	40	44
73	Point- 73	H→←	39	40	41	42	39	40	44
74	Point- 74	H→←	40	36	37	39	40	38	40
75	Point- 75	H→←	41	39	38	36	37	38	40
76	Point- 76	H→←	36	38	40	39	38	38	40
77	Point- 77	H→←	40	41	36	37	36	38	40
78	Point- 78	H→←	42	40	41	39	38	40	44
79	Point- 79	H→←	36	32	36	37	39	36	36
80	Point- 80	H→←	35	36	37	38	40	37	38
81	Point- 81	H→←	41	42	39	36	42	40	44
82	Point- 82	H→←	40	39	36	39	38	38	40
83	Point- 83	H→←	39	38	36	37	40	38	40
84	Point- 84	H→←	41	42	37	38	41	40	44
85	Point- 85	H→←	42	43	36	38	39	40	44
86	Point- 86	H→←	40	39	37	39	40	39	42
87	Point- 87	H→←	41	42	38	36	37	39	42
88	Point- 88	H→←	39	38	40	41	42	40	44
89	Point- 89	H→←	36	37	41	42	40	39	42
Average Compressive Strength =									39.55
Location : Pier near Abutment									
184	Point- 01	H→←	39	40	41	42	43	41	46
185	Point- 02	H→←	40	39	46	40	38	39	42
186	Point- 03	H→←	39	36	37	34	32	36	36
187	Point- 04	H→←	36	34	38	39	31	36	36



188	Point- 05	H→κ←	32	36	39	40	38	37	38
189	Point- 06	H→κ←	40	41	38	38	37	39	42
190	Point- 07	H→κ←	42	38	37	39	38	39	42
191	Point- 08	H→κ←	40	41	38	38	40	39	42
192	Point- 09	H→κ←	41	42	39	42	41	41	46
193	Point- 10	H→κ←	39	36	37	39	45	38	40
194	Point- 11	H→κ←	36	32	39	40	41	39	42
195	Point- 12	H→κ←	40	42	33	35	36	37	38
196	Point- 13	H→κ←	38	39	40	41	42	40	44
197	Point- 14	H→κ←	40	46	36	37	38	38	40
198	Point- 15	H→κ←	41	42	39	38	37	39	42
199	Point- 16	H→κ←	39	40	41	42	36	40	44
200	Point- 17	H→κ←	38	42	38	39	45	40	44
201	Point- 18	H→κ←	40	41	39	40	42	40	44
202	Point- 19	H→κ←	46	42	38	39	37	39	42
203	Point- 20	H→κ←	38	36	39	42	40	39	42
204	Point- 21	H→κ←	41	40	42	38	37	40	44
205	Point- 22	H→κ←	39	38	43	40	41	40	44
206	Point- 23	H→κ←	36	37	39	41	42	39	42
207	Point- 24	H→κ←	40	42	46	39	35	40	44
208	Point- 25	H→κ←	32	34	36	34	30	33	30
209	Point- 26	H→κ←	36	39	38	40	41	39	42
210	Point- 27	H→κ←	40	38	37	32	36	37	38
211	Point- 28	H→κ←	34	32	37	39	38	36	36
212	Point- 29	H→κ←	40	41	39	38	36	39	42



213	Point- 30	H→κ←	37	42	44	36	39	40	44
214	Point- 31	H→κ←	36	39	40	41	43	40	44
215	Point- 32	H→κ←	41	40	42	43	39	41	46
216	Point- 33	H→κ←	39	38	36	37	39	38	40
217	Point- 34	H→κ←	40	41	42	39	38	40	44
218	Point- 35	H→κ←	38	39	44	40	41	40	44
219	Point- 36	H→κ←	42	43	39	41	42	41	46
220	Point- 37	H→κ←	43	44	38	40	43	42	48
221	Point- 38	H→κ←	40	41	42	38	39	40	44
222	Point- 39	H→κ←	41	42	43	40	36	40	44
223	Point- 40	H→κ←	37	38	39	41	42	39	42
224	Point- 41	H→κ←	40	41	38	46	38	39	42
225	Point- 42	H→κ←	42	44	40	43	39	42	48
226	Point- 43	H→κ←	36	37	38	39	42	38	40
227	Point- 44	H→κ←	40	41	39	40	41	40	44
228	Point- 45	H→κ←	40	39	38	36	39	38	40
229	Point- 46	H→κ←	38	37	40	41	42	40	44
230	Point- 47	H→κ←	40	39	42	39	38	40	44
231	Point- 48	H→κ←	42	38	40	42	39	40	44
232	Point- 49	H→κ←	36	37	38	39	40	38	40
233	Point- 50	H→κ←	42	40	39	40	42	41	46
234	Point- 51	H→κ←	36	37	38	36	37	37	38
235	Point- 52	H→κ←	38	36	35	34	39	36	36
236	Point- 53	H→κ←	41	42	40	39	40	40	44
237	Point- 54	H→κ←	42	43	39	38	36	40	44



238	Point- 55	H→κ←	37	32	36	37	39	36	36
239	Point- 56	H→κ←	40	41	42	46	36	41	46
240	Point- 57	H→κ←	38	39	40	37	39	39	42
241	Point- 58	H→κ←	40	41	39	39	37	39	42
242	Point- 59	H→κ←	36	34	36	38	41	37	38
243	Point- 60	H→κ←	42	40	39	40	42	41	46
244	Point- 61	H→κ←	39	36	40	43	42	40	44
245	Point- 62	H→κ←	44	40	42	41	40	41	46
246	Point- 63	H→κ←	38	37	36	40	39	38	40
247	Point- 64	H→κ←	42	43	41	38	39	41	46
248	Point- 65	H→κ←	38	38	36	39	40	38	40
249	Point- 66	H→κ←	41	42	40	38	42	41	46
250	Point- 67	H→κ←	43	39	41	42	40	41	46
251	Point- 68	H→κ←	36	37	38	39	41	38	40
252	Point- 69	H→κ←	42	40	36	38	37	39	42
253	Point- 70	H→κ←	39	41	42	40	36	40	44
254	Point- 71	H→κ←	35	37	39	41	42	39	42
255	Point- 72	H→κ←	43	46	40	39	37	41	46

Average Compressive Strength = 42.31

Location: Girder Beam - 01 (Intake Side)

256	Point - 01 (Right side) (Near Riverside Pier)	H→κ←	50	46	48	47	52	49	62
257		H→κ←	48	43	45	50	48	47	58
258	Point - 02 (Right side) (Near Riverside Pier)	H→κ←	52	50	46	47	49	49	62
259		H→κ←	50	51	52	46	48	49	62
260		H→κ←	56	50	48	42	46	48	60



261	Point - 03 (Left side) (Near Riverside Pier)	H→←	47	45	52	51	49	49	62
262	Point - 04 (Left side) (Near Riverside Pier)	H→←	56	48	47	46	43	46	56
263		H→←	50	43	45	47	50	47	58
264	Point - 01 (Right side) (At Mid Span)	H→←	42	40	46	39	44	42	48
265		H→←	43	42	41	45	38	42	48
266	Point - 02 (Left side) (At Mid Span)	H→←	46	47	42	40	39	43	50
267		H→←	47	45	43	41	43	44	52
268	Point - 01 (Right side) (At Abutment Side)	H→←	40	44	46	47	42	44	52
269		H→←	41	38	39	40	43	40	44
270	Point - 02 (Left side) (At Abutment Side)	H→←	47	46	41	42	44	44	52
271		H→←	45	43	48	41	43	44	52
Average Compressive Strength =									54.88
Location: Girder Beam - 02									
272	Point - 01 (Right side) (At Mid Span)	H→←	48	46	43	44	42	45	54
273		H→←	41	40	44	45	40	42	48
274	Point - 02 (Left side) (At Mid Span)	H→←	46	48	41	42	43	44	52
275		H→←	45	47	43	40	49	45	54
276	Point - 01 (Right side) (At Abutment Side)	H→←	48	47	49	46	45	47	58
277		H→←	43	40	44	42	43	42	48
278	Point - 02 (Left side) (At Abutment Side)	H→←	48	42	46	47	36	46	56
279		H→←	44	46	42	49	50	46	56
Average Compressive Strength =									53.25
Location: PIER									
280	Pedestal -01 (Intake side)	H→←	40	42	39	44	45	42	48
281		H→←	46	38	36	42	43	41	46



282		H→←	38	45	40	41	46	42	48
283		H→←	47	43	42	44	40	43	50
284	Pedestal -02	H→←	45	46	48	42	44	45	54
285		H→←	38	42	40	46	43	42	48
286		H→←	41	43	45	47	45	44	52
287	Top of Haunch portion of Riverside Pier	V↓	50	48	42	40	41	43	54
288		V↓	46	39	44	45	42	43	54
289		V↓	47	48	42	43	44	45	60
290		V↓	46	40	44	39	45	43	54
291		V↓	42	45	47	40	41	43	54
292		V↓	40	38	39	42	40	40	50
293	Top of Haunch portion of Abutment side Pier	V↓	39	42	40	41	43	41	50
294		V↓	44	45	47	48	40	45	60
295		V↓	48	47	41	40	42	44	56
296		V↓	43	38	36	37	39	39	48
297		V↓	42	40	41	39	40	40	50
298		V↓	38	36	32	34	37	35	40
299		V↓	40	44	43	47	41	43	54
300		V↓	39	41	42	40	43	41	50
Average Compressive Strength =									51.43



2. Ultrasonic Pulse Velocity Test Results :-

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					Date : 07.10.2021
Name of the Structure: FUKHAIL GHAT BRIDGE					
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: Pier near Intake Gate					
1	Point- 01 & 02	Indirect	400	3.775	Good
2	Point- 03 & 04	Indirect	400	3.005	Doubtful
3	Point- 05 & 06	Indirect	400	3.222	Doubtful
4	Point-07 & 08	Indirect	400	3.155	Doubtful
5	Point- 09 & 10	Indirect	400	3.004	Doubtful
6	Point- 11 & 12	Indirect	400	3.569	Good
7	Point- 13 & 14	Indirect	400	3.509	Good
8	Point-15 & 16	Indirect	400	3.290	Doubtful
9	Point- 17 & 18	Indirect	400	3.549	Good
10	Point- 19 & 20	Indirect	400	3.208	Doubtful
11	Point- 21 & 22	Indirect	400	3.660	Good
12	Point- 23 & 24	Indirect	400	3.129	Doubtful
13	Point- 25 & 26	Indirect	400	3.062	Doubtful
14	Point- 27 & 28	Indirect	400	2.995	Doubtful
15	Point- 29 & 30	Indirect	400	3.132	Doubtful
16	Point- 31 & 32	Indirect	400	3.646	Good
17	Point- 33 & 34	Indirect	400	3.920	Good
18	Point- 35 & 36	Indirect	400	3.620	Good
19	Point- 37 & 38	Indirect	400	3.524	Good
20	Point- 39 & 40	Indirect	400	3.625	Good
21	Point- 41 & 42	Indirect	400	3.562	Good
22	Point- 43 & 44	Indirect	400	3.492	Doubtful



23	Point- 45 & 46	Indirect	400	3.400	Doubtful
24	Point- 47 & 48	Indirect	400	3.465	Doubtful
25	Point- 49 & 50	Indirect	400	3.929	Good
26	Point- 51 & 52	Indirect	400	3.562	Good
27	Point- 53 & 54	Indirect	400	3.423	Doubtful
28	Point- 55 & 56	Indirect	400	3.620	Good
29	Point- 57 & 58	Indirect	400	3.295	Doubtful
30	Point- 59 & 60	Indirect	400	3.109	Doubtful
31	Point- 61 & 62	Indirect	400	3.412	Doubtful
32	Point- 63 & 64	Indirect	400	3.592	Good
33	Point- 65 & 66	Indirect	400	3.490	Doubtful
34	Point- 67 & 68	Indirect	400	3.642	Good
35	Point- 69 & 70	Indirect	400	3.422	Doubtful
36	Point- 71 & 72	Indirect	400	3.319	Doubtful
37	Point- 73 & 74	Indirect	400	3.203	Doubtful
38	Point- 75 & 76	Indirect	400	3.001	Doubtful
39	Point- 77 & 78	Indirect	400	3.406	Doubtful
40	Point- 79 & 80	Indirect	400	3.192	Doubtful
41	Point- 81 & 82	Indirect	400	3.423	Doubtful
42	Point- 83 & 84	Indirect	400	3.290	Doubtful
43	Point- 85 & 86	Indirect	400	2.891	Doubtful
44	Point- 87 & 88	Indirect	400	3.342	Doubtful
Average UPV =				3.388	Doubtful
Location: Pier near Abutment					
90	Point- 01 & 02	Indirect	600	3.552	Good
91	Point- 03 & 04	Indirect	600	3.660	Good
92	Point- 05 & 06	Indirect	600	3.036	Doubtful
93	Point-07 & 08	Indirect	600	3.533	Good
94	Point- 09 & 10	Indirect	600	3.541	Good



95	Point- 11 & 12	Indirect	600	3.394	Doubtful
96	Point- 13 & 14	Indirect	600	3.461	Doubtful
97	Point-15 & 16	Indirect	600	3.390	Doubtful
98	Point- 17 & 18	Indirect	600	3.734	Good
99	Point- 19 & 20	Indirect	600	3.291	Doubtful
100	Point- 21 & 22	Indirect	600	3.762	Good
101	Point- 23 & 24	Indirect	600	3.054	Doubtful
102	Point- 25 & 26	Indirect	600	3.943	Good
103	Point- 27 & 28	Indirect	600	3.472	Doubtful
104	Point- 29 & 30	Indirect	600	3.619	Good
105	Point- 31 & 32	Indirect	600	3.449	Doubtful
106	Point- 33 & 34	Indirect	600	3.629	Good
107	Point- 35 & 36	Indirect	600	3.701	Good
108	Point- 37 & 38	Indirect	600	3.299	Doubtful
109	Point- 39 & 40	Indirect	600	3.490	Doubtful
110	Point- 41 & 42	Indirect	600	3.629	Good
111	Point- 43 & 44	Indirect	600	3.726	Good
112	Point- 45 & 46	Indirect	600	3.291	Doubtful
113	Point- 47 & 48	Indirect	600	3.625	Good
114	Point- 49 & 50	Indirect	600	3.401	Doubtful
115	Point- 51 & 52	Indirect	600	3.725	Good
116	Point- 53 & 54	Indirect	600	3.802	Good
117	Point- 55 & 56	Indirect	600	3.610	Good
118	Point- 57 & 58	Indirect	600	3.592	Good
119	Point- 59 & 60	Indirect	600	3.990	Good
120	Point- 61 & 62	Indirect	600	3.492	Doubtful
121	Point- 63 & 64	Indirect	600	4.001	Good
122	Point- 65 & 66	Indirect	600	3.725	Good
123	Point- 67 & 68	Indirect	600	3.607	Good



124	Point- 69 & 70	Indirect	600	3.310	Doubtful
125	Point- 71 & 72	Indirect	600	3.009	Doubtful
Average UPV =				3.543	Good
Location : Girder Beam - 01 (Intake Side)					
126	Point - 01 (Right side) (Near Riverside Pier)	Indirect	400	4.335	Good
127	Point - 02 (Right side) (Near Riverside Pier)	Indirect	400	4.100	Good
128	Point - 03 (Left side) (Near Riverside Pier)	Indirect	400	4.673	Excellent
129	Point - 04 (Left side) (Near Riverside Pier)	Indirect	400	4.490	Good
130	Point - 01 (Right side) (At Mid Span)	Indirect	30	4.650	Excellent
131	Point - 02 (Left side) (At Mid Span)	Indirect	300	4.060	Good
132	Point - 01 (Right side) (At Abutment Side)	Indirect	300	3.330	Doubtful
133	Point - 02 (Left side) (At Abutment Side)	Indirect	300	3.905	Good
Average UPV =				4.193	Good
Location : Girder Beam - 02					
134	Point - 01 (Right side) (At Mid Span)	Indirect	300	3.886	Good
135	Point - 02 (Left side) (At Mid Span)	Indirect	300	3.560	Good
136	Point - 01 (Right side) (At Abutment Side)	Indirect	300	3.997	Good
137	Point - 02 (Left side) (At Abutment Side)	Indirect	300	3.865	Good
Average UPV =				3.827	Good
Location : PIER					



138	Pedestal -01 (Intake side)	Indirect	400	4.087	Good
139		Indirect	400	4.793	Excellent
140	Pedestal -02	Indirect	400	4.731	Excellent
141		Indirect	400	4.557	Excellent
142	Top of Haunch portion of Riverside Pier	Indirect	300	3.433	Doubtful
143		Indirect	300	3.882	Good
144		Indirect	300	3.979	Good
145	Top of Haunch portion of Abutment side Pier	Indirect	300	3.901	Good
146		Indirect	300	3.523	Good
147		Indirect	300	3.988	Good
148		Indirect	300	3.475	Doubtful
Average UPV =				4.032	Good

3. Electrical Resistivity Test Results :-

Name of the Structure : Bridge at Fakhial Ghat						
Location : Various Parts						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	Pier Near Intake Well-1	202500	186700	195800	195000	Negligible
2	Pier Near Intake Well-2	48300	52600	64800	55233	Negligible
3	Pier Near Intake Well-3	203400	192500	126400	174100	Negligible
4	Pier Near Intake Well-4	146500	213400	187500	182467	Negligible
5	Pier Near Intake Well-5	112500	113400	165300	130400	Negligible
6	Pier Near Intake Well-6	134800	135300	167500	145867	Negligible
7	Pier Near Intake Well-7	126300	136500	156400	139733	Negligible
8	Pier Near Intake Well-8	23900	23400	35600	27633	Negligible
9	Pier Near Abutment-1	55700	60400	116300	77467	Negligible



10	Pier Near Abutment-2	194500	128500	165300	162767	Negligible
11	Pier Near Abutment-3	120500	104300	113700	112833	Negligible
12	Pier Near Abutment-4	116500	165300	104300	128700	Negligible
13	Pier Near Abutment-5	105200	110400	102400	106000	Negligible
14	Pier Near Abutment-6	117800	115400	98400	110533	Negligible
15	Pier Near Abutment-7	117500	102400	89500	103133	Negligible

4. Concrete Cover Meter Measurements: -

Sl No.	Location	Cover Depth (mm)	Permissible Value (mm)	Remarks
1	Bridge at Fakial Ghat	68	Min 50 mm	Sufficient
2		70		Sufficient
3		74		Sufficient
4		75		Sufficient
5		81		Sufficient
6		65		Sufficient
7		80		Sufficient
8		73		Sufficient
9		74		Sufficient
10		69		Sufficient



CLARIFLOCCULATOR

1 & 2



Performed Tests :-





Electrical Resistivity



Visual Inspection: -

1. No cracks, no delamination or deterioration is observed
2. Water retaining structures have no sign of damage
3. Periodically maintenance required.
4. There are some damages on the plaster which need to be replaster in both 1 & 2.
5. Some portion steel are started to corroded which need to be protect both 1 & 2





1. Schmidt Hammer Test Results :-

Site Name : ASSAM GAS BASED POWER PLANT, NEEPCO									Date : 01.10.2021
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure: CLARIFLOCCULATOR-01									
Location : Outside Wall									
1	Point- 01	H→←	30	34	36	37	32	34	32
2			31	32	33	32	34	32	30
3	Point- 02	H→←	35	36	39	30	38	37	38
4			40	42	41	35	36	39	42
5	Point- 03	H→←	34	37	38	32	33	35	34
6			30	31	30	29	32	30	26
7	Point- 04	H→←	37	34	32	40	38	36	36
8			38	42	39	36	32	39	42
9	Point- 05	H→←	40	41	38	30	31	38	40
10			37	42	34	37	30	36	36
11	Point- 06	H→←	44	39	40	36	32	38	40
12			38	37	32	31	39	35	34
13	Point- 07	H→←	34	30	33	37	36	34	32
14			32	39	37	34	35	35	34
15	Point- 08	H→←	40	32	36	37	30	35	34
16			33	34	37	39	38	36	36
17	Point- 09	H→←	39	36	32	34	30	34	32
18			31	33	34	38	39	35	34
19	Point- 10	H→←	44	40	39	32	34	38	40
20			36	38	40	39	38	38	40



21	Point- 11	H→←	38	39	36	37	35	37	38
22			34	40	41	38	34	37	38
23	Point- 12	H→←	42	45	40	37	38	40	44
24			36	34	35	39	40	37	38
25	Point- 13	H→←	34	37	36	32	33	34	32
26			36	39	32	35	34	35	34
27	Point- 14	H→←	30	37	38	40	36	38	40
28			32	34	35	36	32	34	32
29	Point- 15	H→←	34	30	34	37	39	35	34
30			40	39	35	36	32	36	36
31	Point- 16	H→←	30	37	32	34	39	34	32
32			32	34	30	32	38	33	30
33	Point- 17	H→←	34	37	39	40	32	36	36
34			36	38	36	42	40	38	40
35	Point- 18	H→←	42	40	37	39	34	38	40
36			36	39	42	40	41	40	44
Average Compressive Strength =									36.11



2. Ultrasonic Pulse Velocity Test Results :-

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					Date : 01.10.2021
Name of the Structure: CLARIFLOCCULTAOR-02					
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: Outside Wall					
1	Point - 01	Indirect	300	3.432	Doubtful
2	Point - 02	Indirect	300	3.663	Good
3	Point - 03	Indirect	300	3.621	Good
4	Point - 04	Indirect	300	3.413	Doubtful
5	Point - 05	Indirect	300	3.876	Good
6	Point - 06	Indirect	300	3.981	Good
7	Point - 07	Indirect	300	3.714	Good
8	Point - 08	Indirect	300	3.991	Good
9	Point - 09	Indirect	300	3.924	Good
10	Point - 10	Indirect	300	3.513	Good
11	Point - 11	Indirect	300	3.827	Good
12	Point - 12	Indirect	300	3.575	Good
13	Point - 13	Indirect	300	3.605	Good
14	Point - 14	Indirect	300	3.596	Good
15	Point - 15	Indirect	300	3.197	Doubtful
16	Point - 16	Indirect	300	3.976	Good
17	Point - 17	Indirect	300	3.575	Good
18	Point - 18	Indirect	300	3.641	Good
Average Velocity =				3.673	Good



3. Electrical Resistivity Test Results:-

Name of the Structure: Clariflocculator-1						
Location: Various Parts						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	Cylindrical Wall-1-1	27300	25600	41700	31533	Negligible
2	Cylindrical Wall-1-2	25400	39300	42400	35700	Negligible
3	Cylindrical Wall-1-3	25500	57800	75300	52867	Negligible
4	Cylindrical Wall-2-1	110500	122300	96500	109767	Negligible
5	Cylindrical Wall-2-2	104200	109600	110200	108000	Negligible
6	Cylindrical Wall-2-3	108300	106400	107900	107533	Negligible
7	Cylindrical Wall-3-1	75800	74800	84300	78300	Negligible
8	Cylindrical Wall-3-2	54300	32300	41300	42633	Negligible
9	Cylindrical Wall-3-3	28900	32600	38700	33400	Negligible
10	Cylindrical Wall-4-1	46300	48500	32600	42467	Negligible
11	Cylindrical Wall-4-2	27300	49300	74200	50267	Negligible
12	Cylindrical Wall-4-3	75800	38900	32600	49100	Negligible
13	Cylindrical Wall-11-1	75400	80100	82300	79267	Negligible
14	Cylindrical Wall-11-2	92300	56400	80800	76500	Negligible
15	Cylindrical Wall-11-3	85300	84600	50500	73467	Negligible
16	Cylindrical Wall-12-1	36500	48400	96600	60500	Negligible
17	Cylindrical Wall-12-2	58300	152400	144900	118533	Negligible
18	Cylindrical Wall-12-3	144500	137500	134900	138967	Negligible
19	Cylindrical Wall-13-1	98300	96400	85300	93333	Negligible
20	Cylindrical Wall-13-2	84700	98300	72400	85133	Negligible



21	Cylindrical Wall-13-3	75600	57300	74300	69067	Negligible
22	Cylindrical Wall-14-1	48200	48800	75600	57533	Negligible
23	Cylindrical Wall-14-2	74300	47500	48900	56900	Negligible
24	Cylindrical Wall-14-3	68300	78900	74300	73833	Negligible
25	Cylindrical Wall-15-1	153300	132600	130300	138733	Negligible
26	Cylindrical Wall-15-2	122300	146300	109500	126033	Negligible
27	Cylindrical Wall-15-3	165300	110300	111400	129000	Negligible
28	Cylindrical Wall-16-1	98300	102400	105600	102100	Negligible
29	Cylindrical Wall-16-2	108900	112300	113400	111533	Negligible
30	Cylindrical Wall-16-3	115900	129300	109600	118267	Negligible

1. Schmidt Hammer Test Results:-

Site Name : ASSSAM GAS BASED POWER PLANT, NEEPCO										Date : 01.10.2021
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)	
Name of the Structure: CLARIFLOCCULATOR-02										
Location : Outside Wall										
1	Point- 01	H→←	44	37	36	35	34	36	36	
2			38	39	37	36	32	36	36	
3	Point- 02	H→←	36	40	42	39	37	39	42	
4			41	39	38	36	40	39	42	
5	Point- 03	H→←	38	36	30	32	33	34	32	
6			39	40	41	37	38	39	42	
7	Point- 04	H→←	40	39	36	37	36	38	40	
8			41	42	34	32	30	33	30	
9	Point- 05	H→←	42	40	39	37	35	39	42	
10			30	32	34	36	38	34	32	



11	Point- 06	H→K←	44	40	39	38	36	39	42
12			42	34	46	39	40	40	44
13	Point- 07	H→K←	44	39	38	36	32	38	40
14			34	30	34	37	33	34	32
15	Point- 08	H→K←	39	40	39	38	34	38	40
16			36	37	42	39	33	37	38
17	Point- 09	H→K←	45	42	40	38	45	42	48
18			43	40	39	37	42	40	44
19	Point- 10	H→K←	40	42	36	35	40	39	42
20			38	37	40	39	42	39	42
21	Point- 11	H→K←	40	39	42	36	37	39	42
22			30	36	32	34	38	34	32
23	Point- 12	H→K←	42	47	49	40	39	42	48
24			36	43	40	37	41	39	42
25	Point- 13	H→K←	50	39	47	42	40	42	48
26			43	41	42	38	39	41	46
27	Point- 14	H→K←	39	42	40	38	37	39	42
28			45	40	36	32	39	38	40
29	Point- 15	H→K←	38	37	35	39	40	38	40
30			36	33	40	38	36	37	38
31	Point- 16	H→K←	42	39	44	36	43	41	46
32			36	40	38	37	41	38	40
33	Point- 17	H→K←	39	37	40	41	39	39	42
34			38	36	32	40	36	36	36
35	Point- 18	H→K←	42	40	45	39	38	41	46



36			40	39	37	36	41	39	42
37	Point- 19	H→←	45	32	34	37	38	36	36
38			40	36	32	30	39	37	38
Average Compressive Strength =									40.26

2. Ultrasonic Pulse Velocity Test Results :-

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					Date : 01.10.2021
Name of the Structure: CLARIFLOCCULTAOR-02					
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: Outside Wall					
1	Point - 01	Indirect	300	3.871	Good
2	Point - 02	Indirect	300	3.494	Doubtful
3	Point - 03	Indirect	300	3.513	Good
4	Point - 04	Indirect	300	3.641	Good
5	Point - 05	Indirect	300	3.876	Good
6	Point - 06	Indirect	300	3.597	Good
7	Point - 07	Indirect	300	3.663	Good
8	Point - 08	Indirect	300	3.503	Good
9	Point - 09	Indirect	300	3.851	Good
10	Point - 10	Indirect	300	3.932	Good
11	Point - 11	Indirect	300	3.395	Doubtful
12	Point - 12	Indirect	300	3.492	Doubtful
13	Point - 13	Indirect	300	3.222	Doubtful
14	Point - 14	Indirect	300	3.690	Good



15	Point - 15	Indirect	300	3.723	Good
16	Point - 16	Indirect	300	3.597	Good
17	Point - 17	Indirect	300	3.472	Doubtful
18	Point - 18	Indirect	300	3.732	Good
19	Point - 19	Indirect	300	3.634	Good
Average Velocity =				3.626	Good

3. Electrical Resistivity Test Results :-

Name of the Structure: Clariflocculator-2						
Location: Various Parts						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	Cylindrical Wall-19-1	161600	154300	58300	124733	Negligible
2	Cylindrical Wall-19-2	48200	47200	46200	47200	Negligible
3	Cylindrical Wall-19-3	45600	74300	65300	61733	Negligible
4	Cylindrical Wall-17-1	63600	62600	56300	60833	Negligible
5	Cylindrical Wall-17-2	58200	96600	85300	80033	Negligible
6	Cylindrical Wall-17-3	52500	72800	84300	69867	Negligible
7	Cylindrical Wall-16-1	92300	98600	92900	94600	Negligible
8	Cylindrical Wall-16-2	93200	94200	94800	94067	Negligible
9	Cylindrical Wall-16-3	48300	62400	94900	68533	Negligible
10	Cylindrical Wall-15-1	26500	28600	30600	28567	Negligible
11	Cylindrical Wall-15-2	48600	34300	27800	36900	Negligible
12	Cylindrical Wall-15-3	33500	34900	36800	35067	Negligible
13	Cylindrical Wall-14-1	35900	30600	38900	35133	Negligible



14	Cylindrical Wall-14-2	90800	85600	84300	86900	Negligible
15	Cylindrical Wall-14-3	82300	83400	85500	83733	Negligible
16	Cylindrical Wall-12-1	82600	84500	82300	83133	Negligible
17	Cylindrical Wall-12-2	84600	56300	62600	67833	Negligible
18	Cylindrical Wall-12-3	75300	46800	48600	56900	Negligible
19	Cylindrical Wall-11-1	49300	61300	64300	58300	Negligible
20	Cylindrical Wall-11-2	53400	58300	98400	70033	Negligible
21	Cylindrical Wall-11-3	58700	55400	54800	56300	Negligible
22	Cylindrical Wall-9-1	56200	54200	46700	52367	Negligible
23	Cylindrical Wall-9-2	34900	39300	74500	49567	Negligible
24	Cylindrical Wall-9-3	85600	78900	59700	74733	Negligible
25	Cylindrical Wall-8-1	73500	72300	72600	72800	Negligible
26	Cylindrical Wall-8-2	87300	70400	91300	83000	Negligible
27	Cylindrical Wall-8-3	79400	68400	62300	70033	Negligible
28	Cylindrical Wall-7-1	117800	120800	122600	120400	Negligible
29	Cylindrical Wall-7-2	128400	117400	138300	128033	Negligible
30	Cylindrical Wall-7-3	134200	137800	130500	134167	Negligible



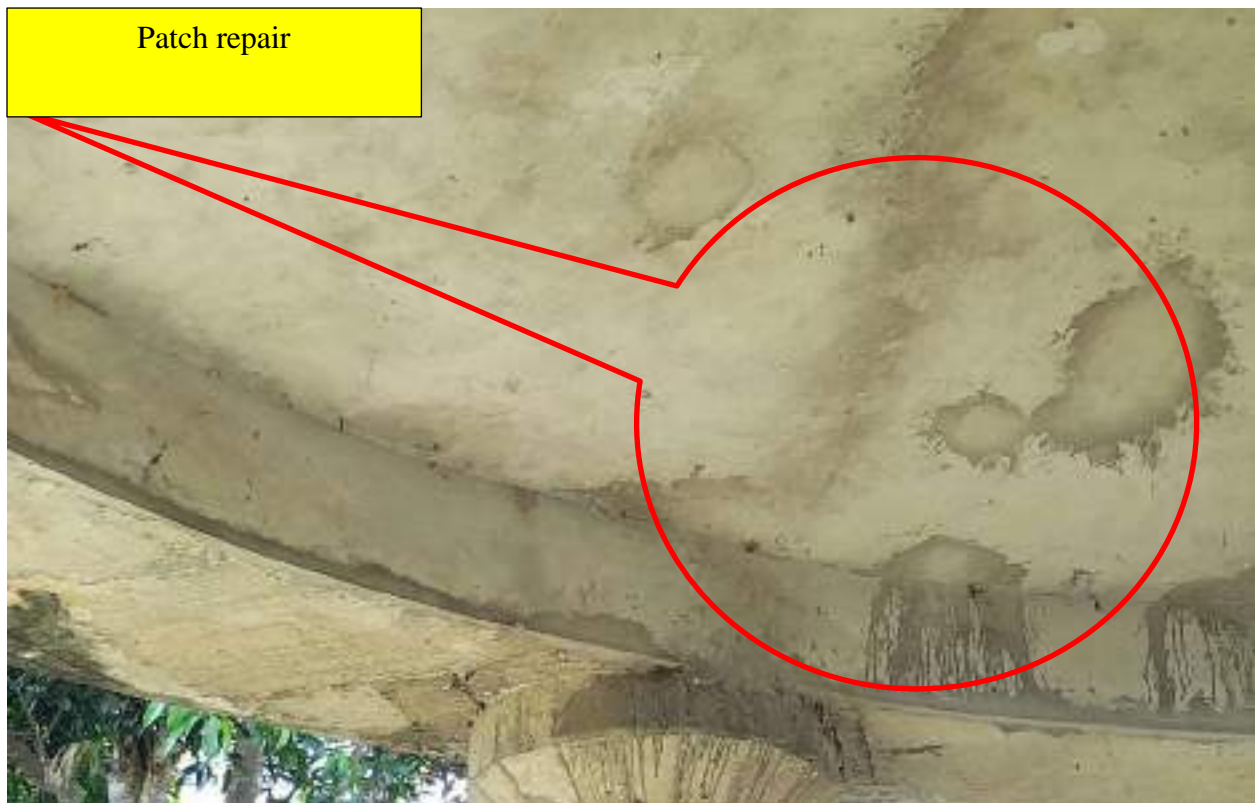
AERATOR



Visual Inspection :-







1. Schmidt Hammer Test Results :-

Site Name : ASSAM GAS BASED POWER PLANT, NEEPCO									Date : 01.10.2021
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure: AERATOR									
Location : Column									
1	Column - 01	H→←	30	36	37	39	40	38	40
2			41	33	34	36	34	34	32
3	Column - 02	H→←	39	40	37	38	35	38	40
4			32	33	34	35	39	35	34
5	Column - 03	H→←	37	35	40	39	32	37	38
6			34	36	37	38	30	35	34
7	Column - 04	H→←	39	40	38	41	36	39	42
8			37	38	34	39	39	37	38
9	Column - 05	H→←	38	41	40	36	37	38	40
10			39	40	35	34	39	37	38
11		H→←	34	36	39	41	40	38	40
12			42	38	35	34	32	35	34
13		H→←	39	40	38	42	36	39	42
14			37	38	30	34	39	37	38
Average Compressive Strength =									37.86

1. Path repair was not proper.
2. Steel is exposed in some portion which need to protect with the help of plaster.
3. In some portion plaster has lost its bond from the concrete.



2. Ultrasonic Pulse Velocity Test Results :-

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					Date : 01.10.2021
Name of the Structure: AERATOR					
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: Column					
1	Column - 01	Direct	700	4.153	Good
2	Column - 02	Direct	700	3.735	Good
3	Column - 03	Direct	700	4.337	Good
4	Column - 04	Direct	700	4.473	Good
5	Column - 05	Indirect	300	3.469	Doubtful
6		Indirect	300	3.364	Doubtful
7		Indirect	300	3.675	Good
Average Velocity =				3.887	Good



3. Electrical Resistivity Test Results :-

Name of the Structure : Aerator						
Location : Various Parts						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	Cylindrical Column-1-1	85500	95600	98300	93133	Negligible
2	Cylindrical Column-1-2	94800	75300	74700	81600	Negligible
3	Cylindrical Column-1-3	95500	85600	94700	91933	Negligible
4	Cylindrical Column-2-1	98900	84500	65800	83067	Negligible
5	Cylindrical Column-2-2	67900	62300	61400	63867	Negligible
6	Cylindrical Column-2-3	45600	47300	56400	49767	Negligible
7	Cylindrical Column-3-1	58300	62600	75300	65400	Negligible
8	Cylindrical Column-3-2	78400	77500	88600	81500	Negligible
9	Cylindrical Column-3-3	98300	99600	45400	81100	Negligible
10	Cylindrical Column-4-1	52300	56400	58600	55767	Negligible
11	Cylindrical Column-4-2	74300	76500	78400	76400	Negligible
12	Cylindrical Column-4-3	67600	66500	61900	65333	Negligible
13	Cylindrical Column-5-1	94500	99800	95600	96633	Negligible
14	Cylindrical Column-5-2	85300	86700	82300	84767	Negligible
15	Cylindrical Column-5-3	70400	74500	41700	62200	Negligible



DM STORAGE TANK

1 & 2



Performed Tests :-



Ultrasonic Thickness Gauge Test



Ultrasonic Pulse Velocity Test





1. Ultrasonic Thickness Precision Gauge Test Results :-

Name of the Building :- DM Storage Tank Area											
Location : DM Storage Tank-1											
SL No.	Member Type	Location	Tested Part of Tank	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Circular Cylinder Tank	D-1	Body	5.82	5.79	5.89	5.82	5.80	5.88	4.59	C2 Low
2		D-2	Body	5.90	5.62	5.94	5.92	5.89	5.70	2.65	C1 Very Low
3		D-3	Body	5.40	5.49	5.42	5.38	5.30	5.20	4.71	C2 Low
4		D-4	Body	5.62	5.09	5.28	5.54	5.64	5.69	5.98	C2 Low
5		D-5	Body	5.34	5.38	5.39	5.32	5.32	5.30	4.55	C2 Low
6		D-6	Body	5.38	3.42	3.43	3.39	3.38	3.41	3.12	C2 Low
7		P-14	Body	10.12	10.14	10.08	10.07	10.15	10.05	2.34	C1 Very Low
8		P-15	Body	10.54	10.64	10.45	10.54	10.25	10.54	2.18	C1 Very Low
9		P-16	Body	10.34	10.38	10.32	10.39	10.29	10.34	1.65	C1 Very Low
10		P-17	Body	10.62	10.60	10.59	10.68	10.62	10.63	3.59	C2 Low
11		P-18	Body	10.60	10.58	10.56	10.52	10.59	10.52	4.57	C2 Low
12		P-19	Body	10.32	10.24	10.28	10.22	10.30	10.32	4.89	C2 Low
13		P-20	Body	10.12	10.18	10.19	10.23	10.10	10.20	3.54	C2 Low
14		P-21	Body	10.40	10.39	10.32	10.42	10.30	10.32	1.65	C1 Very Low
15		P-22	Body	10.30	10.28	10.25	10.27	10.29	10.25	1.66	C1 Very Low
16		P-23	Body	10.28	10.28	10.24	10.20	10.20	10.22	3.46	C2 Low
17		P-24	Body	10.05	10.09	10.07	10.06	10.09	10.22	3.89	C2 Low
18		P-25	Body	10.24	10.02	10.22	10.22	10.09	10.22	4.45	C2 Low
19		P-26	Body	10.32	10.34	10.29	10.35	10.32	10.34	5.97	C2 Low



20	P-27	Body	10.38	10.41	10.40	10.42	10.43	10.42	4.51	C2 Low
21	P-28	Body	10.34	10.28	10.35	10.32	10.29	10.28	5.32	C2 Low
22	P-29	Body	10.34	10.28	10.32	10.30	10.28	10.32	4.87	C2 Low

Ultrasonic Pulse velocity Test Results :-

Name of the Building :- DM Storage Tank Area						
Location : DM Storage Tank -1						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) <i>(for Low Carbon Steel should not be less than 50 % of the desired industrial velocity)</i>
1	Circular Cylindrical Tank	D-1	Body	3591	5890	61%
2		D-2	Body	3625		62%
3		D-3	Body	3625		62%
4		D-4	Body	3920		67%
5		D-5	Body	4420		75%
6		D-6	Body	4926		84%
7		P-14	Body	4328		73%
8		P-15	Body	3620		61%
9		P-16	Body	3759		64%
10		P-17	Body	4325		73%
11		P-18	Body	3625		62%
12		P-19	Body	4204		71%
13		P-20	Body	4398		75%
14		P-21	Body	4308		73%
15		P-22	Body	3625		62%



16		P-23	Body	3528		60%
17		P-24	Body	3632		62%
18		P-25	Body	3820		65%
19		P-26	Body	3920		67%
20		P-27	Body	4258		72%
21		P-28	Body	4520		77%
22		P-29	Body	4020		68%

3. Schmidt Hammer Test Results :-

Site Name : ASSAM GAS BASED POWER PLANT, NEEPCO					Date : 02.10.2021				
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure: D.M TANK - 01									
Location: Foundation Outside									
1	Point- 14	H→←	30	32	38	36	35	34	32
2			36	34	30	34	35	34	32
3	Point- 15	H→←	30	32	35	37	38	34	32
4			34	36	35	37	36	36	36
5	Point- 16	H→←	38	32	35	34	32	34	32
6			36	34	32	35	34	34	32
7	Point- 17	H→←	35	39	36	33	38	36	36
8			32	34	35	32	33	33	30
9	Point- 18	H→←	34	32	30	36	34	33	30
10			35	34	36	32	30	33	30
11	Point- 19	H→←	36	38	34	30	31	34	32
12			32	30	32	33	34	32	30
13	Point- 20	H→←	36	38	34	36	30	35	34



14			32	37	33	32	34	34	32
15	Point- 21	H→κ←	36	34	32	30	33	33	30
16			32	33	36	34	38	35	34
17	Point- 22	H→κ←	32	34	30	36	38	34	32
18			36	30	32	34	36	34	32
19	Point- 23	H→κ←	37	34	35	33	36	35	34
20			36	37	32	34	30	34	32
21			35	36	32	30	34	33	30
22			32	30	34	35	33	33	30
23	Point- 24	H→κ←	34	33	34	30	36	33	30
24			30	31	32	33	34	32	30
25	Point- 25	H→κ←	32	34	35	34	36	34	32
26			38	32	30	35	33	34	32
27	Point- 26	H→κ←	30	33	31	36	32	32	30
28			32	34	35	34	37	34	32
29	Point- 27	H→κ←	32	35	30	33	34	33	30
30			36	34	31	32	36	34	32
31	Point- 28	H→κ←	30	32	33	34	35	33	30
32			32	34	34	36	30	33	30
33	Point- 29	H→κ←	39	41	38	47	40	40	44
34			38	39	36	37	41	38	40
Average Compressive Strength =									32.24



4. Ultrasonic Pulse Velocity of concrete Test Results:-

Site Name: ASSAM GASED BASED POWER PLANT, NEEPCO					Date : 02.10.2021
Name of the Structure: D.M TANK - 01					
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location: Foundation Outside					
1	Point - 14	Indirect	300	3.964	Good
2	Point - 15	Indirect	300	3.721	Good
3	Point - 16	Indirect	300	3.832	Good
4	Point - 17	Indirect	300	4.046	Good
5	Point - 18	Indirect	300	3.823	Good
6	Point - 19	Indirect	300	3.753	Good
7	Point - 20	Indirect	300	3.514	Good
8	Point - 21	Indirect	300	3.429	Doubtful
9	Point - 22	Indirect	300	3.613	Good
10	Point - 23	Indirect	300	3.602	Good
11		Indirect	301	3.596	Good
12	Point - 24	Indirect	300	3.761	Good
13	Point - 25	Indirect	300	4.091	Good
14	Point - 26	Indirect	300	4.319	Good
15	Point - 27	Indirect	300	4.181	Good
16	Point - 28	Indirect	300	3.948	Good
17	Point - 29	Indirect	300	3.689	Good
Average Velocity =				3.817	Good



5. Electrical Resistivity Test Results:-

Name of the Structure: DM Storage Tank-1						
Location : Circular Wall						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	P-27-1	173500	178600	172300	174800	Negligible
2	P-27-2	120800	138900	160200	139967	Negligible
3	P-27-3	99200	103200	98200	100200	Negligible
4	P-28-1	174200	168400	163300	168633	Negligible
5	P-28-2	162300	122800	98200	127767	Negligible
6	P-28-3	138300	142700	149500	143500	Negligible
7	P-29-1	64300	56400	58900	59867	Negligible
8	P-29-2	62300	50200	59500	57333	Negligible
9	P-29-3	38300	39400	40700	39467	Negligible
10	P-14-1	121400	122600	118300	120767	Negligible
11	P-14-2	120200	138300	142500	133667	Negligible
12	P-14-3	110700	99800	112900	107800	Negligible
13	P-15-1	88200	98300	97200	94567	Negligible
14	P-15-2	78600	72300	62500	71133	Negligible
15	P-15-3	50900	59700	38900	49833	Negligible
16	P-16-1	57400	58900	72200	62833	Negligible
17	P-16-2	42300	48200	59500	50000	Negligible
18	P-16-3	38200	39700	45900	41267	Negligible
19	P-17-1	32300	38600	36300	35733	Negligible
20	P-17-2	30400	28200	22800	27133	Negligible



21	P-17-3	40200	48300	38300	42267	Negligible
22	P-18-1	72400	74300	78900	75200	Negligible
23	P-18-2	82200	90200	85300	85900	Negligible
24	P-18-3	62300	68700	72500	67833	Negligible
25	P-19-1	56300	58900	52400	55867	Negligible
26	P-19-2	62400	69200	70300	67300	Negligible
27	P-19-3	50300	59800	58900	56333	Negligible
28	P-20-1	34300	29900	38500	34233	Negligible
29	P-20-2	32200	30300	28700	30400	Negligible
30	P-20-3	22500	35200	39500	32400	Negligible
31	P-21-1	45600	46800	49900	47433	Negligible
32	P-21-2	68200	78200	62300	69567	Negligible
33	P-21-3	50300	59500	65800	58533	Negligible
34	P-22-1	42400	38500	26900	35933	Negligible
35	P-22-2	59300	50700	62500	57500	Negligible
36	P-22-3	39200	42200	49700	43700	Negligible
37	P-24-1	48300	52600	42300	47733	Negligible
38	P-24-2	38200	39700	49200	42367	Negligible
39	P-24-3	30300	28500	32700	30500	Negligible
40	P-25-1	55300	62600	65800	61233	Negligible
41	P-25-2	82700	85200	78400	82100	Negligible
42	P-25-3	62200	68500	72200	67633	Negligible
43	P-26-1	148300	150600	129300	142733	Negligible
44	P-26-2	150700	168200	162800	160567	Negligible
45	P-26-3	138200	142300	138400	139633	Negligible



1. Ultrasonic Thickness Precision Gauge Test Results :-

Name of the Building :- DM Storage Tank Area											
Location : DM Storage Tank-2											
SL No.	Member Type	Location	Tested Part of Tank	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Circular Cylinder Tank	D-13	Body	5.72	5.79	5.68	5.67	6.00	5.90	4.81	C2 Low
2		D-12	Body	6.08	6.03	6.07	6.11	6.04	6.02	3.46	C2 Low
3		D-11	Body	6.04	6.02	6.11	6.14	6.15	6.09	1.25	C1 Very Low
4		D-10	Body	5.62	5.64	5.59	5.60	5.63	5.67	5.27	C2 Low
5		D-9	Body	6.78	6.70	6.72	6.76	6.67	6.20	3.49	C2 Low
6		D-8	Body	5.62	5.67	5.20	5.64	5.61	5.65	3.72	C2 Low
7		D-7	Body	6.28	6.23	6.20	6.17	6.22	6.25	4.81	C2 Low
8		P-1	Body	10.28	10.22	10.24	10.20	10.29	10.34	6.78	C2 Low
9		P-2	Body	9.28	9.22	9.24	9.18	9.18	9.28	3.59	C2 Low
10		P-3	Body	9.34	9.33	9.29	9.27	9.30	9.20	3.49	C2 Low
11		P-4	Body	9.28	9.24	9.30	9.34	9.20	9.32	3.56	C2 Low
12		P-5	Body	9.89	9.70	9.84	9.83	9.87	9.79	4.59	C2 Low
13		P-6	Body	9.64	9.62	9.65	9.61	9.65	9.70	1.56	C1 Very Low
14		P-7	Body	9.42	9.42	9.40	9.39	9.46	9.50	3.15	C2 Low
15		P-8	Body	9.00	9.01	9.09	9.08	9.07	9.11	4.59	C2 Low
16		P-9	Body	9.67	9.59	9.63	9.64	9.60	9.69	1.23	C1 Very Low
17		P-10	Body	9.72	9.76	9.72	9.70	9.78	9.65	6.23	C2 Low
18		P-11	Body	9.62	9.56	9.54	9.52	9.60	9.64	4.56	C2 Low
19		P-12	Body	9.50	9.54	9.56	9.49	9.52	9.54	3.78	C2 Low
20		P-13	Body	9.04	9.01	9.00	9.05	9.02	9.01	3.16	C2 Low



2. Ultrasonic Pulse Velocity Test Results :-

Name of the Building :- DM Storage Tank Area						
Location : DM Storage Tank -2						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Circular Cylindrical Tank	D-13	Body	3562	5890	60%
2		D-12	Body	3420		58%
3		D-11	Body	3924		67%
4		D-10	Body	3640		62%
5		D-9	Body	3820		65%
6		D-8	Body	4325		73%
7		D-7	Body	4350		74%
8		P-1	Body	4352		74%
9		P-2	Body	3629		62%
10		P-3	Body	3409		58%
11		P-4	Body	4208		71%
12		P-5	Body	4070		69%
13		P-6	Body	4249		72%
14		P-7	Body	4407		75%
15		P-8	Body	4371		74%
16		P-9	Body	3520		60%
17		P-10	Body	3702		63%
18		P-11	Body	3892		66%
19		P-12	Body	4290		73%
20		P-13	Body	4520		77%



3. Schmidt Hammer Test Results :-

Site Name : ASSSAM GAS BASED POWER PLANT, NEEPCO									Date : 02.10.2021	
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)	
Name of the Structure : D.M TANK - 02										
Location : Foundation Outside										
1	Point- 01	H→↯←	32	33	35	37	30	33	30	
2			34	34	36	30	32	33	30	
3	Point- 02	H→↯←	30	32	35	32	34	33	30	
4			31	33	34	30	31	32	30	
5	Point- 03	H→↯←	36	31	32	33	34	33	30	
6			30	32	33	34	35	33	30	
7	Point- 04	H→↯←	34	30	38	36	32	34	32	
8			35	36	32	34	30	33	30	
9	Point- 05	H→↯←	30	32	31	33	32	32	30	
10			32	31	34	36	30	33	30	
11	Point- 06	H→↯←	32	30	33	35	36	33	30	
12			33	34	34	32	37	34	32	
13	Point- 07	H→↯←	40	42	41	44	40	41	46	
14			38	36	40	39	42	39	42	
15	Point- 08	H→↯←	40	38	39	40	41	40	44	
16			36	37	38	42	39	38	40	
17	Point- 09	H→↯←	33	34	35	36	32	34	32	
18			34	30	32	35	34	33	30	
19	Point- 10	H→↯←	39	36	37	38	35	37	38	
20			32	34	33	36	34	34	32	



21	Point- 11	H→←	36	37	38	32	30	35	34
22			34	35	36	30	31	33	30
23	Point- 12	H→←	36	34	37	32	36	35	34
24			35	33	32	30	34	33	30
25	Point- 13	H→←	34	32	30	36	35	33	30
26			39	34	33	35	34	35	34
Average Compressive Strength =									33.08

4. Ultrasonic Pulse Velocity of Concrete Test Results :-

Site Name : ASSAM GASED BASED POWER PLANT, NEEPCO					Date :
Name of the Structure: D.M TANK - 02					01.10.2021
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
Location : Foundation Outside					
1	Point - 01	Indirect	300	3.831	Good
2	Point - 02	Indirect	300	3.662	Good
3	Point - 03	Indirect	300	4.014	Good
4	Point - 04	Indirect	300	3.813	Good
5	Point - 05	Indirect	300	3.601	Good
6	Point - 06	Indirect	300	3.583	Good
7	Point - 07	Indirect	300	3.712	Good
8	Point - 08	Indirect	300	3.403	Doubtful
9	Point - 09	Indirect	300	3.692	Good
10	Point - 10	Indirect	300	3.516	Good
11	Point - 11	Indirect	300	3.661	Good
12	Point - 12	Indirect	300	4.073	Good
13	Point - 13	Indirect	300	3.714	Good
Average Velocity =				3.713	Good



5. Electrical Resistivity Test Results :-

Name of the Structure : DM Storage Tank-2						
Location : Circular Wall						
SL No.	Location	Readings of Electrical Resistivity (K Ω -cm)			Average Electrical Resistivity (K Ω -cm)	Remarks
		1	2	3		
1	P-13-1	81300	94400	92200	89300	Negligible
2	P-13-2	88300	78200	90500	85667	Negligible
3	P-13-3	80200	72500	82300	78333	Negligible
4	P-1-1	97300	89900	90700	92633	Negligible
5	P-1-2	68200	62300	72500	67667	Negligible
6	P-1-3	70500	69200	59200	66300	Negligible
7	P-2-1	110300	112400	114600	112433	Negligible
8	P-2-2	112800	99700	120200	110900	Negligible
9	P-2-3	130400	138200	128700	132433	Negligible
10	P-3-1	107300	108400	103600	106433	Negligible
11	P-3-2	101200	120800	138300	120100	Negligible
12	P-3-3	130700	99900	112200	114267	Negligible
13	P-4-1	25800	38600	40200	34867	Negligible
14	P-4-2	22700	28300	32500	27833	Negligible
15	P-4-3	38900	39500	42300	40233	Negligible
16	P-5-1	97500	98300	96400	97400	Negligible
17	P-5-2	82200	80200	79500	80633	Negligible
18	P-5-3	72700	68500	62700	67967	Negligible
19	P-6-1	127500	129400	120500	125800	Negligible
20	P-6-2	120200	112300	142700	125067	Negligible



21	P-6-3	128200	132300	110500	123667	Negligible
22	P-7-1	62300	68400	59200	63300	Negligible
23	P-7-2	65200	70200	78500	71300	Negligible
24	P-7-3	59500	60300	50400	56733	Negligible
25	P-8-1	22600	26300	28400	25767	Negligible
26	P-8-2	22800	30700	38900	30800	Negligible
27	P-8-3	28200	39300	42200	36567	Negligible
28	P-9-1	44200	38500	30200	37633	Negligible
29	P-9-2	59200	52500	49900	53867	Negligible
30	P-9-3	38200	32300	42700	37733	Negligible
31	P-10-1	70300	78600	88500	79133	Negligible
32	P-10-2	72800	65200	68200	68733	Negligible
33	P-10-3	90300	80500	82700	84500	Negligible
34	P-11-1	22300	28300	26500	25700	Negligible
35	P-11-2	28500	32600	38700	33267	Negligible
36	P-11-3	22300	36700	39200	32733	Negligible
37	P-12-1	98600	57800	92300	82900	Negligible
38	P-12-2	72200	78500	62200	70967	Negligible
39	P-12-3	90500	82700	89900	87700	Negligible



COOLING WATER PUMP HOUSE

Visual observation

1. Damp has been identified in various portions of the wall
2. Many portions' cracks have been observed in various parts of the structure.
3. Surface plaster has spalled out from the concrete.
4. Structural steel has been exposed and severely corroded in many places.
5. Concrete has also spalled out in many portions



Performed Tests :-





Ultrasonic
Pulse Velocity
Test



Rebound
Hammer Test



Visual Inspection :-















TEST RESULTS



1. Ultrasonic Thickness Precision Gauge Test Results :-

Name of the Building :- CW Pump House											
Location : Ground Floor											
SL No	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-1	Web/Flange	12.68	12.24	12.04	12.04	12.08	12.14	3.15	C2 Low
2		C-2	Web/Flange	12.70	12.72	12.40	12.40	12.48	12.14	4.52	C2 Low
3		C-3	Web/Flange	12.59	12.24	12.62	12.68	12.59	12.62	3.68	C2 Low
4		C-4	Web/Flange	12.09	12.04	12.08	12.06	12.02	12.00	5.89	C2 Low
5		C-5	Web/Flange	12.99	12.87	12.89	12.92	12.94	12.96	6.52	C2 Low
6		C-6	Web/Flange	12.60	12.63	12.69	12.63	12.66	12.65	2.32	C1 Very Low
7		C-7	Web/Flange	12.12	12.18	12.20	12.21	12.19	12.22	4.62	C2 Low
8		C-8	Web/Flange	12.18	12.23	12.14	12.20	12.10	12.12	5.71	C2 Low
9		C-9	Web/Flange	12.52	12.48	12.56	12.53	12.53	12.50	3.56	C2 Low
10		C-10	Web/Flange	12.49	12.43	12.32	12.36	12.37	12.39	4.52	C2 Low
11		C-11	Web/Flange	12.22	12.24	12.21	12.29	12.24	12.21	3.69	C2 Low
12		C-12	Web/Flange	12.20	12.25	12.20	12.02	12.23	12.27	4.87	C2 Low
13		C-13	Web/Flange	12.89	12.74	12.82	12.92	12.77	12.79	3.56	C2 Low



2. Ultrasonic Pulse Velocity of Steel Test Results :-

Name of the Building :- CW Pump House						
Location : Ground Floor						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	C-1	Web/Flange	3590	5890	61%
2		C-2	Web/Flange	3620		61%
3		C-3	Web/Flange	3270		56%
4		C-4	Web/Flange	3725		63%
5		C-5	Web/Flange	4525		77%
6		C-6	Web/Flange	4327		73%
7		C-7	Web/Flange	3620		61%
8		C-8	Web/Flange	3870		66%
9		C-9	Web/Flange	3920		67%
10		C-10	Web/Flange	3720		63%
11		C-11	Web/Flange	4325		73%
12		C-12	Web/Flange	3625		62%
13		C-13	Web/Flange	4302		73%



3. Schmidt Hammer Test Results :-

Site Name : ASSAM GAS BASED POWER PLANT, NEEPCO							Date : 02.10.2021		
Sl. No.	Name of the Structural Member	Dir. of Test	Re-bound Hammer Readings					Average Value	Compressive Strength (MPa)
Name of the Structure : C.W PUMP HOUSE									
1	Beam between C-06 & C-07	H→←	35	36	34	33	37	35	34
2			34	35	38	37	36	36	36
3	Beam between C-07 & C-08	H→←	32	33	36	38	34	35	34
4			34	36	35	36	35	35	34
5	Beam between C-08 & C-09	H→←	33	35	36	37	34	35	34
6			32	38	40	39	38	39	42
7	Beam between C-10 & C-11	H→←	34	35	36	33	34	34	32
8			39	38	37	38	36	38	40
9	Beam between C-11 & C-12	H→←	36	37	38	39	34	37	38
10			35	36	37	36	35	36	36
11	Beam between C-12 & C-13	H→←	37	38	35	34	33	35	34
12			36	35	34	39	36	36	36
Average Compressive Strength =								35.83	



4. Ultrasonic Pulse Velocity of concrete Test Results :-

Site Name : ASSAM GASED BASED POWER PLANT, NEEPCO					
Name of the Structure : C.W PUMP HOUSE				Date : 02.10.2021	
Sl. No.	Name of Structure	UPV Direction	Distance (mm)	Velocity (Km/sec)	Remarks
1	Beam between C-06 & C-07	Indirect	300	3.611	Good
2	Beam between C-07 & C-08	Indirect	300	3.720	Good
3	Beam between C-08 & C-09	Indirect	300	3.519	Good
4	Beam between C-10 & C-11	Indirect	300	3.615	Good
5	Beam between C-11 & C-12	Indirect	300	3.295	Doubtful
6	Beam between C-12 & C-13	Indirect	300	3.413	Doubtful
Average Velocity =				3.529	Good



AIR COMPRESSOR HOUSE



Performed Tests :-



Visual Inspection:-

1. Most of Steel ISMB Members are in good condition no sign of Flaw (Sagging, Corrosion, Paint Delamination).
2. Wall paint is delaminated due to efflorescence.



Vibration test



TEST RESULTS



1. Ultrasonic Thickness precision gauge Test :-

Name of the Building: - Air Compressor Building											
Location: Ground Floor											
SL No.	Member Type	Location	Tested Part of ISMB	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	Column	C-1	Web/Flange	9.91	9.84	9.28	9.38	9.38	9.34	3.56	C2 Low
2		C-2	Web/Flange	9.14	9.22	9.16	10.02	9.45	9.25	4.29	C2 Low
3		C-3	Web/Flange	9.66	9.10	9.22	9.54	9.21	9.22	6.27	C2 Low
4		C-4	Web/Flange	9.75	9.24	9.38	9.39	9.80	9.72	2.26	C1 Very Low
5		C-5	Web/Flange	36.70	36.86	36.27	36.76	36.20	36.25	2.15	C1 Very Low
6		C-6	Web/Flange	9.57	9.57	9.47	9.58	9.38	9.54	3.56	C2 Low
7		C-7	Web/Flange	9.12	9.14	9.00	9.15	9.14	9.16	4.89	C2 Low
8		C-8	Web/Flange	9.35	9.32	9.40	9.33	9.28	9.29	3.24	C2 Low
9		C-9	Web/Flange	9.41	9.38	9.53	9.42	9.39	9.24	4.56	C2 Low
10		C-10	Web/Flange	9.33	9.38	9.34	9.38	9.28	9.25	5.78	C2 Low
11		C-11	Web/Flange	9.59	9.52	9.42	9.38	9.32	9.54	5.81	C2 Low
12		C-12	Web/Flange	9.56	9.65	9.62	9.67	9.58	9.34	3.74	C2 Low
13		C-13	Web/Flange	9.46	9.42	9.44	9.28	9.38	9.34	4.56	C2 Low
14		C-14	Web/Flange	9.74	9.70	9.30	9.68	9.59	9.49	3.15	C2 Low
15		C-15	Web/Flange	9.84	9.82	9.74	9.38	9.34	9.38	4.78	C2 Low
16		C-16	Web/Flange	9.08	9.07	9.01	9.28	9.12	9.14	3.61	C2 Low
17		C-17	Web/Flange	9.28	9.24	9.32	9.22	9.20	9.20	5.23	C2 Low
18		C-18	Web/Flange	9.20	9.17	9.18	9.18	9.21	9.25	6.78	C2 Low
19		C-19	Web/Flange	9.28	9.37	9.37	9.32	9.30	9.24	7.45	C2 Low



1. Ultrasonic Pulse Velocity Test Results:-

Name of the Building: - Air Compressor Building						
Location: Ground Floor						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	Column	C-1	Web/Flange	3528	5890	60%
2		C-2	Web/Flange	3680		62%
3		C-3	Web/Flange	4480		76%
4		C-4	Web/Flange	3520		60%
5		C-5	Web/Flange	3620		61%
6		C-6	Web/Flange	3949		67%
7		C-7	Web/Flange	4020		68%
8		C-8	Web/Flange	4425		75%
9		C-9	Web/Flange	4320		73%
10		C-10	Web/Flange	3894		66%
11		C-11	Web/Flange	3520		60%
12		C-12	Web/Flange	3725		63%
13		C-13	Web/Flange	4259		72%
14		C-14	Web/Flange	4240		72%
15		C-15	Web/Flange	3728		63%
16		C-16	Web/Flange	3520		60%
17		C-17	Web/Flange	4480		76%
18		C-18	Web/Flange	3967		67%
19		C-19	Web/Flange	3852		65%



Vibration Test Results

Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (μm)	Temperature (°C)	CF Plus	Comment
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3(for RCC foundation)				
5	Building Name : Air Compressor Building								
i)	Air Compressor - D (At Machine)	2.07	2.83	1.26	Good	7.87	48.6	5	Good
	Air Compressor - D (At Foundation)	0.18	0.00	0.25	OK	3.09	35.5	0	Good
ii)	Air Compressor - C (At Machine)	1.52	3.11	0.98	Good	4.84	48.6	7	Satisfactory
	Air Compressor - C (At Foundation)	0.52	0.32	0.43	OK	3.56	40.2	0	Good
iii)	Air Compressor - A (At Machine)	0.97	2.62	0.69	Good	4.08	46.3	6	Satisfactory
	Air Compressor - A (At Foundation)	0.42	0.00	0.36	OK	3.57	36.1	0	Good

SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	<ol style="list-style-type: none"> For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied. Wall should be clean with 1:3 Vinegar solution or 1:12 Muriatic Acid solution Repainted with Damp proofing compound.



**10 KM LONG RAW
WATER PIPELINE
(500,600 mm)
DIAMETER AT
FAKHIAL GHAT,
JOYPUR**



Performed Tests:-





Visual Inspection :-

Construction Engineering Department, Jadavpur University Salt-Lake Campus Kolkata-700106



1. Over Ground exposed pipeline having no sign of paint delamination or any kind of deterioration.
2. Over Ground exposed pipeline having no sign structural distress like bending, sagging or denting.
3. Any kind of weld joint fault also not observed.
4. All pipe need to be epoxy painted for future protection.



TEST RESULTS



1. Ultrasonic Thickness Precision Gauge Tests :-

Name of the Building :- 10 KM Long 500,600 mm Dia Pipe Line											
Location : Inside Factory Premises											
SL No.	Member Type	Location	Tested Part of Pipe	Reading at X Axis (mm)			Reading at Y Axis (mm)			Thickness Loss in (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1
1	500, 600 mm dia Pipe	P-1	Body	12.16	12.11	12.19	12.09	12.09	12.28	5.26	C2 Low
2		P-2	Body	12.19	12.23	12.23	12.25	12.28	12.12	3.26	C2 Low
3		P-3	Body	9.16	9.17	9.10	9.20	9.22	9.12	1.25	C1 Very Low
4		P-4	Body	11.19	11.20	11.26	11.28	11.32	11.30	3.59	C2 Low
5		P-5	Body	5.32	5.22	5.08	5.28	5.29	5.24	4.89	C2 Low
6		P-6	Body	6.24	6.23	6.32	6.29	6.25	6.28	5.27	C2 Low
7		P-7	Body	6.14	6.19	6.17	6.12	6.15	6.10	3.59	C2 Low
8		P-8	Body	6.71	6.70	6.76	6.73	6.72	6.72	3.71	C2 Low
9		P-9	Body	6.84	6.80	6.87	6.79	6.83	6.88	7.59	C2 Low
10		P-10	Body	6.23	6.22	6.25	6.27	6.29	6.28	5.23	C2 Low
11		P-11	Body	6.59	6.52	6.50	6.49	6.58	6.52	3.56	C2 Low
12		P-12	Body	6.42	6.39	6.44	6.34	6.29	6.22	2.21	C1 Very Low
13		P-13	Body	6.42	6.40	6.46	6.38	6.39	6.36	4.73	C2 Low
14		P-14	Body	6.65	6.59	6.57	6.53	6.59	6.61	5.16	C2 Low
15		P-15	Body	7.14	7.09	7.15	7.11	7.19	7.03	4.52	C2 Low
16		P-16	Body	5.58	5.52	5.60	5.52	5.53	5.35	3.48	C2 Low
17		P-17	Body	6.45	6.43	6.44	6.39	6.48	6.43	3.41	C2 Low
18		P-18	Body	7.07	7.03	7.10	7.12	7.15	7.14	3.23	C2 Low



19		P-19	Body	7.04	7.09	7.12	7.04	7.06	7.09	3.16	C2 Low
20		P-20	Body	6.09	6.12	6.18	6.1	6.06	6.01	3.26	C2 Low
21		P-21	Body	6.7	6.72	6.59	6.72	6.76	6.77	4.27	C2 Low
22		P-22	Body	6.29	6.32	6.33	6.34	6.38	6.37	5.12	C2 Low
23		P-23	Body	6.32	6.28	6.32	6.36	6.3	6.39	3.48	C2 Low
24		P-24	Body	7.12	7.23	7.32	7.02	7.04	7.04	2.25	C1 Very Low
25		P-25	Body	7.20	7.02	7.04	6.20	7.04	7.07	5.24	C2 Low

Location : Near at Fakhial Ghat Bridge

1	500, 600 mm dia Pipe	P-1	Body	6.25	6.28	6.32	6.42	6.28	6.32	2.56	C1 Very Low
2		P-2	Body	5.72	5.92	5.62	5.28	5.88	5.90	3.59	C2 Low
3		P-3	Body	6.34	6.37	6.38	6.37	6.39	6.34	4.52	C2 Low
4		P-4	Body	6.26	6.34	6.29	6.28	6.32	6.30	5.23	C2 Low
5		P-5	Body	6.52	6.56	6.70	6.38	6.39	6.38	4.52	C2 Low
6		P-6	Body	7.01	7.08	7.12	7.20	7.15	7.16	6.23	C2 Low
7		P-7	Body	6.89	6.78	6.83	6.74	6.77	6.76	5.21	C2 Low
8		P-8	Body	6.08	6.09	6.03	6.12	6.14	6.16	4.52	C2 Low
9		P-9	Body	6.09	6.07	6.02	6.32	6.38	6.28	3.57	C2 Low
10		P-10	Body	6.09	6.28	6.28	6.28	6.29	6.32	6.27	C2 Low
11		P-11	Body	6.12	6.19	6.15	6.23	6.32	6.28	4.51	C2 Low
12		P-12	Body	6.18	6.19	6.15	6.23	6.32	6.28	5.24	C2 Low
13		P-13	Body	5.92	5.93	6.27	6.28	5.92	5.90	4.57	C2 Low
14		P-14	Body	6.03	6.12	6.28	6.29	6.26	6.25	1.28	C1 Very Low
15		P-15	Body	6.28	6.32	6.29	6.33	6.90	6.27	5.21	C2 Low
16		P-16	Body	6.28	6.04	6.27	6.29	6.29	6.04	4.28	C2 Low
17		P-17	Body	5.98	5.28	5.94	5.88	5.68	5.90	3.57	C2 Low



18		P-18	Body	5.92	5.99	5.92	5.84	5.72	5.82	5.67	C2 Low
19		P-19	Body	5.88	5.98	5.40	5.87	5.92	5.90	4.52	C2 Low
20		P-20	Body	5.94	5.04	5.28	5.94	5.92	5.92	3.47	C2 Low
21		P-21	Body	6.04	5.99	6.04	5.29	5.89	5.90	2.48	C1 Very Low
22		P-22	Body	5.68	5.64	5.62	5.66	5.65	5.60	3.41	C2 Low
23		P-23	Body	5.42	5.39	5.36	5.44	5.42	5.40	4.78	C2 Low
24		P-24	Body	5.27	5.34	5.39	5.42	5.49	5.58	3.49	C2 Low
25	500, 600 mm dia Pipe	P-25	Body	5.20	5.23	5.24	5.28	5.26	5.29	3.15	C2 Low
26		P-26	Body	5.40	5.43	5.44	5.40	5.41	5.48	3.49	C2 Low
27		P-27	Body	5.44	5.34	5.39	5.42	5.49	5.58	4.29	C2 Low
28		P-28	Body	5.20	5.99	5.79	5.86	5.72	5.29	3.42	C2 Low
29		P-29	Body	5.85	5.87	5.88	5.71	5.89	5.90	3.43	C2 Low
30		P-30	Body	5.72	5.70	5.73	5.73	5.65	5.72	1.28	C1 Very Low
31		P-31	Body	5.30	5.29	5.30	5.28	5.22	5.21	3.49	C2 Low
32		P-32	Body	5.32	5.24	5.35	5.32	5.30	5.31	4.79	C2 Low
33		P-33	Body	6.00	5.90	5.92	5.58	5.86	5.92	3.48	C2 Low
34		P-34	Body	5.38	5.32	5.30	5.33	5.32	5.34	4.19	C2 Low
35		P-35	Body	5.24	5.38	5.28	5.22	5.20	5.30	3.74	C2 Low
36		P-36	Body	5.44	5.42	5.48	5.41	5.00	5.99	4.19	C2 Low
37		P-37	Body	5.84	5.29	5.56	5.90	5.28	5.98	3.67	C2 Low
38		P-38	Body	5.72	5.68	5.84	5.29	5.74	5.72	4.81	C2 Low
39		P-39	Body	5.96	5.59	5.66	5.72	5.90	5.64	3.13	C2 Low
40		P-40	Body	5.08	5.04	5.14	5.29	5.59	5.77	4.52	C2 Low
41		P-41	Body	5.86	5.79	5.86	5.62	5.72	5.62	3.11	C2 Low



42		P-42	Body	5.21	6.10	6.25	6.01	6.02	6.29	5.91	C2 Low
43		P-43	Body	5.90	5.72	5.68	5.92	5.69	5.58	4.27	C2 Low
44		P-44	Body	6.00	5.92	6.01	6.02	6.02	6.07	3.48	C2 Low
45		P-45	Body	5.99	5.97	5.62	5.60	5.72	5.29	3.15	C2 Low
46		P-46	Body	5.29	5.82	5.72	5.90	5.24	5.29	1.21	C1 Very Low
47		P-47	Body	6.23	6.32	6.04	6.28	6.29	6.32	2.48	C1 Very Low
48		P-48	Body	5.92	5.84	5.92	5.94	5.90	5.88	2.17	C1 Very Low
49		P-49	Body	5.84	5.28	5.30	5.28	5.30	5.22	3.49	C2 Low
50		P-50	Body	6.04	6.00	6.10	6.12	6.12	6.14	4.77	C2 Low

Location : Near at Chengelijan

1	500, 600 mm dia Pipe	P-1	Body	5.52	5.62	5.42	5.82	5.60	5.59	5.29	C2 Low
2		P-2	Body	6.26	6.28	6.30	6.34	6.28	6.28	3.24	C2 Low
3		P-3	Body	6.33	6.34	6.40	6.34	6.24	6.34	3.48	C2 Low
4		P-4	Body	6.34	6.29	6.20	6.24	6.33	6.24	1.26	C1 Very Low
5		P-5	Body	5.34	5.28	5.30	5.28	5.30	5.28	4.29	C2 Low
6		P-6	Body	5.42	5.25	5.28	5.34	5.60	5.62	5.33	C2 Low
7		P-7	Body	6.14	6.20	6.28	6.28	6.20	6.27	3.48	C2 Low
8		P-8	Body	5.16	5.32	5.42	5.52	5.59	5.29	3.22	C2 Low
9		P-9	Body	5.14	5.19	5.28	5.38	5.20	5.21	1.23	C1 Very Low
10		P-10	Body	5.20	5.19	5.20	5.29	5.30	5.28	8.23	C2 Low

Location :- at Near Digboi Over Bridge

1	500, 600 mm dia Pipe	P-1	Body	5.03	5.03	5.05	5.26	5.28	5.28	1.26	C1 Very Low
2		P-2	Body	6.35	6.00	6.22	6.10	6.25	6.32	2.56	C1 Very Low
3		P-3	Body	6.05	5.97	5.93	5.28	5.09	5.08	1.25	C1 Very Low
4		P-4	Body	5.90	6.24	6.16	6.14	6.10	6.12	3.59	C2 Low



5		P-5	Body	6.14	6.24	6.26	6.28	6.28	6.22	4.29	C2 Low
6		P-6	Body	6.19	6.28	5.82	6.14	6.28	5.96	5.26	C2 Low
7		P-7	Body	5.75	5.74	5.62	5.28	5.28	5.20	3.48	C2 Low
8		P-8	Body	5.92	5.92	5.28	5.28	5.08	5.29	3.22	C2 Low
9		P-9	Body	6.09	6.24	6.12	6.25	6.32	6.28	1.23	C1 Very Low
10		P-10	Body	6.16	6.29	6.04	6.03	6.21	6.01	8.23	C2 Low
11		P-11	Body	5.81	5.77	5.69	5.28	5.72	5.28	2.36	C1 Very Low
12		P-12	Body	5.88	5.82	5.28	5.29	5.26	5.22	2.48	C1 Very Low
13		P-13	Body	5.92	5.70	6.16	5.40	5.28	5.20	3.56	C2 Low
14		P-14	Body	6.09	5.90	6.84	6.23	6.21	6.18	5.16	C2 Low
15		P-15	Body	6.09	6.14	6.12	6.01	6.04	5.97	4.52	C2 Low
16		P-16	Body	6.14	6.01	6.00	6.20	6.20	6.14	2.56	C1 Very Low
17		P-17	Body	5.76	5.78	5.49	6.10	6.18	6.04	3.41	C2 Low
18		P-18	Body	6.29	6.24	6.20	5.89	5.80	6.28	3.23	C2 Low

Location :- at Near Borpul Near Bhady Panch

1	500, 600 mm dia Pipe	P-1	Body	6.08	6.29	6.26	6.44	6.28	6.29	2.58	C1 Very Low
2		P-2	Body	5.90	5.29	5.84	5.94	5.28	5.84	5.42	C2 Low
3		P-3	Body	6.04	6.12	6.14	6.18	6.28	6.28	6.23	C2 Low
4		P-4	Body	5.29	5.87	5.82	5.85	5.89	5.92	1.20	C1 Very Low
5		P-5	Body	5.90	5.96	5.90	5.19	5.87	5.38	0.85	C1 Very Low
6		P-6	Body	6.24	6.04	6.28	6.32	6.32	6.09	1.57	C1 Very Low
7		P-7	Body	6.24	6.11	6.12	6.01	6.00	6.29	2.54	C1 Very Low
8		P-8	Body	6.28	6.28	6.31	6.32	6.24	6.01	5.89	C2 Low

Location :- at Near Borpathar Nala

1		P-1	Body	6.21	6.20	6.28	6.00	6.09	6.09	2.58	C1 Very Low
---	--	-----	------	------	------	------	------	------	------	------	-------------



2	500, 600 mm dia Pipe	P-2	Body	5.92	5.92	5.94	5.92	5.96	5.92	5.42	C2 Low
3		P-3	Body	6.58	5.92	5.92	5.20	5.28	5.82	6.23	C2 Low
4		P-4	Body	5.52	5.42	5.28	5.68	5.87	5.72	1.20	C1 Very Low
5		P-5	Body	5.29	5.62	5.89	5.64	5.68	5.69	0.85	C1 Very Low
6		P-6	Body	6.28	6.29	6.12	6.22	6.24	6.27	1.57	C1 Very Low

Location :- at Near Borpathar Nala

1	500, 600 mm dia Pipe	P-1	Body	6.27	6.20	6.01	6.14	6.14	6.04	2.99	C1 Very Low
2		P-2	Body	5.29	5.90	7.52	5.44	5.92	5.94	5.48	C2 Low
3		P-3	Body	5.29	5.28	5.92	5.29	5.92	5.98	6.59	C2 Low

2. Ultrasonic Pulse Velocity Test Results :-

Name of the Building :- 10 KM Long Pipe Line 500 ,600 mm Dia						
Location : Inside Factory Premises						
SL No.	Member Type	Location	Tested Part of ISMB	Ultrasonic Pulse Velocity Results (m/Sec)	Industrial Velocity for Low Carbon Steel as per EN ISO (m./Sec)	Ultrasonic Flaw Detection with Velocity intensity (%) (<i>for Low Carbon Steel should not be less than 50 % of the desired industrial velocity</i>)
1	500,600 mm dia Pipe	P-1	Body	3529	5890	60%
2		P-2	Body	3427		58%
3		P-3	Body	3.928		0%
4		P-4	Body	3.842		0%
5		P-5	Body	3.724		0%
6		P-6	Body	3632		62%
7		P-7	Body	3827		65%
8		P-8	Body	3920		67%
9		P-9	Body	3962		67%
10		P-10	Body	3725		63%



11		P-11	Body	3523		60%
12		P-12	Body	3872		66%
13		P-13	Body	3732		63%
14		P-14	Body	3820		65%
15		P-15	Body	3625		62%
16		P-16	Body	3902		66%
17		P-17	Body	3604		61%
18		P-18	Body	3835		65%
19		P-19	Body	3920		67%
20		P-20	Body	3629		62%
21		P-21	Body	3592		61%
22		P-22	Body	3791		64%
23		P-23	Body	3924		67%
24		P-24	Body	3824		65%
25		P-25	Body	3726		63%

Location : At Near Fakhial Ghat Bridge

1	500,600 mm dia Pipe	P-1	Body	3754	5890	64%
2		P-2	Body	2896		49%
3		P-3	Body	3420		58%
4		P-4	Body	2892		49%
5		P-5	Body	3425		58%
6		P-6	Body	2872		49%
7		P-7	Body	3820		65%
8		P-8	Body	2892		49%
9		P-9	Body	3420		58%



10		P-10	Body	3820		65%
11		P-11	Body	3529		60%
12		P-12	Body	4020		68%
13		P-13	Body	3280		56%
14		P-14	Body	2860		49%
15		P-15	Body	3285		56%
16		P-16	Body	3429		58%
17		P-17	Body	3872		66%
18		P-18	Body	3624		62%
19		P-19	Body	4028		68%
20		P-20	Body	3924		67%
21		P-21	Body	2684		46%
22		P-22	Body	2890		49%
23		P-23	Body	3048		52%
24		P-24	Body	2689		46%
25		P-25	Body	2721		46%
1	500,600 mm dia Pipe	P-26	Body	2692	5890	46%
2		P-27	Body	2875		49%
3		P-28	Body	3520		60%
4		P-29	Body	3420		58%
5		P-30	Body	3328		57%
6		P-31	Body	2842		48%
7		P-32	Body	2904		49%
8		P-33	Body	3028		51%
9		P-34	Body	2728		46%



10		P-35	Body	2420		41%
11		P-36	Body	3328		57%
12		P-37	Body	2864		49%
13		P-38	Body	3028		51%
14		P-39	Body	2968		50%
15		P-40	Body	3207		54%
16		P-41	Body	3029		51%
17		P-42	Body	2925		50%
18		P-43	Body	2528		43%
19		P-44	Body	2980		51%
20		P-45	Body	3025		51%
21		P-46	Body	3728		63%
22		P-47	Body	3629		62%
23		P-48	Body	3420		58%
24		P-49	Body	4028		68%
25		P-50	Body	3259		55%

Location : At Near Chengelijan

1	500,600 mm dia Pipe	P-1	Body	3420	5890	58%
2		P-2	Body	3626		62%
3		P-3	Body	3489		59%
4		P-4	Body	3428		58%
5		P-5	Body	3872		66%
6		P-6	Body	3480		59%
7		P-7	Body	3209		54%
8		P-8	Body	3540		60%



9		P-9	Body	3308		56%
10		P-10	Body	3920		67%

Location : At Near Digboi Over Bridge

1	500,600 mm dia Pipe	P-1	Body	3420	5890	58%
2		P-2	Body	3870		66%
3		P-3	Body	4025		68%
4		P-4	Body	3872		66%
5		P-5	Body	3209		54%
6		P-6	Body	3089		52%
7		P-7	Body	3028		51%
8		P-8	Body	3428		58%
9		P-9	Body	3324		56%
10		P-10	Body	3480		59%
11		P-11	Body	3094		53%
12		P-12	Body	4204		71%
13		P-13	Body	3720		63%
14		P-14	Body	3402		58%
15		P-15	Body	3820		65%
16		P-16	Body	3820		65%
17		P-17	Body	3412		58%
18		P-18	Body	3260		55%

Location : At Near Borpuli Bhady Panch

1	500,600 mm dia Pipe	P-1	Body	3429	5890	58%
2		P-2	Body	3872		66%
3		P-3	Body	4026		68%



4		P-4	Body	2926		50%
5		P-5	Body	3520		60%
6		P-6	Body	3620		61%
7		P-7	Body	3720		63%
8		P-8	Body	3620		61%

Location : At Near Bopathar Nala

1	500,600 mm dia Pipe	P-1	Body	2789	5890	47%
2		P-2	Body	3280		56%
3		P-3	Body	3280		56%
4		P-4	Body	2872		49%
5		P-5	Body	3292		56%
6		P-6	Body	2684		46%

Location : At Near Bopathar TENALI

1	500,600 mm dia Pipe	P-1	Body	2892	5890	49%
2		P-2	Body	3320		56%
3		P-3	Body	3428		58%



3. Dye Penetration Test Results :-

Sl No.	Location	Remarks on basis visual observation	Permissible Value (mm)
1	Inside Factory Premises	Satisfactory	Unsatisfactory <Satisfactory<Fair < Excellent
2	Near at Fakhial Ghat Bridge	Satisfactory	
3	Near at Chengelijan	Satisfactory	
4	Near at Borpud Near Bhady Panch	Satisfactory	
5	Near at Borpathar Nala	Satisfactory	
6	Near at Borpathar Nala	Satisfactory	

Dr. Partha Ghosh
 Professor
 Construction Engg. Deptt.
 Jadavpur University.

 22/12/21
 Dr. Partha Ghosh
 B. E. (Civil), M.E. (Structural Engg.), Ph.D (Engg.)
 Professor
 Construction Engg. Department
 Jadavpur University, Kolkata-700 106



**REPORT FOR FINAL RECOMMENDATION
FOR
CHECKING OF STRUCTURAL STABILITY AND EARTHQUAKE RESISTANCE
OF BUILDINGS AND OTHER STRUCTURES OF ASSAM GAS BASED POWER
PLANT, BOKULONI (NEAR DULIANJAN), DISTRICT. DIBRUGARH, ASSAM.**




Name of the Client : NORTH EASTERN ELECTRIC POWER CORPORATION LIMITED

Work Order No. : NEEPCO/AGBF/CWC/2021-22/T-99/549, Dated on 10.09.2021

*Prepared
By*

**Dr. Partha Ghosh
Professor**

**CONSTRUCTION ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
Kolkata-700106**


Dr. Partha Ghosh
 B. E. (Civil), M.E. (Structural Engg.), Ph.D (Engg.),
 Professor
 Construction Engg. Department
 Jadavpur University, Kolkata-700 106



Construction Engineering Department, Jadavpur University Salt-Lake Campus Kolkata-700106

CONTENTS

<u>Chapters</u>	<u>Page No.</u>
<u>Final Recommendation</u>	
1 Main Control Building	01
2 Gas Turbine Building	02 – 06
3 Steam Turbine Building	07 – 11
4 Gas Booster Station Building	12 - 14
5 Raw Water Reservoir	14 - 15
6 Cooling Water	16 - 17
7 Desilting Basin	18-18
8 Clarified Water Storage Tank	19 - 20
9 Intake Well and Pump House at Fakhail Ghat Bridge	21 - 21
10 Effluent Treatment Plant	22-23
11 425 meter Long RCC Bridge at Fakhail Ghat	24-24
12 Clariflocculator 1 & 2	25-25
13 Aerator	26 - 27
14 DM Storage Tank	28 - 29
15 Cooling Water Pump House	30 - 31
16 Air Compressor House	32-33
17 10 Km Long Raw Water Pipeline at Fakhail Ghat	34-34



Final Recommendations: -

1.Main Control Room Building: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	1 to 27 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1, all the values are lie down in between Very Low C1 to Medium C3
2	Ultrasonic Pulse Velocity (m./Sec)	Max – 5466 Min -1509	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	Max – 93% Min -25%	Most of the values are above 50% of desired industrial velocity except 5-6 points

<u>SL No.</u>	<u>Type of Condition</u>	<u>Remarks</u>	<u>Recommendations</u>
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition except a few non-structural deteriorations.	<ol style="list-style-type: none"> For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied. Roof areas are covered with Tar felt. For long term sustainability of the roof the area should be repair with advance roof treatment techniques (*9.) Drainage metal pipe should be replaced with CPVC or UPVC pipes better sustainability of the structural components. Broken window glasses should be replaced. Toilet area slab portions which are effected with seepage and leaking should be repair with High Strength cementitious patching Mortar (BASF-Master Emaco 488/FOSROC- Rendroc HBS) along with water proofing agent (BASF- Master Seal for wet Wash Room range)/(FOSROC- Brushbond Range)



Final Recommendations: -

2. Gas Turbine Building: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	1 to 25 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table- 1, all the values are lie down in between Very Low C1 to Low C2
2	Ultrasonic Pulse Velocity (m./Sec)	Max – 4897 Min -2330	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	Max – 83% Min -40%	Most of the values are above 50% of desired industrial velocity except 4-5 points
4	Average Surface Compressive Strength through Rebound Hammer (MPa)	GTF-01-43.33 GTF-02-39.04 GTF-03-34.58 GTF-04-35.27 GTF-05-35.78 GTF-06-31.06 GT Roof -24.29	All Six No Foundational concrete have strength > 30 MPa except roof portion it is >20 MPa
5	Average Ultrasonic Pulse Velocity (m./Sec)	GTF-01-3.272 GTF-02-3.817 GTF-03-3.537 GTF-04-3.263 GTF-05-3.213 GTF-06-3.070 GT Roof -3.341	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
6	Average Electrical Resistivity ($\Omega\text{-cm}$)	GTF-01->20000 GTF-02->20000 GTF-03->20000 GTF-04->20000 GTF-05->20000 GTF-06->20000 GT Roof ->20000	Negligible Negligible Negligible Negligible Negligible Negligible Negligible



Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (µm)	Temperature (°C)	CF Plus	Comment
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3 (for RCC foundation)				
2	Building Name - Gas Turbine Building								
i)	Location: Gas Turbine Generator-1								
	Starting Diesel Engine (At Machine)	2.33	31.86	1.00	Good	5.70	65.6	10	Satisfactory
	Starting Diesel Engine (At Foundation)	1.23	0.48	0.28	OK	3.00	26.3	0	Good
	Generator (At Machine)	1.36	4.83	1.71	Good	6.15	27.5	2	Good
	Generator (At Foundation)	0.18	0.00	0.24	OK	2.91	27.9	0	Good
	Gas Turbine (At Machine)	6.21	27.52	4.00	Satisfactory	5.97	66.6	7	Satisfactory
	Gas Turbine (At Foundation)	0.17	0.00	0.25	OK	3.50	29.9	0	Good
ii)	Location: Gas Turbine Generator-2								
	Starting Diesel Engine (At Machine)	0.91	5.87	1.37	Good	4.49	61.8	6	Satisfactory
	Starting Diesel Engine (At Foundation)	0.28	0.00	0.25	OK	3.22	30.0	0	Good
	Generator (At Machine)	1.67	2.87	1.50	Good	4.79	26.0	1	Good
	Generator (At Foundation)	0.28	0.00	0.32	OK	3.64	28.3	0	Good
	Reduction Gear (At Machine)	1.46	5.14	1.40	Good	5.17	60.7	2	Good
	Reduction Gear (At Foundation)	0.28	2.43	0.28	OK	3.62	24.9	1	Good
	Gas Turbine (At Machine)	5.29	14.50	2.91	Satisfactory	6.72	88.4	5	Good
	Gas Turbine (At Foundation)	0.36	1.08	0.28	OK	3.81	28.7	0	Good



iii)	Location: Gas Turbine Generator-3								
	Starting Diesel Engine (At Machine)	0.89	9.54	1.18	Good	4.65	66.6	6	Satisfactory
	Starting Diesel Engine (At Foundation)	0.93	0.28	0.30	OK	3.55	26.4	7	Satisfactory
	Generator (At Machine)	2.64	7.65	0.78	Good	3.58	25.9	2	Good
	Generator (At Foundation)	0.45	0.00	0.35	OK	3.64	28.8	0	Good
	Reduction Gear (At Machine)	2.05	13.20	1.74	Good	6.31	65.3	4	Good
	Reduction Gear (At Foundation)	0.69	0.54	0.31	OK	2.82	24.4	0	Good
	Axial Compressor (At Machine)	8.53	18.62	9.43	Unsatisfactory	19.10	29.5	6	Satisfactory
	Axial Compressor (At Foundation)	0.16	0.00	0.28	OK	3.76	24.0	0	Good
	Gas Turbine (At Machine)	6.19	20.16	3.59	Satisfactory	9.67	59.3	6	Satisfactory
Gas Turbine (At Foundation)	0.19	0.59	0.25	OK	3.34	23.6	0	Good	
iv)	Location: Gas Turbine Generator-4								
	Starting Diesel Engine (At Machine)	0.96	5.18	1.53	Good	5.09	64.9	5	Satisfactory
	Starting Diesel Engine (At Foundation)	0.61	0.42	0.25	OK	2.96	24.9	0	Good
	Generator (At Machine)	2.14	3.91	0.80	Good	3.67	27.1	1	Good
	Generator (At Foundation)	0.50	0.00	0.29	OK	2.82	28.1	0	Good
	Reduction Gear (At Machine)	1.23	4.05	1.27	Good	4.90	63.3	2	Good
	Reduction Gear (At Foundation)	0.31	1.24	0.29	OK	3.09	26.3	0	Good
Axial Compressor (At Machine)	5.48	26.31	1.99	Satisfactory	4.95	30.2	7	Satisfactory	



v)	Axial Compressor (At Foundation)	0.32	5.35	0.27	OK	3.15	25.3	3	Good	
	Gas Turbine (At Machine)	5.36	19.66	3.09	Satisfactory	6.07	64.8	6	Satisfactory	
	Gas Turbine (At Foundation)	0.21	0.39	0.26	OK	3.73	22.5	0	Good	
	Location: Gas Turbine Generator-5									
	Starting Diesel Engine (At Machine)	2.01	9.06	1.41	Good	4.90	73.6	4	Good	
	Starting Diesel Engine (At Foundation)	0.10	0.00	0.21	OK	3.00	34.2	0	Good	
	Generator (At Machine)	3.14	1.42	2.59	Satisfactory	7.03	51.4	0	Good	
	Generator (At Foundation)	0.25	0.00	0.29	OK	3.30	26.1	0	Good	
	Reduction Gear (At Machine)	0.95	0.00	1.89	Satisfactory	6.03	55.8	0	Good	
	Reduction Gear (At Foundation)	0.18	0.00	0.52	OK	4.29	22.2	0	Good	
vi)	Excitor (At Machine)	5.39	4.31	5.51	Unsatisfactory	17.27	67.3	2	Good	
	Excitor (At Foundation)	0.21	0.00	0.60	OK	3.78	21.3	0	Good	
	Gas Turbine (At Machine)	5.30	25.82	2.21	Satisfactory	6.34	94.5	7	Satisfactory	
	Gas Turbine (At Foundation)	0.45	0.50	0.38	OK	3.76	55.4	0	Good	
	Location: Gas Turbine Generator-6									
	Starting Diesel Engine (At Machine)	1.31	5.39	1.90	Satisfactory	5.66	61.8	2	Good	
	Starting Diesel Engine (At Foundation)	0.16	0.00	0.27	OK	3.30	32.8	0	Good	
	Generator (At Machine)	3.91	0.63	3.32	Satisfactory	6.84	49.1	0	Good	
	Generator (At Foundation)	0.25	0.00	0.43	OK	3.68	30.1	0	Good	
	Excitor (At Machine)	7.17	5.50	10.41	Unsatisfactory	30.65	65.3	2	Good	



Excitor (At Foundation)	0.34	0.00	0.97	OK	4.29	24.6	0	Good
Gas Turbine (At Machine)	3.10	11.73	2.25	Satisfactory	7.38	78.3	3	Good
Gas Turbine (At Foundation)	0.36	0.00	0.42	OK	3.99	32.3	0	Good

SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition except a few non-structural deteriorations.	<ol style="list-style-type: none"> 1. For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied. 2. Roof areas are covered with Tar felt. For long term sustainability of the roof the area should be repair with advance roof treatment techniques (Epoxy, PU, APP, HDPE Membrane etc.) 3. If drainage metal pipe should be replaced with CPVC or UPVC pipes better sustainability of the structural components. 4. For protection of the structural steel members from Environmental hazards (Rain, Dust, Heat, UV Rays) broken window glasses should be replaced with new one. 5. Proper re plastering is required for future stability of the structure.



Final Recommendations: -

3.Steam Turbine Building: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	1 to 25 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1 all the values are lie down in between Very Low C1 to Low C2
2	Ultrasonic Pulse Velocity (m./Sec)	Max – 4728 Min -3204	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	Max – 80% Min -54%	Most of the values are above 50% of desired industrial velocity
4	Average Surface Compressive Strength through Rebound Hammer (MPa)	ST TG-01- 30.44 ST TG-02- 28.90 ST TG-03- 29.05 ST Roof Slab- 31.78	TG Foundation 1 & Roof Slab average surface compressive strength is > 30 MPa TG Foundation 2 & 3 average surface compressive strength is > 25 MPa
5	Average Ultrasonic Pulse Velocity (m./Sec)	ST TG-01- 2.788 ST TG-02- 3.528 ST TG-03- 3.508 ST Roof Slab- 3.197	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good except TG-01
6	Average Electrical Resistivity ($\Omega\text{-cm}$)	ST TG-01- >20000 ST TG-02- >20000 ST TG-03- >20000 ST Roof Slab- >20000	Negligible Negligible Negligible Negligible



7.	Average Depth of Carbonation	ST TG-01- 20 ST TG-02- 15 ST TG-03- 30	Low Low Low
8	In-Situ Compressive Strength (MPa)	ST-1 FC-1 = 43.59 ST-2 FC-2 = 43.15 ST-3 FC-3 = 41.30 ST-3 C-1 = 39.52	More Than 85 % of Designated Grade M25
9	Modulus of Elasticity of Concrete (GPa)	ST TG-01- 33.01 ST TG-02- 32.84 ST TG-03- 31.43	OK OK OK
10	Chloride Content of Concrete (%)	ST TG-01- 0.32 ST TG-02- 0.30 ST TG-03- 0.29	OK OK OK
11	pH Value of concrete	ST TG-01- 11.1 ST TG-02- 11.4 ST TG-03- 11.3	High High High
12	Microstructural Studies	1.Dense Paste & Matrix is Shown SEM Images 2. High Intensity peaks of Calcium and Silica indicates towards a Strong C-S-H Gel. 3. Alkali content are not exceeding the permissible limit	OK



Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (µm)	Temperature (°C)	CF Plus	Comment
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3(for RCC foundation)				
1	Building Name - Steam Turbine Building								
i)	Location: Stream Turbine Generator-1								
	At Exciter Machine	0.97	0.61	1.55	Good	4.20	46.9	0	Good
	At Exciter Foundation	0.19	0.00	0.38	OK	4.09	33.8	0	Good
	At Bearing Machine	0.75	0.00	1.47	Good	5.16	48.1	0	Good
	At Bearing Foundation	0.15	0.00	0.30	OK	3.39	37.1	0	Good
	At Generator Machine	2.57	0.95	1.07	Good	3.99	44.8	0	Good
	At Generator Foundation	0.31	0.00	0.40	OK	3.05	37.1	0	Good
	At Turbine Machine	1.89	14.93	1.72	Good	5.40	40.3	4	Good
	At Turbine Foundation	0.48	0.00	0.36	OK	3.13	36.4	0	Good
	At Condenser Machine	0.30	0.43	0.54	Good	3.61	35.1	0	Good
	At Condenser Foundation	0.06	0.00	0.21	OK	3.04	31.2	0	Good
ii)	Location: Stream Turbine Generator-2								
	At Exciter Machine	8.18	2.45	4.20	Satisfactory	7.49	52.9	1	Good
	At Exciter Foundation	1.06	0.00	1.64	OK	5.55	34.5	0	Good
	At Bearing Machine	2.03	0.00	2.54	Satisfactory	5.87	50.9	0	Good
	At Bearing Foundation	0.54	0.00	0.70	OK	3.58	37.4	0	Good
	At Generator Machine	1.53	0.41	2.09	Satisfactory	4.94	45.5	0	Good



iii)	At Generator Foundation	0.79	0.00	1.04	OK	3.85	33.0	0	Good		
	At Turbine Machine	3.31	9.08	2.56	Satisfactory	6.47	41.5	3	Good		
	At Turbine Foundation	0.34	0.00	0.43	OK	3.68	37.1	0	Good		
	At Condenser Machine	0.17	0.56	0.23	Good	3.35	37.1	0	Good		
	At Condenser Foundation	0.07	0.00	0.20	OK	2.99	33.7	0	Good		
	Location: Stream Turbine Generator-3										
	At Exciter Machine	0.79	1.77	1.31	Good	4.87	58.5	0	Good		
	At Exciter Foundation	0.35	0.00	0.67	OK	3.64	33.1	0	Good		
	At Bearing Machine	0.32	0.00	0.72	Good	3.67	52.0	0	Good		
	At Bearing Foundation	0.19	0.00	0.45	OK	3.44	35.3	0	Good		
	At Generator Machine	2.92	0.91	2.05	Satisfactory	5.06	45.9	0	Good		
iv)	At Generator Foundation	0.53	0.00	0.70	OK	4.08	39.6	0	Good		
	At Turbine Machine	0.94	8.37	1.22	Good	4.73	37.2	2	Good		
	At Turbine Foundation	0.20	0.00	0.32	OK	3.47	38.0	0	Good		
	At Condenser Machine	0.33	1.17	0.32	Good	2.97	33.8	0	Good		
	At Condenser Foundation	0.08	0.00	0.16	OK	1.91	29.8	0	Good		
	Location: Boiler Feed Pump - 1B										
	At Machine	1.63	0.73	2.59	Satisfactory	10.31	28.6	0	Good		
	At Foundation	0.09	0.00	0.24	OK	2.90	26.2	0	Good		
	v)	Location: Boiler Feed Pump - 2A									
		At Machine	1.35	0.53	2.77	Satisfactory	8.91	28.1	0	Good	
		At Foundation	0.07	0.00	0.24	OK	3.33	24.4	0	Good	
vi)	Location: Boiler Feed Pump - 3B										
	At Machine	1.97	0.46	2.51	Satisfactory	6.75	23.6	0	Good		
	At Foundation	0.15	0.00	0.39	OK	3.28	19.6	0	Good		



SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, Partially Destructive Test Results & visual observation the overall structure is not in healthy Condition. Some Major critical repair also required.	<ol style="list-style-type: none"> 1. For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied. 2. Roof areas are covered with Tar felt. For long term sustainability of the roof the area should be repair with advance roof treatment techniques (Epoxy, PU, APP, HDPE Membrane etc.) 3. Metal pipe should be replaced with CPVC or UPVC alternatives for better sustainability of the structural components. 4. For protection of the structural steel members from Environmental hazards (Rain, Dust, Heat, UV Rays) broken window glasses should be replaced with new one. 5. TG Foundation -3 Column which is having spalling of concrete should be repair with Cementitious Pressure grouting (BASF-Master Flow Range/ FOSROC-Conbextra GP Range) or Low viscous Epoxy injection Grouting(BASF-Master Flow Range/ FOSROC-Conbextra EP Range for Cracks <10 mm) after that delaminated concrete surface should be repair with should be repair with High Strength cementitious patching Mortar (BASF-Master Emaco 488/FOSROC- Rendroc HBS) 6. Use carbon fiber strip (FOSROC NitoPlate Crackfix with Conbextra EP-10) to stretch the wall cracks and then replaster the wall. 7. All wall need to be replastering. 8. Provide additional plate of 8 mm thick to restrengthen of the damages steel girder with the help of welding and then provide epoxy painting. 9. Use FOSROCK/BASF damp proofing compound while repairing the concrete portion.



Final Recommendations: -

4. Gas Booster Station Building: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	1 to 25 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1 all the values are lie down in between Very Low C1 to Low C2
2	Ultrasonic Pulse Velocity (m./Sec)	Max – 4529 Min -3028	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	Max – 77% Min -51%	Most of the values are above 50% of desired industrial velocity
4	Average Surface Compressive Strength through Rebound Hammer (MPa)	GBS-01-34.50 GBS-02-33.33 GBS-03-34.55 GBS-04-33.33	GBS Foundation average surface compressive strength is > 30 MPa
5	Average Ultrasonic Pulse Velocity (m./Sec)	GBS-01-2.926 GBS-02-2.895 GBS-03-2.525 GBS-04-3.202	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Doubtful except GBS-04 which in terms of GOOD
6	Average Electrical Resistivity ($\Omega\text{-cm}$)	GBS-01- > 20000 GBS-02-> 20000 GBS-03- > 20000 GBS-04- > 20000	Negligible Negligible Negligible Negligible



7. Vibration test results

Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (μm)	Temperature (°C)	CF Plus	Comment	
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3(for RCC foundation)					
4	Building : Gas Booster Station									
	i)	Location : Gas Compressor -01								
		At Engine	10.84	1.11	4.66	Unsatisfactory	12.49	79.6	2	Good
		At Engine Foundation	0.42	0.00	0.70	OK	4.90	25.0	0	Good
		At Compressor Machine	5.96	43.06	7.95	Unsatisfactory	41.68	90.2	13	Unsatisfactory
	At Compressor Foundation	0.29	1.81	0.52	OK	4.76	27.5	7	Satisfactory	
	ii)	Location : Gas Compressor -02								
		At Engine	10.16	0.81	5.43	Unsatisfactory	25.74	81.1	0	Good
		At Engine Foundation	0.32	0.00	0.41	OK	4.24	24.0	0	Good
		At Compressor Machine	5.24	23.68	7.49	Unsatisfactory	29.80	92.1	10	Satisfactory
	At Compressor Foundation	0.22	0.00	0.63	OK	6.22	28.0	0	Good	
	iii)	Location : Gas Compressor -04								
		At Engine	8.12	1.10	4.83	Unsatisfactory	22.23	79.5	1	Good
		At Engine Foundation	0.30	0.00	0.41	OK	4.38	22.9	0	Good
		At Compressor Machine	5.51	8.57	7.34	Unsatisfactory	35.87	75.4	9	Satisfactory
	At Compressor Foundation	0.22	0.00	0.44	OK	4.33	26.9	0	Good	



SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	<p>1. For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied.</p> <p>2. Condition is good but periodically maintenance required.</p>

Final Recommendations: -

5.Raw Water Reservoir: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Average Surface Compressive Strength through Rebound Hammer (MPa)	38.44	According to the clause 7.1.5 of IS 516 (Part-5/Sec-4) 2020 The corrected average surface compressive strength is 19.22 MPa
2	Average Ultrasonic Pulse Velocity (m./Sec)	3.833	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
3	Average Electrical Resistivity (Ω -cm)	>20000	Negligible
4	Average Depth of Carbonation (mm)	40	High
5	Average In-Situ Compressive Strength (MPa)	41.37	More Than 85 % of Designated Grade M25
6	Average Modulus of Elasticity of Concrete (GPa)	32.15	OK
10	Average Chloride Content of Concrete (%)	0.28	OK
11	Average pH Value of concrete	9.35	Moderate



12	Microstructural Studies	1. Calcite formation is Shown SEM Images 2. High Intensity peaks of Calcium and Silica indicates towards a Strong C-S-H Gel 3. apart from this Carbon Peak also obtained which indicates towards carbonation.	Remedial Measures is required for carbonation mitigation
----	-------------------------	---	--

SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, Partially Destructive Tests & visual observation the overall structure is not sound condition. Major Repair and re-strengthening required with proper repair methodology.	<ol style="list-style-type: none"> 1. Reduce the hydrostatic pressure or if possible empty the whole reservoir and go for a repair job. 2.A) Prop & support the structural member to relieve it of stress and strain before repairing. B) Removal of existing surface plaster shall be done properly. C) Chipping unsound/weak concrete material shall be done. D) Removing concrete all around embedded rusted reinforcement shall be done properly 3. Expose the embedded reinforcement. 4. Apply the Rust Removing Agent (SIKA-Rust OFF/FOSROC-Rebanklenss RR), to the corroded reinforcement. 5. After that Apply Protective coating (Zinc Rich Primer- BASF-Master Emaco P130 or FOSROC-Nitozinc Primer) to the reinforcement. 6. Water Leakage cracks should heal with PU grout (FOSROC-Nitofill WS60 or BASF- Master ROC) 7. Extra Peripheral reinforcement should be added. 8. Jacket the wall with micro concrete (BASF-Master Emaco Range or FOSROC- Rendroc RG) 9. After the DE shuttering cure the concrete wall in a proper way. 10. Appl plaster in the inside ad out side portion with water proofing compound(BASF/FOSROC)



Final Recommendations: -

6.Cooling Tower: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Average Surface Compressive Strength through Rebound Hammer (MPa)	38.92	According to the clause 7.1.5 of IS 516 (Part-5/Sec-4) 2020 The corrected average surface compressive strength is 19.46 MPa
2	Average Ultrasonic Pulse Velocity (m./Sec)	4.049	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good to excellent
3	Average Electrical Resistivity (Ω -cm)	>20000	Negligible
4	Average Depth of Carbonation (mm)	42.37	High
5	Average In-Situ Compressive Strength (MPa)	40.62	More Than 85 % of Designated Grade M25
6	Average Modulus of Elasticity of Concrete (GPa)	31.76	OK
10	Average Chloride Content of Concrete (%)	0.28	OK
11	Average pH Value of concrete	8.75	Low
12	Microstructural Studies	1. Calcium leaching observed in SEM Images 2. Alkali Silica Gel Barrier clear shown the nature of the hygroscopic gel. 3. Calcite formation also shown in the SEM Images	Remedial measures are required for carbonation, alkali silica reaction, calcium leaching mitigation



SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, Partially Destructive Tests & visual observation the overall structure is not sound condition. Major Repair and re-strengthening required with proper repair methodology.	<p>A) Prop & support the structural member to relieve it of stress and strain before repairing.</p> <p>B) Removal of existing surface plaster shall be done properly.</p> <p>C) Chipping unsound/weak concrete material shall be done.</p> <p>D) Removing concrete all around embedded rusted reinforcement shall be done properly.</p> <p>E) Removing and cleaning reinforcement of rust (Fosroc-Rebaktenss RR/SIKA RUST OFF) from its surface to give it a shining bright metal shall be done properly. Extra Protection to the reinforcement (Fosroc-Nitozinc Primer/ BASF-Master Emaco P130)</p> <p>F) Sealing the cracked or honeycombed concrete with injection grouting (Fosroc-Conbextra EP10/ EP10M or Master Flow Range) shall be done properly.</p> <p>G) Provide Reinforcement at structural peripherals.</p> <p>H) Providing and inserting mild steel shear keys of 8 mm dia shall be done properly.</p> <p>I) Cleaning of lightly sticking materials and foreign matter from the exposed concrete surface and steel reinforcement by suitable means shall be done properly.</p> <p>J) Additional reinforcement required shall be tied with required overlaps or welded.</p> <p>K) Apply Passivating & bonding coat(Fosroc-Nitobond/BASF-MasterBrace) over the cleaned reinforcement.</p> <p>L) Apply bond coat(Fosroc-Nitobond/ BASF-MasterBrace) on the cleaned concrete substrate.</p> <p>M) Erect pre-fabricated watertight shuttering, if required, while the bond coat is still tacky to Receive the self-compacting free flowing shotcrete technique (Fosroc-Rendroc SP40/BASF-MasterRoc Range)</p> <p>N) Prepare self-compacting, free flowing shotcrete technique (Fosroc-Rendroc SP40/BASF-MasterRoc Range) simultaneously so as to have a uniform consistency and texture in a mechanical concrete mixer by adding a specified proportion of water in the pre-weighted dry mix of pre-batched, pre-packaged, single component shotcrete.</p> <p>O) To Mitigate Alkali-Silica reaction use Lithium Nitrate (LiNO_3) in sprayed concrete mix.</p> <p>P) Use Silane base coating to mitigate the alkali silica gel reaction.</p> <p>Q)Anti-Carbonation Coating (BASF-Master Protect 300/FOSROC-Dekguard Range)</p>



Final Recommendations: -

7.Desilting Basins: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Average Surface Compressive Strength through Rebound Hammer (MPa)	30-40 MPa	average surface compressive strength is > 30 MPa
2	Average Ultrasonic Pulse Velocity (m./Sec)	3.5-4.5	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good

<u>SL No.</u>	<u>Type of Condition</u>	<u>Remarks</u>	<u>Recommendations</u>
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	1. Condition is good but periodically maintenance required.



Final Recommendations: -

8. Clarified Water Storage Tank: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Average Surface Compressive Strength through Rebound Hammer (MPa)	37.20	>M30
2	Average Ultrasonic Pulse Velocity (m./Sec)	3.5-4.5	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
3	Average Half Cell Potential Value (-mV)	>-350	High (There is a > 90% probability that reinforcing steel corrosion is occurring in that area at time of measurement.)
4	Average Electrical Resistivity (Ω -cm)	>20000	Negligible
5	Average Depth of Carbonation (mm)	22.80	Low
6	Average In-Situ Compressive Strength (MPa)	44.18	More than 85 % of designated Grade M25
7	Average Modulus of Elasticity of Concrete (GPa)	33.21	OK
8	Average Chloride Content of Concrete (%)	0.25	OK
9	Average pH Value of concrete	11.14	High
10	Microstructural Studies	1. High Intensity peaks of Calcium and Silica indicates towards a Strong C-S-H Gel	OK



SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, Partially Destructive Tests & visual observation the overall structure is not sound condition. Major Repair and re-strengthening required with proper repair methodology.	<ol style="list-style-type: none"> 1. Reduce the hydrostatic pressure or if possible empty the whole reservoir and go for a repair job. 2.A) Prop & support the structural member to relieve it of stress and strain before repairing. B) Removal of existing surface plaster shall be done properly. C) Chipping unsound/weak concrete material shall be done. D) Removing concrete all around embedded rusted reinforcement shall be done properly 3. Expose the embedded reinforcement. 4. Apply the Rust Removing Agent (SIKA-Rust OFF/FOSROC-Rebanklenss RR). to the corroded reinforcement. 5. After that Apply Protective coating (Zinc Rich Primer- BASF-Master Emaco P130 or FOSROC-Nitozinc Primer) to the reinforcement. 6. Water Leakage cracks should heal with PU grout (FOSROC-Nitofill WS60 or BASF- Master ROC) 7. Extra Peripheral reinforcement should be added. 8. Jacket the wall with micro concrete (BASF-Master Emaco Range or FOSROC- Rendroc RG) 9. After the DE shuttering cure the concrete wall in a proper way.



Final Recommendations: -

9.Intake Well Pump House: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	1 to 25 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1 all the values are lie down in between Very Low C1 to Low C2
2	Ultrasonic Pulse Velocity (m./Sec)	Max – 3720 Min -2934	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	Max – 63% Min -50%	Most of the values are above 50% of desired industrial velocity
4	Average Surface Compressive Strength through Rebound Hammer (MPa)	42.13	average surface compressive strength is > 30 MPa
5	Average Ultrasonic Pulse Velocity (m./Sec)	3.450	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
6	Average Electrical Resistivity ($\Omega\text{-cm}$)	>20000	Negligible

<u>SL No.</u>	<u>Type of Condition</u>	<u>Remarks</u>	<u>Recommendations</u>
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	1. For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied. 2. Periodically maintenance required for the RCC Part.



Final Recommendations: -

10.Effluent Treatment Plant: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Average Surface Compressive Strength through Rebound Hammer (MPa)	30-40 MPa	Average surface compressive strength is > 30 MPa
2	Average Ultrasonic Pulse Velocity (m./Sec)	3.5-4.5	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good



Vibration test results

Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (μm)	Temperature (°C)	CF Plus	Comment
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3(for RCC foundation)				
6	Building Name: Effluent Treatment Plant Building								
	Centrifuge PUMP - 01 (At Machine)	1.67	53.94	3.42	Satisfactory	10.55	18.7	10	Satisfactory
	Centrifuge PUMP - 01 (At Foundation)	0.11	0.00	0.28	OK	4.20	18.3	0	Good

SL No.	Type of Condition	Remarks	Recommendation
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition except some minor spalling on sludge thickener tank	<ol style="list-style-type: none"> 1. Use polymer modified mortar (FOSROC/BASF) to replaster the damaged portion 2. Use epoxy coating for corroded portion of the reinforcement.



Final Recommendations: -

11.425 Meter Long RCC Bridge at Fakhial Ghat: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Average Surface Compressive Strength through Rebound Hammer (MPa)	40-50 MPa	Average surface compressive strength is > 40 MPa
2	Average Ultrasonic Pulse Velocity (m./Sec)	3.5-4.5	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
3	Average Electrical Resistivity (Ω -cm)	>20000	Negligible
4	Average Cover Meter Measurement (mm)	65-80	Sufficient

<u>SL No.</u>	<u>Type of Condition</u>	<u>Remarks</u>	<u>Recommendation</u>
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	1. The overall condition is good but periodically maintenance required.



Final Recommendations: -

12. Clarifloculator 1 & 2: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Average Surface Compressive Strength through Rebound Hammer (MPa)	C1-36.11 C2-40.26	Average surface compressive strength is > 30 MPa
2	Average Ultrasonic Pulse Velocity (m./Sec)	C1-3.673 C2-3.626	As per IS 516 (Part 5/Sec 1): 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
3	Average Electrical Resistivity (Ω -cm)	>20000	Negligible

<u>SL No.</u>	<u>Type of Condition</u>	<u>Remarks</u>	<u>Recommendation</u>
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	<ol style="list-style-type: none"> 1. Use Polymer modified mortar (BASF/FOSROCK) for replastering 2. Overall condition is good but periodically maintenance required.



Final Recommendations: -

13.Aerator: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Average Surface Compressive Strength through Rebound Hammer (MPa)	37.86	average surface compressive strength is > 30 MPa
2	Average Ultrasonic Pulse Velocity (m./Sec)	3.883	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
3	Average Electrical Resistivity (Ω -cm)	>20000	Negligible



SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, & visual observation the overall structure is not in healthy Condition. Major repair required	<ol style="list-style-type: none"> 1. If possible, stop the aeration process. 2. A) Prop & support the structural member to relieve it of stress and strain before repairing. B) Removal of existing surface plaster shall be done properly. C) Chipping unsound/weak concrete material shall be done. D) Removing concrete all around embedded rusted reinforcement shall be done properly 3. Expose the embedded reinforcement. 4. Apply the Rust Removing Agent (SIKA-Rust OFF/FOSROC- Rebanklenss RR), to the corroded reinforcement. 5. After that Apply Protective coating (Zinc Rich Primer- BASF-Master Emaco P130 or FOSROC-Nitozinc Primer) to the reinforcement. 6. Water Leakage cracks should heal with PU grout (FOSROC-Nitofill WS60 or BASF- Master ROC) 7. Extra Peripheral reinforcement should be added. 8. Jacket the wall with micro concrete (BASF-Master Emaco Range or FOSROC- Rendroc RG) 9. After the DE shuttering cure the concrete wall in a proper way



Final Recommendations: -

14.DM STORAGE TANK 1&2: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	DM-1= 1 to 25 (μm) ^a DM-2= 1 to 25 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1 all the values are lie down in between Very Low C1 to Low C2
2	Ultrasonic Pulse Velocity (m./Sec)	DM-1 = Max – 3720 Min - 2934 DM-1 = Max – 3720 Min - 2934	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	DM-1 = Max – 84% Min – 60% DM-1 = Max – 77% Min – 58%	Most of the values are above 50% of desired industrial velocity
4	Average Surface Compressive Strength through Rebound Hammer (MPa)	DM-1 = 32.24 DM-2= 33.08	average surface compressive strength is > 30 MPa
5	Average Ultrasonic Pulse Velocity (m./Sec)	DM-1 = 3.817 DM-2= 3.713	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
6	Average Electrical Resistivity ($\Omega\text{-cm}$)	DM-1 = >20000 DM-2= >20000	Negligible Negligible



SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	<ol style="list-style-type: none">1. For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied.2. Periodically maintenance required for the RCC Part.



Final Recommendations: -

15.Cooling Water Pump House: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	1 to 25 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1 all the values are lie down in between Very Low C1 to Low C2
2	Ultrasonic Pulse Velocity (m./Sec)	Max – 4525 Min - 3270	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	Max =77 % Min = 56 %	Most of the values are above 50% of desired industrial velocity
4	Average Surface Compressive Strength through Rebound Hammer (MPa)	35.83	average surface compressive strength is > 30 MPa
5	Average Ultrasonic Pulse Velocity (m./Sec)	3.529	As per IS 516 (Part 5/Sec 1) : 2018, Clause 2.4.3.2.5 : Surface probing in general gives lower pulse velocity than in case of cross probing and depending on number of parameters, the difference could be of the order of about 0.5 km/s. In view of this, it is recommended that, in surface probing method the pulse velocity may be increased by 0.5 km/s, for values > 3.0 km/s. *Over all the UPV (Ultrasonic Pulse Velocity) Values are Good
6	Average Electrical Resistivity ($\Omega\text{-cm}$)	>20000	Negligible



SL No.	Type of Condition	Remarks	Recommendations
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition some minor spalling of concrete and corrosion of reinforcement	<ol style="list-style-type: none"> 1. For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied. 2. Periodically maintenance required for the RCC Part. 3. Over all condition is good



Final Recommendations: -

16. Air Compressor House: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	1 to 25 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1 all the values are lie down in between Very Low C1 to Low C2
2	Ultrasonic Pulse Velocity (m./Sec)	Max. – 4480 Min. - 3520	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	Max. =76 % Min. = 60 %	Most of the values are above 50% of desired industrial velocity

Sl No.	Name of the Structure	OV-Acceleration RMS (m/s ²)	HF-Acceleration RMS (m/s ²)	OV-Velocity RMS (mm/s)		OV-Displacement RMS (μm)	Temperature (°C)	CF Plus	Comment
				Obtained Value	Severity as per ISO 10816 (for Machine) & DIN 4150-3(for RCC foundation)				
5	Building Name : Air Compressor Building								
i)	Air Compressor - D (At Machine)	2.07	2.83	1.26	Good	7.87	48.6	5	Good
	Air Compressor - D (At Foundation)	0.18	0.00	0.25	OK	3.09	35.5	0	Good
ii)	Air Compressor - C (At Machine)	1.52	3.11	0.98	Good	4.84	48.6	7	Satisfactory
	Air Compressor - C (At Foundation)	0.52	0.32	0.43	OK	3.56	40.2	0	Good
iii)	Air Compressor - A (At Machine)	0.97	2.62	0.69	Good	4.08	46.3	6	Satisfactory
	Air Compressor - A (At Foundation)	0.42	0.00	0.36	OK	3.57	36.1	0	Good

<u>SL No.</u>	<u>Type of Condition</u>	<u>Remarks</u>	<u>Recommendations</u>



1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	<ol style="list-style-type: none">1. For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied.2. Wall should be clean with 1:3 Vinegar solution or 1:12 Muriatic Acid solution3. Repainted with Damp proofing compound.
---	---------	---	--



Final Recommendations: -

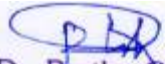
17. 10 KM Long Pipe Line: -

Test Results: -

<u>SL No.</u>	<u>Parameters</u>	<u>Value Obtained</u>	<u>Remarks</u>
1	Thickness Loss in (μm) ^a through Ultrasonic Thickness Precision Gauge	1 to 25 (μm) ^a	Corrosivity Category as per EN ISO 12944-2 1998 Table 1 all the values are lie down in between Very Low C1 to Low C2
2	Ultrasonic Pulse Velocity (m./Sec)	Max – 4204 Min - 2420	Industrial Velocity for Low Carbon Steel as per EN ISO – 5890 (m./Sec)
3	Ultrasonic Flaw Detection with Velocity intensity (%)	Max =71 % Min = 41 %	Most of the values are above 50% of desired industrial velocity except 5-6 points
4	Dye Penetration Test	Satisfactory	OK

<u>SL No.</u>	<u>Type of Condition</u>	<u>Remarks</u>	<u>Recommendation</u>
1	Working	Based on the NDT Test Results, & visual observation the overall structure is in healthy Condition	1. For future sustainability of the structural steel members triple protective coating (Primer, Epoxy, Polyurethane) Paint (Berger/Asian Paints) system should be applied.

Dr. Partha Ghosh
Professor

 22/12/21
Dr. Partha Ghosh
B. E. (Civil), M.E. (Structural Engg.), Ph.D (Engg.),
Professor
Construction Engg. Department
Jadavpur University, Kolkata-700 106



Construction Engineering Department, Jadavpur University Salt-Lake Campus Kolkata-700106



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम) पंजीकृत कार्यालय: इंदिरा नगर, अरुणा
Oil India Limited

(A Government of India Enterprise) Registered Office: Indira Nagar, Arunachal Pradesh

प्लॉट नं. 19, सेक्टर 16-ए, नोएडा-201 301 उत्तर प्रदेश

Plot No. : 19, Sector 16-A, Noida-201 301, Uttar Pradesh

दूरभाष / Telephone : 0120-2419000 फैक्स / Fax : 0120-2488310

CIN : L11101AS1959GOI001148 ई-मेल / E-mail : oilindia@oilindia.in, वेबसाईट / Website : www.oil-india.com

संदर्भ नं./Ref. No.:DO:OIL:02/758

दिनांक / Date: 23.02.2024

Sri Ranendra Sarma
Director (Technical), AGBPS
NEEPCO LIMITED

Sub: Comfort Letter - Natural Gas Availability for NEEPCO's Bokuloni Power Plant

Ref: NEEPCO/D(T)/AGBPP-1/2023-24/76 dtd 25.01.2024

Sir,

- 1.0 In response to your request, we hereby confirm the availability of Natural Gas in the region for supply at the rate of 1.4 MMSCMD for the next 15 years.
- 2.0 This continuation of gas supply is contingent upon:
 - 2.1 The continuation of the existing gas allocation by Ministry of Petroleum and Natural Gas (MoP&NG).
 - 2.2 Adherence to the guidelines issued by the Govt. of India/MoP&NG from time to time regarding Domestic natural gas, in terms of future gas production from blocks awarded under various regimes.
 - 2.3 The mutual agreement and execution of a new Gas Sale and Purchase Agreement (GSPA) between NEEPCO Ltd. and Oil India Limited, after expiry of the existing GSPA.

Thank you.

Yours sincerely,
FOR OIL INDIA LIMITED

(Pankaj Kumar Goswami)
Director Operations

Date: September 8, 2023
Ref.: MTD/XA-F999

North Eastern Electric Power Corporation Ltd.
(A Government of India Enterprise)
Assam Gas Based Power Project
Bokuloni, Dist, Dibrugarh, Assam, PIN 786-191

Kind Attn: Mr. Bhupen Goswami / ED (T) & HOP

Subject: Life Extension of Gas Turbines at NEEPCO Assam Power Station

Dear Sir,


With reference to the captioned subject, we are pleased to submit you the following letter as per the attached.

Item	Title	Ref. No.
1	Life Extension of Gas Turbines at NEEPCO Assam Power Station	Ref.: TGSC23-0012

If you have any questions to the above, please do not hesitate to contact us.

Thank you for your kind attention to the above.

Very truly yours,
MITSUBISHI CORPORATION



Arihiro Nakamura
General Manager
Infrastructure Projects Dept.

Date: September 5th, 2023
Ref.: TGSC23-0012

North Eastern Electric Power Corporation Ltd.
(A Government of India Enterprise)
Assam Gas Based Power Project
Bokuloni, Dist, Dibrugarh, Assam, PIN – 786-191

Kind Attn: Mr. Bhupen Goswami / ED (T) & HOP

Subject: Life Extension of Gas Turbines at NEEPCO Assam Power Station

Dear Sir,

With reference to the captioned subject, we (Mitsubishi Heavy Industries, Ltd.) recognize that Gas Turbines which installed at NEEPCO Assam Power Station as Original Equipment Manufacturer (OEM) may be able to life extension by 15 years if NEEPCO Assam Power Station follows the guidance of the OEM, perform proper maintenance, and replace parts.

Very truly yours,

K. Hirai

Kozo Hirai / Engineering Manager
Takasago Service Engineering Department
GTCC Business Division
Energy Systems
Mitsubishi Heavy Industries, Ltd.

To,
 Sri Bhupendra Goswami,
 ED (T) & Head of Plant
 AGBPS, NEEPCO Ltd,
 PO: Bokuloni Chariali, Dibrugarh,
 Assam

Date 05.09.2023

Ref: 1) Your letter NEEPCO/AGBPS/HOP/2023-24/W-8(A)/132 dated 25/07/2023.

2) Our Letter Dtd 26.08.2023

3) Your e-mail Dtd 04.09.2023

Subject: Life Extension of equipment installed at AGBPS.

Dear Sir,

This has reference to your e-mail Dtd 04.09.2023 on the subject. We would like to inform that by following the approach and carrying out the study/activities mentioned in our letter dated 26th-Aug-2023, it is possible to extend the life of the power plant equipment (gas turbine generator & its support systems) to another 15 years.

Please find below a gist of the activities that are envisaged during this assessment study:

- Physical condition of the components/ systems
- Performance of the components / systems
- Life cycle support availability / obsolesce considering next 15 years operation

Thanking you,



(Madhusudan)

మధుసూదన్ - మధుసూదన్
 MADHUSUDAN

अपर महाप्रबंधक / गैस टरबाईन अभियांत्रिकी एवं प्रौद्योगिकी
 Adtl. General Manager / Gas Turbine Engineering & Technology
 बी.एच.ई.एल.-एचपीईपी, हैदराबाद-32, BHEL- HPEP, HYD-32

CC:

- 1) Mr. Kolusu Venkatasyamkumar, BGGTS
- 2) Mr. Anshu Bhatnagar, GM, SSBG (R&M Thermal), BHEL



Bharat Heavy Electricals Limited-HPEP
(A Govt. of India Undertaking)
Ramachandrapuram - Hyderabad - 502032
Dept. : Turbine & Compressors Engineering



Date 12.09.2023

To,
Sri Bhupendra Goswami,
ED(T) & Head of Plant,
AGBPS, NEEPCO Ltd,
PO: Bokuloni Chariali, Dibrugarh,
Assam.

Ref: 1) Your letter NEEPCO/AGBPS/HOP/2023-24/W-8(A)/243 dated 25/07/2023.
2) Your e-mail Dtd 04.09.2023

Subject: Life extension of Steam Turbines installed at AGBPS (NEEPCO)

Dear Sir,

This has reference to your e-mail dated 04.09.2023 on the subject. We would like to inform that by carrying out an assessment study and retrofitting of steam turbine, it is possible to extend the life of the power plant equipments (Steam turbine generator & its support systems) to another 15 years.

Please find below a list of the activities that are envisaged during this assessment study:

- Physical condition of the components/systems
- Performance of the components/systems
- Life cycle support availability/obsolesce considering next 15 years operation.
- RLA study of steam turbine components

Thanking you,

(M Rajeswara Rao)

एम. राजेश्वर राव

M. RAJESWARA RAO

अवर महाप्रबन्धक / टरबाइन & कंप्रेसर्स अभियंता
Addl. General Manager / Turbines & Compressors Engg

बी.एस.ई.एल. हैदराबाद, BHEL, HYD-32

Page 1/1

Engineer - Install - Maintain

Date:22.08.2023

Reference: CEIPL/NEEPCO/2023-2024/WL-103.

To,

Station Facilities Complex
AGBP, NEEPCO LTD,
Bokuloni, Dist.: Dibrugarh
Assam: 786191 (India)
Ph No, 0374-2825216 / 392

Subject: Support letter on Life Cycle of Waukesha's Engine Model 12V275GL+ Installed at AGBPS, NEEPCO LTD.

Kind Attn: Shri. Bhupendra Goswami - CGM(E/M), HOP

Reference: Your letter Neepco/AGBPS/HOP/2023-24/W-10/131 dtd 25.07.2023

Dear Sir,

We confirm that life of below listed engines will be 15 years with effect from 22.08.2023. This life is subject to –

- Adherence to Waukesha's maintenance schedule with Waukesha genuine parts and maintenance is carried out by Waukesha trained technicians.
- Consideration that upgrades due to changing part design, technology, controls, and obsolescence as suggested by Waukesha are implemented.

Unit Name	Engine type	Engine Serial Number	Approx Engine Running Hrs likely to be on 22 nd August 2023.
Unit#1	12V275GL+	5283702943	55180
Unit#2	12V275GL+	5283702964	58280
Unit#3	12V275GL+	5283702942	55349
Unit#4	12V275GL+	3233586	24452

Clarke Energy India Pvt Ltd
Shivkiran, Plot No.160,
CTS No. 632, Lane No.4
Dahanukar Colony, Kothrud,
Pune 411038, India

Tel. +9120 30241777
india@clarke-energy.com
www.clarke-energy.com


We hope the above clarification is in line with your requirement. Kindly feel free to contact us if you have any questions.

Yours sincerely

For **CLARKE ENERGY INDIA PVT. LTD.**

Atul

Herlekar

 Digitally signed by Atul
Herlekar
Date: 2023.08.22
17:40:28 +05'30'

Authorized Signatory



DETAIL PROJECT REPORT



LIFE EXTENSION OF

291 MW ASSAM GAS BASED POWER STATION (AGBPS)

MARCH 2023

(VOLUME-III)

ANNEXURE-I
(VARIOUS SUPPORTING
DOCUMENTS)





ऑयल इंडिया लिमिटेड
 (भारत सरकार का उपक्रम)
Oil India Limited
 A Government of India Enterprise

Conquering Newer Horizons

CIN Number : 39001148
 CST Regd. Number : 18759918502
 VAT Regd. Number : 18620023278
 Service Tax Regd. Number : AAACO2352CST007
 PAN Number : AAACO2352C
 GST Regd. No. : 18AAACO2352C1ZW

325
 6/3/23

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: finmabn@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
 Attn.: Project Manager
 North Eastern Electric Power Corpn. Ltd.
 P.O. No. 3, Bakulani, Dibrugarh
 786191, Assam
 Customer VAT Regd.No.:18420117090

Customer ID : 100040
 Invoice Number : 206728
 Invoice Date : 14.02.2023
 Billing Period : 01.01.2023 to 31.01.2023
 Payment due date : 25.02.2023

TAX INVOICE

Product: Natural Gas



ACCOUNT :NEEPCO

Pricing considerations		
Gross calorific value of gas		9,109,000 Kcal/SCM
Net calorific value of gas		8,205,000 Kcal/SCM
Basic Price		8.57 USD/MMBTU
GCV Adjusted Basic Price		7.81 USD/MMBTU
Discounted Basic Price		5.14 USD/MMBTU
GCV Adjusted Discounted Basic Price		4.68 USD/MMBTU
Marketing margin		200.00 INR/MSCM
NCV Adjusted Marketing margin		164.10 INR/MSCM
Exchange Rate		82.46 USD/INR
Quantity Delivered (MSCM)	Rate (Based on GCV) (₹/MSCM)	Amount (₹)
31000.000	15,320.64	474,939,823.36
7819.312	25,544.32	199,739,020.26
Total Value		674,678,843.50
Marketing Margin		6,370,249.10
VAT @ 14.5%		98,752,118.43
Total Amount		779,801,211.03
TCS @%		0.04
Total Bill Amount		779,801,211.03
Amount Payable (Rounded to nearest Rupee)		77,98,00,861.00

Jan 2023

(Rupees Seventy-seven Crore Ninety-eight Lakh One Thousand Two Hundred Eleven Only)

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A.O.(A/R) on Telephone no. 0374-2808571

We hereby certify that my/our registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by us and that the transaction of sale covered by this tax invoice has been effected by us.

OIL INDIA LIMITED

for GENERAL MANAGER F&A
 for RESIDENT CHIEF EXECUTIVE

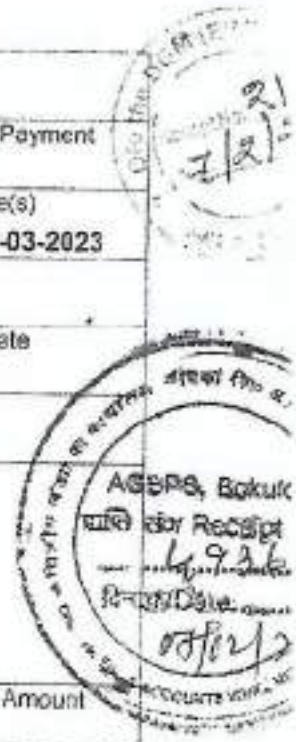
Handwritten signatures and dates:
 DAM/D. O.K.
 6/3/23
 07.03.2023
 02/03/2023

15 X
 0374-2808571

Tax Invoice

Bill No. NFE/AGCL/02/2023/11441/11 dtd. 07/02/2023

Assam Gas Company Limited Duliajan Dist Dibrugarh GSTIN/UIN: 18AABCA6977C1ZM State Name: Assam, Code: 18 CIN: U11101AS1962SGC001184 E-Mail: acctts.agcl@gmail.com		Invoice No: AGCL/IND/2301/01	Dated: 6-Feb-2023
Buyer: North Eastern Electric Power Corpn. Ltd. AGBPP P.O Bakuloni Dist- Dibrugarh Place of Supply: Bakuloni, Dibrugarh GSTIN/UIN : 18AAACN9991J3ZP State Name : Assam, Code : 18		Delivery Note	Mode/Terms of Payment
		Supplier's Ref.	Other Reference(s) Due Date: 07-03-2023
		Buyer's Order No.	Dated
		Despatch Document No.	Delivery Note Date
		Despatched through	Destination
		Terms of Delivery <p style="font-size: 2em; text-align: center;"><u>Jan 2023</u></p>	



Sl No	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-01-2023 to 31-01-2023 Volume : 39999312 Scum Rate : Rs 134.66 PER 1000 SCUM	996513				53,86,307.00
2					6 %	3,23,178.00
3					6 %	3,23,178.00
Total						₹ 60,32,663.00

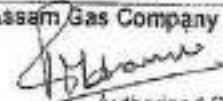
Amount Chargeable (in words) E & O E

INR Sixty Lakh Thirty Two Thousand Six Hundred Sixty Three Only

HSN/SAC	Taxable Value	Central Tax		State Tax		Total Tax Amount
		Rate	Amount	Rate	Amount	
996513	53,86,307.00	6%	3,23,178.00	6%	3,23,178.00	6,46,356.00
Total			3,23,178.00		3,23,178.00	6,46,356.00

Tax Amount (in words) : **INR Six Lakh Forty Six Thousand Three Hundred Fifty Six Only**

Company's VAT TIN : 18170012516
 Company's PAN : AABCA6977C

for Assam Gas Company Limited

 Authorized Signatory

Bill verified for amount of ₹ 60,32,663.00 (Rupees Sixty Lakh Thirty Two Thousand Six Hundred Sixty Three) only on Jan 23. Entered into bill register.

General Manager (S&M)

D.M (E/M)
 07/02/2023



ऑयल इंडिया लिमिटेड
(एनएसई एंड बीएसई)
Oil India Limited
(A Joint Venture of Indian Companies)

Conquering Newer Horizons

CIN Number : L11101AS1959GOI001148
CST Regd. Number : 18759918502
VAT Regd. Number : 18620023278
Service Tax Regd. Number : AAACO2352CST007
PAN Number : AAACO2352C
GST Regd. No. : 18AAACO2352C1ZW

230
30/3/23

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: finmain@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
Attn.: Project Manager
North Eastern Electric Power Corpn. Ltd.
P.O. No. 3, Bakulani, Dibrugarh
786191, Assam
Customer VAT Regd.No.:18420117090

Customer ID : 100040
Invoice Number : 206756
Invoice Date : 11.03.2023
Billing Period : 01.02.2023 TO 28.02.2023
Payment due date : 25.03.2023

TAX INVOICE

Product: Natural Gas



ACCOUNT : NEEPCO

Pricing considerations

Gross calorific value of gas	9,169,000 Kcal/SCM
Net calorific value of gas	8,260,000 Kcal/SCM
Basic Price	8.57 USD/MMBTU
GCV Adjusted Basic Price	7.87 USD/MMBTU
Discounted Basic Price	3.14 USD/MMBTU
GCV Adjusted Discounted Basic Price	4.71 USD/MMBTU
Marketing margin	200.00 INR/MSCM
NCV Adjusted Marketing margin	165.20 INR/MSCM
Exchange Rate	81.90 USD/INR

Feb 2023

Quantity Delivered (MSCM)	Rate (Based on GCV) (₹/MSCM)	Amount (₹)
28000.000	15,316.80	428,870,400.00
9124.752	25,537.94	233,027,380.08
Total Value		661,897,780.08
Marketing Margin		6,133,009.03
VAT @ 14.5%		96,864,471.01
Total Amount		764,895,260.12
TCS @%		0.00
Total Bill Amount		764,895,260.12
Amount Payable (Rounded to nearest Rupee)		764,895,306.00

(Rupees Seventy-six Crore Forty-eight Lakh Ninety-five Thousand Three Hundred Six Only)

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A.O.(A/R) on Telephone no. 0374-2808571

I/We hereby certify that my/our registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by me/us and that the transaction of sale covered by this tax invoice has been effected by me/us.

DAM/02
02 APR
30/3/23

D/ILE
30/03/2023

OIL INDIA LIMITED

for GENERAL MANAGER F&A
for RESIDENT CHIEF EXECUTIVE

Tax Invoice

(ORIGINAL FOR RECIPIENT)

Assam Gas Company Limited
 Duliajan
 Dist Dibrugarh
 GSTIN/UIN 18AABCA6977C1ZM
 State Name Assam Code 18
 CIN U11101AS1992SGC001184
 E-Mail acctls.agcl@gmail.com
 Buyer

Invoice No. AGCL/IND/2302/01
 Supplier's Ref

Dated 6-Mar-2023
 Other Reference(s)
 Due Date: 07-04-2023



North Eastern Electric Power Corpn. Ltd.
 AGBPI
 P O Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UIN 18AAACN9901J3ZP
 Place of Supply Assam

Feb '23

Sl No	Particulars	HSN/SAC	Quantity	Rate per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-02-2023 to 28-02-2023 Volume : 38224752 Scum Rate : Rs 134.66 PER '000 SCUM	998513			51,47,345.00
2	CGS Tax			6 %	3,08,841.00
3	SGS Tax			6 %	3,08,841.00
	Total				₹ 57,65,027.00 E & O.E

Amount Chargeable (in words)
 INR Fifty Seven Lakh Sixty Five Thousand Twenty Seven Only

Company's VAT TIN : 18170012516
 Company's PAN : AABCA6977C

for Assam Gas Company Limited
C. Sheela
 Authorised Signatory,
 Sr. Manager (F & A)
 Assam Gas Co. Ltd.
 Duliajan

This is a Computer Generated Invoice

Bill.No.NEEPCO/AGBPS/O&AWC/AGCL/2022-23/T-4(Bill) 12, Dtd. 06.03.2023

Bill Verified for an amount of Rs. 57,65,027.00(Rupees fifty seven Lakhs sixty five thousand twenty)only for the month of Feb'2023 entered in to the bill register.

Bitte
 06.03.2023

Sanjeev



ऑयल इंडिया लिमिटेड
(एनएसईएल का ब्रान्ड)
Oil India Limited
(A Government of India Enterprise)

Conquering Newer Horizons

CIN Number : L11101AS1959GOI001148
CST Regd. Number : 18759918502
VAT Regd. Number : 18620023278
Service Tax Regd. Number : AAACO2352CST007
PAN Number : AAACO2352C
GST Regd. No. : 18AAACO2352C1ZW

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: finmain@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
Attn.: Project Manager
North Eastern Electric Power Corpn. Ltd.
P.O. No. 3, Bakulani, Dibrugarh
786191, Assam
Customer VAT Regd.No.:18420117090

Customer ID : 100040
Invoice Number : 206782
Invoice Date : 12.04.2023
Billing Period : 01.03.2023 to 31.03.2023
Payment due date : 25.04.2023

TAX INVOICE

Product: Natural Gas

ACCOUNT :NEEPCO

Pricing considerations

Gross calorific value of gas
Net calorific value of gas

Basic Price

GCV Adjusted Basic Price

Discounted Basic Price

GCV Adjusted Discounted Basic Price

Marketing margin

NCV Adjusted Marketing margin

Exchange Rate



✓ 9,155,000 Kcal/SCM
✓ 8,248,000 Kcal/SCM

✓ 8.57 USD/MMBTU
✓ 7.85 USD/MMBTU
✓ 5.14 USD/MMBTU
✓ 4.71 USD/MMBTU
✓ 200.00 INR/MSCM
✓ 164.96 INR/MSCM
✓ 82.61 USD/IN

Quantity Delivered (MSCM)	Rate (Based on GCV) (₹/MSCM)	Amount (₹)
31000.000 ✓	15,426.88 01	478,206,345.00
12779.857 ✓	25,720.83 02	328,698,177.64
Total Value		7,221,925.20
Marketing Margin		11,80,98,329.86
VAT @ 14.5%		93,21,74,743.71
Total Amount		0.00
TCS @1%		93,21,74,743.71
Total Bill Amount		93,21,74,743.71
Amount Payable (Rounded to nearest Rupee)		93,21,74,743.71

(Rupees Ninety-three Crore Twenty-one Lakh Seventy-four Thousand Five Hundred Forty-three Only)

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A.O.(A/R) on Telephone no. 0374-2808571

I/We hereby certify that my/our registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by me/us and that the transaction of sale covered by this tax invoice has been effected by me/us.

06/06/23
120

DGM (E), O&A
D.M. (E) ASST
[Handwritten signatures and dates]

OIL INDIA LIMITED

for GENERAL MANAGER F&A
for RESIDENT CHIEF EXECUTIVE

Tax Invoice

Assam Gas Company Limited
 Duliajan
 Dist Dibrugarh
 GSTIN/UIN: 18AABCA6977C1ZM
 State Name: Assam, Code: 18
 CIN: U11101AS1962SGC001184
 E-Mail: aocits.agcl@gmail.com
 Buyer

Invoice No
 AGCL/IND/2303/01
 Supplier's Ref

Dated
 4-Apr-2023
 Other Reference(s)
 Due Date: 08-05-23



North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply: Bakuloni, Dibrugarh
 GSTIN/UIN : 18AAACN9991J3ZP
 Place of Supply : Assam

Sl No	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-03-2023 to 31-03-2023 Volume : 45099857 Scum Rate : Rs 134.66 PER 1000 SCUM	998513				60,73,147.00
2					6 %	3,64,389.00
3					6 %	3,64,389.00
						CGS TAX
						SGS TAX

March 2023

Total ₹ 68,01,925.00
 E. & O.E

Amount Chargeable (in words)
 INR Sixty Eight Lakh One Thousand Nine Hundred
 Twenty Five Only

Company's VAT TIN : 18170012516
 Company's PAN : AABCA6977C

for Assam Gas Company Limited
C. Shereen
 Authorized Signatory
 Sr. Manager (F & A)
 Assam Gas Co. Ltd.
 Duliajan

This is a Computer Generated Invoice

Bill No. NEEPCO/AGBPS/O&AWC/2023-24/T-4/ 01 Dtd. 05.04.2023
 Bill verified for an amount of Rs. 68,01,925.00 (Rupees Sixty-Eight Lakhs One Thousand Nine Hundred Twenty-five)
 only for March 2023. Entered into bill register.

05.04.2023
 D. M. (E/M)
 O/ide DGR (E/M)
 NWE, AGBPS.



ऑयल इंडिया लिमिटेड
(असम सरकार का प्रभुत्व)
Oil India Limited
A Government of India Enterprise

Conquering Newer Horizons

CIN Number : L11101AS1959GC01001148
CST Regd. Number : 1875991B302
VAT Regd. Number : 18620023278
Service Tax Regd. Number : AAACO2352CST007
PAN Number : AAACO2352C
GST Regd. No. : 18AAACO2352C1ZW

1005

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: fromain@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
Attn.: Project Manager
North Eastern Electric Power Corpn. Ltd.
P.O. No. 3, Bakulani, Dibrugarh
786191, Assam
Customer VAT Regd.No.:18420117090

Customer ID : 100040
Invoice Number : 206850
Invoice Date : 19.05.2023
Billing Period : 08.04.2023 TO 30.04.2023
Payment due date : 25.05.2023

April 2023

TAX INVOICE
Product: Natural Gas

DM (S) *[Signature]*
23/05/2023



ACCOUNT : NEEPCO

Material Description	Basic Price (USD/MMBTU)	GCV (Kcal/SCM)	NCV (Kcal/SCM)	Exchange Rate (USD/INR)	NG Rate (INR/MSCM)	Marketing Margin @ 200 INR/MSCM adjusted with NCV
Ngas Non-Nominated	7.92	9435	8511	82.29	24,401.34 ✓	170.22 ✓
Ngas Subsidized	3.90	9087	8184	82.29	11,572.62 ✓	163.68 ✓
Ngas Non-Subsidized	6.50	9061	8162	82.29	19,232.51 ✓	163.24 ✓

Gas Price (INR) = [(BP) X 3.968254 X GCV X FE] / 1000

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
Ngas Non-Nominated	646.533	15,776,269.18	110052.85	15,886,322.03	2,303,516.69	18,189,838.72
Ngas Subsidized	23000.000	766,169,864.42	3764640.00	269,934,504.42	39,146,503.14	309,075,007.56
Ngas Non-Subsidized	8622.536	165,833,111.55	1407542.78	167,240,654.33	24,249,894.88	191,490,549.21
Grand Total:	32,269.069	447,779,245.15	5,282,235.63	453,061,480.78	65,693,914.71	518,755,395.49
Amount payable (Rounded to nearest Rupees):						518,755,395.00

Rupees Fifty-one Crore Eighty-seven Lakh Fifty-five Thousand Three Hundred Ninety-five Only

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A.O(A/R) on Telephone no. 74-2808571

I/We hereby certify that my/our registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by me/us and that the transaction of sale covered by this tax invoice has been effected by me/us.

Bill verified for an amount of Rs. 51,87,55,395.00 (Rupees Fifty-one crore eighty-seven lakh fifty-five thousand three hundred and ninety-five) my for the period from 08-04-2023 to 30-04-2023. Entered into bill register.

[Signature]
29.05.2023

[Signature]
29/05/2023

OIL INDIA LIMITED

[Signature]

For GENERAL MANAGER F&A
For RESIDENT CHIEF EXECUTIVE

Bill NO. NEEPCO/A4BIS/DAWUC/OIL/2023-24/T-7 (bill)/04

U. Sankar - Assistant Project Manager
North Eastern Electric Power Corpn. Ltd., AGA
Kishor Bara Dibrugarh Assam India

U. Sankar (P/M)
Dy. Assistant (F&A)
Oil India Limited, Assam
Kishor Bara, Dibrugarh
Assam India

Tax Invoice

(ORIGINAL FOR RECIPIENT)

Assam Gas Company Limited
Duliajan
Dist Dibrugarh
GSTIN/UIN: 18AABCA6977C1ZM
State Name : Assam, Code : 18
CIN: U11101AS1962SGC001184
E-Mail : acctts.agcl@gmail.com

Invoice No.
AGCL/IND/2304/01
Supplier's Ref.

Dated
5-May-2023
Other Reference(s)
Due Date: 06-06-23

Buyer
North Eastern Electric Power Corpn. Ltd.
AGBPP
P.O. Bakuloni
Dist- Dibrugarh
Place of Supply : Bakuloni, Dibrugarh
GSTIN/UIN : 18AAACN9991J3ZP
Place of Supply : Assam



8/5/23

15/05/23 AGCL/IND/2304/01/AGCL/02
Dtd. 9/5/2023

Sl No	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-04-2023 to 30-04-2023 Volume : 41456161 Scum Rate : Rs 141.39 PER '000 SCUM	996513				58,61,487.00
2		CGS Tax		6 %		3,51,689.00
3		SGS Tax		6 %		3,51,689.00

April 2023

Total

₹ 65,64,865.00

Amount Chargeable (in words)
INR Sixty Five Lakh Sixty Four Thousand Eight Hundred Sixty Five Only

E & O E

Company's VAT TIN : 18170012516
Company's PAN : AABCA6977C

for Assam Gas Company Limited

C. Sharma
Authorised Signatory

This is a Computer Generated Invoice

DGM(O&TW)
For purchase

8/5/23

Bill verified on 09-05-2023
amount of ₹ 65,64,865.00 (Rupees Sixty Five Lakh Sixty Four Thousand Eight Hundred Sixty Five Only) only will be paid into bank account of NEEPSCO, Dibrugarh.

Sixty-five Lakh

09-05-2023



ऑयल इंडिया लिमिटेड
(एन सी ई डी सी)
Oil India Limited
A Government of India Enterprise

CIN Number : LI1101AS1959GOT001148
CST Regd. Number : 18759918502
VAT Regd Number : 18620023278
Service Tax Regd. Number : AAACO2352CST007
PAN Number : AAACO2352C
GST Regd. No. : 18AAACO2352C1ZW

Conquering Newer Horizons

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2809544/2800535, e-mail: flomaine@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
Attn.: Project Manager
North Eastern Electric Power Corpn. Ltd.
P.O. No. 3, Bakulani, Dibrugarh
786191, Assam
Customer VAT Regd.No.:18420117090

Customer ID : 100040
Invoice Number : 206888
Invoice Date : 12.06.2023
Billing Period : 01.05.2023 to 31.05.2023
Payment due date : 25.06.2023

May 2023

TAX INVOICE

Product: Natural Gas

ACCOUNT NEEPCO

Pricing Considerations						
Material Description	Basic Price (USD/MMBTU)	GCV (Kcal/SCM)	NCV (Kcal/SCM)	Exchange Rate (USD/INR)	NG Rate (INR)/MSCM	Marketing Margin @ 200 (INR/MSCM) adjusted with NCV
NGas Subsidized	3.90	9553	8622	82.02	12,126.17	172.44
NGas Non-Subsidized	6.50	9530.101	8600.978	82.02	20,161.84	172.02
NGas Non-Nominated	8.27	9923	8963	82.02	26,709.62	179.26

Gas Price (INR) = (JBF) X 3.968254 X GCV X FEI / 1000

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
NGas Subsidized	31000.000	375,910,932.67	5345640.00	381,256,572.67	55,282,203.04	436,538,775.71
NGas Non-Subsidized	10449.171	210,674,352.66	1797466.40	212,471,819.06	30,808,413.76	243,280,232.82
NGas Non-Nominated	646.699	17,273,081.10	115927.26	17,389,008.36	2,521,406.21	19,910,414.57
Grand Total:	42,095.870	603,858,366.43	7,259,033.66	611,117,400.09	88,612,023.01	699,729,423.09

Amount payable (Rounded to nearest Rupees):
Rupees Sixty-nine Crore Ninety-seven Lakh Twenty-nine Thousand Four Hundred Twenty-three Only
Note: Payments received after due date will be subjected to interest as applicable in case of any discrepancy please contact A.O (A/R) on Telephone no: 0374-2808571
We hereby certify that my/our registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by me/ us and that the transaction of sale covered by this tax invoice has been effected by me/ us

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
NGas Subsidized	31000.000	375911235.36	5345640.00	381256875.36	55282246.93	436539122.29
NGas Non-Subsidized	10449.171	210674476.80	1797466.40	212471819.06	30808431.10	243280359.89
NGas Non-Nominated	646.699	17273085.31	115927.26	17389012.57	2521406.82	19910419.39
GRAND TOTAL	42095.870	603858797.47	7259029.66	611117826.52	88612084.85	699729911.37

Bill No. NEEPCO/AGBPS/O&AWC/OIL/T-3(Bills)/2023-24/ o6 Dtd. 13.06.2023
Bill Verified & found correct for an amount of Rs. 69,97,29,911.00 (Rupees Sixty Nine Cores Ninety seven Lakhs Twenty Nine thousand Nine hundred eleven) only for the period from 01.05.2023 to 31.05.2023
entered into the bill register.
OIL INDIA LIMITED

[Signature]
13.06.2023
[Signature] 13/6/23
For GENERAL MANAGER F&A
For RESIDENT CHIEF EXECUTIVE

Tax Invoice

Assam Gas Company Limited
 Duliajan
 Dist Dibrugarh
 GSTIN/UID: 18AABCA9977C1ZM
 State Name : , Code :
 CIN: U11101AS1982SGC0011B4
 E-Mail : acctts.agcl@gmail.com
 Consignee (Ship to)

Invoice No. **AGCL/IND/2305/01**
 Delivery Note

Dated **7-Jun-23**
 Mode/Terms of Payment

Reference No. & Date.

Other References

Buyer's Order No.

Due Date: **08-07-23**
 Dated

Dispatch Doc No.

Delivery Note Date

Dispatched through

Destination

Terms of Delivery

DM (E)
08.06.2023
03/06/2023

03/06/2023

North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UID : 18AAACN9991J3ZP
 State Name : Assam, Code : 18

Buyer (Bill to)
 North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UID : 18AAACN9991J3ZP
 State Name : Assam, Code : 18

dttd. 05/06/2023

Bill No. NEEP/01/188PS/OxAWC/23524/T-4/03

Sl No	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-05-2023 to 31-05-2023 Volume : 42095870 Scum Rate : Rs 141.39 PER '000 SCUM	998513				59,51,935.00
					CGS TAX 6 %	3,57,116.00
					SGS TAX 6 %	3,57,116.00
Total						₹ 66,66,167.00

May 23

Amount Chargeable (in words) E & O/E

INR Sixty Six Lakh Sixty Six Thousand One Hundred Sixty Seven Only

HSN/SAC	Taxable Value	Central Tax		State Tax		Total Tax Amount
		Rate	Amount	Rate	Amount	
998513	59,51,935.00	6%	3,57,116.00	6%	3,57,116.00	7,14,232.00
Total			3,57,116.00		3,57,116.00	7,14,232.00

Tax Amount (in words) : **INR Seven Lakh Fourteen Thousand Two Hundred Thirty Two Only**

Company's VAT TIN : 18170012516
 Company's PAN : AABCA9977C

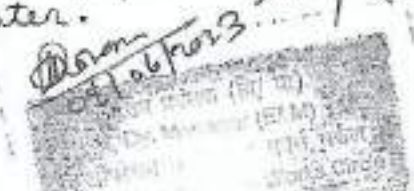
for Assam Gas Company Limited

C. Dasgupta
 Authorized Signatory
 Sr. Manager (F & A)

This is a Computer Generated Invoice

Bill verified for an amount of Rs. 66,66,167.00 (Sixty-six Lakh Sixty-six Thousand one hundred and sixty-seven) only for the month of May, 2023. Entered into bill register.

03/06/2023
 D. Dasgupta (F&A)
 Sr. Manager (F & A)





ऑयल इंडिया लिमिटेड
Oil India Limited

Conquering Newer Horizons

CIN Number : L11101AS1959GO1001148
 CST Regd. Number : 18759918502
 VAT Regd. Number : 18620023278
 Service Tax Regd. Number : AAACO2352CST007
 PAN Number : AAACO2352C
 GST Regd. No. : 18AAACO2352C1ZW

43
 13/7/23

Dullajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: finmain@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
 Attn.: Project Manager
 North Eastern Electric Power Corpn. Ltd.
 P.O. No. 3, Bakulani, Dibrugarh
 786191, Assam
 Customer VAT Regd.No.:18420117090

Customer ID : 100010
 Invoice Number : 206932
 Invoice Date : 14.07.2023
 Billing Period : 01.06.2023 to 30.06.2023
 Payment due date : 25.07.2023

TAX INVOICE

Product: Natural Gas

June 2023

ACCOUNT : NEEPCO

Pricing Considerations

Material Description	Basic Price (USD/MMBTU)	GCV (Kcal/SCM)	NCV (Kcal/SCM)	Exchange Rate (USD/INR)	NG Rate (INR/MSCM)	Marketing Margin @ 200 INR/MSCM adjusted with NCV
Ngas Subsidized	3.50	9473	8563	82.34	12,070.26	170.86
Ngas Non-Subsidized	6.50	9459.104	8331.787	82.34	20,089.71	170.64
Ngas Non-Nominated	7.58	9819	8865	82.34	24,319.06	177.30

Gas Price (INR) = (GBP) X 3.968254 X GCV X FEI / 1000

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50%)	Total Amount (INR)
Ngas Subsidized	30000.000	362,107,307.07	5125800.00	367,232,107.07	53,248,800.53	420,480,907.60
Ngas Non-Subsidized	6830.624	137,225,246.55	1155377.68	138,380,624.23	20,066,569.51	158,447,193.74
Ngas Non-Nominated	253.874	6,173,973.33	45011.86	6,218,985.19	901,752.92	7,120,738.11
Grand Total:	37,084.498	505,506,527.44	6,336,389.54	511,842,916.98	74,217,222.96	586,060,139.94

Amount payable (Rounded to nearest Rupees):

Rupees Fifty-eight Crore Sixty Lakh Sixty Thousand One Hundred Fifty Only

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A.O./A/R on Telephone no 0374-2808571

We hereby certify that my/our registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by us and that the transaction of sale covered by this tax invoice has been effected by us.

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50%)	Total Amount (INR)
Ngas subsidized	30000.000	362107800.00	5125800.00	367233600.00	53248872.00	420482472.00
Ngas Non-Subsidized	6830.624	137225255.28	1165577.68	138390832.96	20066570.78	158457503.74
Ngas Non-Nominated	253.874	6173977.04	45011.86	6218988.90	901753.39	7120742.29
Grand Total:	37084.498	505507032.32	6336389.54	511843421.86	74217296.17	586060718.00

Bill No. NEEPCO/O&AWC/OIL/T-3(bills)/2023-24/ 07 dtd 15.07.2023

Bill verified for an amount of Rs. 58,60,60,718 (Rupees Fifty-eight Crore Sixty Lakh Sixty Thousand Seven Hundred Eighteen) only for the month of June 2023. Entered into bill register.

OIL INDIA LIMITED

Butte
 15.07.2023

15/07/2023

[Signature]

For GENERAL MANAGER F&A
 For RESIDENT CHIEF EXECUTIVE

Oil India Limited (Pvt) Ltd.
 The General Manager (F&A)
 Oil & Gas Division, NEEPCO Ltd, Dibrugarh

Tax Invoice

Assam Gas Company Limited
 Duliajan
 Dist Dibrugarh
 GSTIN/UID: 18AABCA6977C12M
 State Name Code
 CIN: U11101AS1002SGC001184
 E-Mail: acctts.agcl@gmail.com
 Consignee (Ship to)

Invoice No: AAGLJINI2306/01
 Delivery Date:

Date: 06-Jul-23
 Mode/Term of Payment

Reference No. & Date

Other References

Buyer's Order No.

Due Date: 06-08-23
 Dated

Dispatch Doc No.

Delivery Note Date

Dispatched through

Destination

Terms of Delivery

North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UID : 18AAACN9991J3ZP
 State Name : Assam, Code : 18

Buyer (Bill to)
 North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UID : 18AAACN9991J3ZP
 State Name : Assam, Code : 18

Bill No: 06/2023-24/67, dtd: 06/07/2023
 NEERC/AGCL/T-4/2023-24/67

K. S. H. S.

Sl No.	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-06-2023 to 30-06-2023 Volume : 37084498 SCUM Rate : Rs 141.39 PER '000 SCUM	995513				52,43,377.00 ✓
	CGS TAX			6 %		3,14,603.00
	SGS TAX			6 %		3,14,603.00
Total						₹ 58,72,583.00

June 2023

Amount Chargeable (in words) ₹ 58,72,583.00
 E. & O.E

INR Fifty Eight Lakh Seventy Two Thousand Five Hundred Eighty Three Only

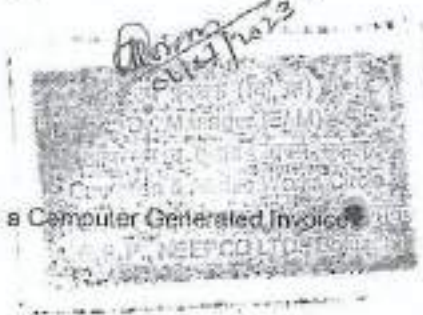
HSN/SAC	Taxable Value	Central Tax Rate	Central Tax Amount	State Tax Rate	State Tax Amount	Total Tax Amount
995513	52,43,377.00	6%	3,14,603.00	6%	3,14,603.00	6,29,206.00
Total			3,14,603.00		3,14,603.00	6,29,206.00

Tax Amount (in words) : INR Six Lakh Twenty Nine Thousand Two Hundred Six Only

Bill verified for an amount of Rs. 58,72,583.00 (Rupees Fifty Eight Lakh Seventy Two Thousand Five Hundred Eighty Three) only for the month of June 2023
 Entered into bill register.

Company's VAT TIN : 18170012516
 Company's PAN : AABCA6977C

Signature
 06.07.2023



for Assam Gas Company Limited
Signature
 Authorized Signatory
 Asstt. Manager (F & A)
 Assam Gas Co. Ltd.
 Duliajan

Do not write on this invoice
 If you have any queries
 Please contact the NEERC/AGCL/T-4/2023-24/67



ऑयल इंडिया लिमिटेड
(एनएसई एंड बीएसई)
Oil India Limited
BSE: 543251

Conquering Newer Horizons

CIN Number : L11101AS1959GOI001148
CST Regd. Number : 18759918502
VAT Regd. Number : 18620023278
Service Tax Regd. Number : AAACO2352CST007
PAN Number : AAACO2352C
GST Regd. No. : 18AAACO2352C1ZW

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: finmain@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
Attn.: Project Manager
North Eastern Electric Power Corpn. Ltd.
P.O. No. 3, Bakulani, Dibrugarh
786191, Assam
Customer VAT Regd.No.:18420117090



Customer ID : 100040
Invoice Number : 206972
Invoice Date : 12.08.2023
Billing Period : 01.07.2023 to 31.07.2023
Payment due date : 25.08.2023

TAX INVOICE

July 2023

Product: Natural Gas

ACCOUNT : NEEPCO

Pricing Considerations

Material Description	Basic Price (USD/MMBTU)	GCV (Kcal/SCM)	NCV (Kcal/SCM)	Exchange Rate (USD/INR)	NG Rate (INR)/MSCM	Marketing Margin @ 200 INR/MSCM adjusted with NCV
NGas Subsidized	3.90	9402	8198	82.23	11,583.27	163.96
NGas Non-Subsidized	6.50	9079.130	8178.007	82.23	19,256.94	163.56
NGas Non-Nominated	7.48	9458	8535	82.23	23,085.04	176.70

Gas Price (INR) = [(BP) X 3.968254 X GCV X FE] / 1000

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50%)	Total Amount (INR)
NGas Subsidized	31000.000	359,081,076.05	3082760.00	364,163,836.05	52,803,756.23	416,967,592.28
NGas Non-Subsidized	9366.993	180,379,634.71	1532065.38	181,911,700.09	26,377,196.51	208,288,896.60
NGas Non-Nominated	601.757	13,891,585.35	102719.92	13,994,305.27	2,029,174.26	16,023,479.53
Grand Total:	40,968.750	553,352,296.11	6,717,545.30	560,069,841.41	81,210,127.00	641,279,968.41

Amount payable (Rounded to nearest Rupees):

Rupees Sixty-four Crore Twelve Lakh Seventy-nine Thousand Nine Hundred Sixty-eight Only

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A.O.(A/R) on Telephone no. 0374-2808571

We hereby certify that our registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by us and that the transaction of sale covered by this tax invoice has been effected by us.

	Quantity	Basic Price	GCV	NCV	Exchange Rate	NG Rate	Marketing Margin	Total
NGas Subsidized	31000.00	35,90,81,370.00	50,82,760.00	36,41,64,130.00	5,28,03,798.85	41,69,67,928.85		
NGas Non-Subsidized	9366.993	18,03,79,622.18	15,32,065.38	18,19,11,687.56	2,63,77,194.70	20,82,88,882.25		
NGas Non-Nominated	601.757	1,38,91,584.42	1,02,719.92	1,39,84,304.34	20,29,174.13	1,60,23,478.46		
Grand Total		55,33,52,576.60	6,717,545.30	56,00,70,121.89	8,12,10,167.67	64,12,80,290.00		

Bill No. NEEPCO/AGBPS/O&AWC/OIL/T-3(Bills)2023-24/ 08 Dtd. 16.08.2023.

Bill verified for an amount of Rs. 64,12,80,290.00 (Rupees Sixty four Crore twelve lakhs eighty thousand two Hundred ninety)only for the month of July 2023. Entered into the bill register.

OIL INDIA LIMITED

Signature
16.08.2023

Signature
21/08/23

Signature

उप-महाप्रबंधक (व. / व. / व.)
Dy. General Manager (E/In)

उप-महाप्रबंधक (व. / व. / व.)
Dy. General Manager (E/In)
O & AWC, AGBPS, NEEPCO LTD., BOKULONI

For GENERAL MANAGER F&A
For RESIDENT CHIEF EXECUTIVE

Tax Invoice

Assam Gas Company Limited
 Duliajan
 Dist Dibrugarh
 GSTIN/UID: 18AABCA6977C1ZM
 State Name : , Code :
 CIN: U11101AS1962SGC001184
 E-Mail : acctts.agcl@gmail.com
 Consignee (Ship to)

North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UID : 18AAACN9991J3ZP
 State Name : Assam, Code : 18

Buyer (Bill to)
 North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UID : 18AAACN9991J3ZP
 State Name : Assam, Code : 18

Invoice No.
AGCL/IND/2307/01
 Delivery Note

Dated
3-Aug-23
 Mode/Terms of Payment

Reference No. & Date

Other References

Buyer's Order No.

Due Date: 04-09-23
 Dated

Dispatch Doc No.

Delivery Note Date

Dispatched through

Destination

Terms of Delivery



July 2023

1522
09/8/2023

Sl No.	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-07-2023 to 31-07-2023 Volume : 40968750 Scum Rate : Rs 141.39 PER '000 SCUM	996513				57,92,572.00
					CGS TAX 6 %	3,47,554.00
					SGS TAX 6 %	3,47,554.00
Total						₹ 64,87,680.00

Amount Chargeable (in words)

E. & O.E

INR Sixty Four Lakh Eighty Seven Thousand Six Hundred Eighty Only

HSN/SAC	Taxable Value	Central Tax		State Tax		Total Tax Amount
		Rate	Amount	Rate	Amount	
996513	57,92,572.00	6%	3,47,554.00	6%	3,47,554.00	6,95,108.00
Total			3,47,554.00		3,47,554.00	6,95,108.00

Tax Amount (in words) : **INR Six Lakh Ninety Five Thousand One Hundred Eight Only**

Company's VAT TIN : 18170012516
 Company's PAN : AABCA6977C

for Assam Gas Company Limited

C. Shewen
 Authorised Signatory

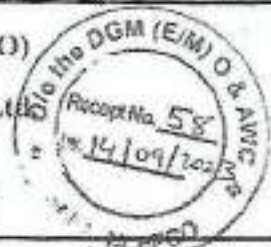
DGM (E/M) O & A/C
18/8/23



CIN Number : L11101AS1959GO1001148
 CST Regd. Number : 18759918502
 VAT Regd. Number : 18620023278
 Service Tax Regd. Number : AAACO2352CST007
 PAN Number : AAACO2352C
 GST Regd. No. : 18AAAAC02352C1ZW

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: finmain@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
 Attn.: Project Manager
 North Eastern Electric Power Corpn. Ltd
 P.O. No. 3, Bakulani, Dibrugarh
 786191, Assam
 Customer VAT Regd.No.:18420117090



Customer ID : 100040
 Invoice Number : 207077
 Invoice Date : 14.09.2023
 Billing Period : 01.08.2023 TO 31.08.2023
 Payment due date : 25.09.2023

TAX INVOICE

Product: Natural Gas

Aug 2023

ACCOUNT: NEEPCO

Pricing Considerations

Material Description	Basic Price (USD/MMBTU)	GCV (Kcal/SCM)	NCV (Kcal/SCM)	Exchange Rate (USD/INR)	NG Rate (INR/01SCM)	Marketing Margin @ 200 INR/MSCM adjusted with NCV
Ngas Subsidized	3.90	9168 ✓	8261	82.15	11,655.91	165.22
Ngas Non-Subsidized	6.50	9120.130 ✓	8219	82.15	19,325.09	164.38
Ngas Non-Nominated	7.85	9560 ✓	8623	82.15	26,164.40	172.44

Gas Price (INR) = [(BP) X 3.968254 X GCV X FE] / 1000

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
Ngas Subsidized	31000.000	36133210.00	5121820.00	36645474.00	53135942.23	419590716.23
Ngas Non-Subsidized	8944.431	172852330.02	1470288.86	174322609.88	25276778.64	199599421.52
Ngas Non-Nominated	1092.280	26721974.83	188352.76	26910327.60	3901997.50	30812325.10
Grand Total:	41036.731	560907505.41	6780461.62	567687967.03	82314755.22	650002722.00

Amount payable (Rounded to nearest Rupees):

₹ 650,00,27,22.00 (Rupees Sixty-five Crore Two Thousand Four Hundred Forty-seven Only)

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A.C.(A/R) on Telephone no. 0374-2808571

We hereby certify that reverse registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by means and that the transaction of sale covered by this tax invoice has been effected by means.

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
Ngas Subsidized	31000.000	361333210.00	5121820.00	366455030.00	53135979.35	419591009.35
Ngas Non-subsidized	8944.451	172852320.58	1470288.86	174322609.43	25276778.37	199599387.80
Ngas Non-Nominated	1092.280	26721974.83	188352.76	26910327.60	3901997.50	30812325.10
Grand Total	41036.731	560907505.41	6780461.62	567687967.03	82314755.22	650002722.00

Bill No. NEEPCO/AGBPS/O&AWC/OIL/T-3(Bills)/2023-24/ 03 Dtd. 15.09.2023

Bill verified for an amount of Rs.65,00,02,722.00 (Rupees Sixty-five Crore Two Thousand Seven Hundred Twenty-two) only for the month of August 2023. Entered into bill register.

Signature
15.09.2023

डि. महाप्रबंधक (दि./वा.)
 Dy. General Manager (E/M)
 O & AWC, AGPS, NEEPCO LTD, BOKULANI

Signature
 Dy. Manager (E/M)
 O & AWC, AGPS, NEEPCO LTD, BOKULANI

OIL INDIA LIMITED

Signature

For GENERAL MANAGER F&A
 For RESIDENT CHIEF EXECUTIVE

Tax Invoice

Assam Gas Company Limited
Duliajan
Dist Dibrugarh
GSTIN/UIN 18AABCA6977C1ZM
State Name , Code
CIN: U11101AS1962SGC001184
E-Mail : acctts agcl@gmail.com
Consignee (Ship to)

North Eastern Electric Power Corpn. Ltd.
AGBPP
P.O. Bakuloni
Dist- Dibrugarh
Place of Supply : Bakuloni, Dibrugarh
GSTIN/UIN : 18AAACN9991J3ZP
State Name : Assam, Code : 18

Buyer (Bill to)
North Eastern Electric Power Corpn. Ltd.
AGBPP
P.O. Bakuloni
Dist- Dibrugarh
Place of Supply : Bakuloni, Dibrugarh
GSTIN/UIN : 18AAACN9991J3ZP
State Name : Assam, Code : 18

Invoice No
AGCL/IND/2308/01
Delivery Note

Reference No & Date

Buyer's Order No.

Dispatch Doc No.

Dispatched through

Terms of Delivery

Dated
4-Sep-23
Mode/Terms of Payment

Other References
Due Date: 05-10-23
Dated

Delivery Note Date

Destination



dt. 05/09/2023
Pawc/T-4/23-24/06
Bill No. NEEIC/AGBPS/

Sl No.	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-08-2023 to 31-08-2023 Volume : 41036731 Scum Rate : Rs 141.39 PER '000 SCUM	998513				58,02,183.00
	CGS TAX			6 %		3,48,131.00
	SGS TAX			6 %		3,48,131.00
	Total					₹ 64,98,445.00 ✓

Aug 2023

Amount Chargeable (in words) E. & O.E

INR Sixty Four Lakh Ninety Eight Thousand Four Hundred Forty Five Only

HSN/SAC	Taxable Value	Central Tax		State Tax		Total Tax Amount
		Rate	Amount	Rate	Amount	
998513	58,02,183.00	6%	3,48,131.00	6%	3,48,131.00	6,96,262.00
Total			3,48,131.00		3,48,131.00	6,96,262.00

Tax Amount (in words) : INR Six Lakh Ninety Six Thousand Two Hundred Sixty Two Only

Company's VAT TIN : 18170012516
Company's PAN : AABCA6977C

Bill verified for an amount of Rs. 64,98,445.00 (Rupees Sixty-four Lakh Ninety-eight Thousand Four Hundred Forty-five only) for August 2023. Entered into bill register.

Authorized Signatory
Sr. Manager (F & A)
Assam Gas Co. Ltd.

05.09.2023
By: Dy. General Manager (F&A)
O & AWC, AGBPS, NEEPCO LTD., DCK-14

This is a Computer Generated Invoice
Dy. Manager (F&A)
O & AWC, AGBPS, NEEPCO LTD., DCK-14

Revised



ऑयल इंडिया लिमिटेड
Oil India Limited

Conquering Newer Horizons

CIN Number: L11101AS1959G01001148
 CST Regd. Number: 18759918502
 VAT Regd. Number: 18620025278
 Service Tax Regd. Number: AAAC02352CS1007
 PAN Number: AAAC02352C
 GST Regd. No.: 18AAAC02352C12W

Dulajjan-786602, Assam (India), Ph: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: firmainfo@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
 Attn.: Project Manager
 North Eastern Electric Power Corpn. Ltd.
 P.O. No. 3, Bakulani, Dibrugarh
 786191, Assam
 Customer VAT Regd.No.:18420117090



Customer ID: 100040
 Invoice Number: 207118
 Invoice Date: 10.10.2023
 Billing Period: 01.09.2023 to 30.09.2023
 Payment due date: 25.10.2023

TAX INVOICE

Product: Natural Gas

Sept. 2023

ACCOUNT : NEEPCO

Pricing Considerations

Material Description	Basic Price (USD/MMBTU)	GCY (Dzad/SCM)	NCV (Dzad/SCM)	Exchange Rate (USD/INR)	NG Rate (INR/MSCM)	Marketing Margin @ 200 INR/MSCM adjusted with NCV
NGas Subsidized	3.90	9887	8185	82.79	11,642.93	165.70
NGas Non Subsidized	4.50	9036.035	8131.114	82.79	19,276.79	162.62
NGas Non Nominated	8.60	9631	8687	82.79	27,211.17	171.74

Gas Price (INR) = [(B/P) X 3,968264 X GCY X FE] / 1000

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
NGas Subsidized	30000.000	449,507,563.71	39,1000.00	354,199,200.00	51,358,791.67	405,557,991.67
NGas Non-Subsidized	8282.849	159,698,176.76	1346956.90	160,997,131.98	23,344,584.14	184,341,716.12
NGas Non-Nominated	927.669	25,242,958.86	161173.21	25,404,132.07	3,682,599.15	29,087,731.23
Grand Total:	39,210.518	534,180,693.18	6,419,130.11	540,599,823.29	78,386,974.38	618,986,797.67

Amount payable (Rounded to nearest Rupees):

Rupees Sixty-one Crore Eighty-nine Lakh Eighty-six Thousand Seven Hundred Ninety-eight Only

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A/C (A/R) on Telephone no 0374-2808541.

I hereby certify that the invoice is genuine and correct, made in Assam under Assam Sales Tax Act, 2005 in force on the date on which the sale of goods specified in this invoice is made by me and that the amount due or will be received by this invoice has been collected by me.

NGas subsidized	30,000.000	349288200.00	4911000.00	354199200.00	51358884.00	405558084.00
NGas Non subsidized	8282.849	159650175.08	1346956.90	160997131.98	23344584.14	184341716.12
NGas Non Nominated	927.669	25242958.86	161173.21	25404132.07	3683599.15	29087731.23
Grand Total	39210.518	534181333.94	6419130.12	540600484.08	78387087.29	618987531.34

Bill No. NEEPCO/AGBPS/ O&AWC/ OIL/I-3(BILLS)/2023-24/ 11 Dtd.13.10.2023.

Bill verified for an amount of Rs.61,89,87,531.00 (Rupees Sixty-one Crore Eighty-nine Lakhs Eighty-seven Thousand Five Hundred and Thirty-one) only for the month of September 2023.
 Entered into bill register.

OIL INDIA LIMITED

13/10/2023

For GENERAL MANAGER F&A
 For RESIDENT CHIEF EXECUTIVE

13.10.2023
 उप-सहायक (वे./या.)
 Dy. General Manager (F&A)
 एन.ए.ए.सी. लि., बकुलानी
 DIBRUGARH



Tax Invoice

Assam Gas Company Limited

Duliajan
Dist Dibrugarh
GSTIN/UIN 18AABCAG977C1ZM
State Name Code
CIN U11101AS1952SGC001184
E-Mail acctg.aggcl@gmail.com
Consignee (Ship to)

North Eastern Electric Power Corpn. Ltd.
AGBPP

P.O. Bakuloni
Dist- Dibrugarh
Place of Supply Bakuloni, Dibrugarh
GSTIN/UIN : 18AAACN9991J3ZP
State Name : Assam, Code : 18

Buyer (Bill to)

North Eastern Electric Power Corpn. Ltd.
AGBPP

P.O. Bakuloni
Dist- Dibrugarh
Place of Supply : Bakuloni, Dibrugarh
GSTIN/UIN : 18AAACN9991J3ZP
State Name : Assam, Code : 18

Invoice No
AGCL/IND/2309/01
Delivery Note

Dated
4-Oct-23
Mode/Terms of Payment

Reference No. & Date

Other Preferences

Buyer's Order No

Due Date: 05-11-23
Limit

Dispatch Date/No

Delivery Date/Date

Dispatched through

Destination

Terms of Delivery

Sl No.	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-09-2023 to 30-09-2023 Volume : 39210518 SCUM Rate : Rs 141.39 PER 1000 SCUM	996513				55,43,975.00
	CGS TAX			6 %		3,32,639.00
	SGS TAX			6 %		3,32,639.00
Total						₹ 62,09,253.00 ✓

Sept 2023

Amount Chargeable (in words)

INR Sixty Two Lakh Nine Thousand Two Hundred Fifty Three Only

E & O.E.

HSN/SAC	Taxable Value	Central Tax		State Tax		Total Tax Amount
		Rate	Amount	Rate	Amount	
996513	55,43,975.00	6%	3,32,639.00	6%	3,32,639.00	6,65,278.00
Total			3,32,639.00		3,32,639.00	6,65,278.00

Tax Amount (in words) : INR Six Lakh Sixty Five Thousand Two Hundred Seventy Eight Only

Company's VAT TIN : 18170012516
Company's PAN : AABCA6977C

for Assam Gas Company Limited

C. Sharma
Authorized Signatory
Sr. Manager (F & A)
Assam Gas Co. Ltd.
Duliajan

This is a Computer Generated Invoice

Bill No. NEEPCO/AGBPS/O&AWC/AGCL/2023-24/T-4/ 07, Dtd. 05.10.2023

Bill verified for any amount of Rs. 62,09,253.00 (Rupees Sixty-two Lakhs Nine Thousand Two Hundred and Fifty-three) only for September 2023. Entered into bill register.

Bhita
05.10.2023उप-महाप्रबंधक (वै./पा.)
Dy. General Manager (E&A)

श्री. एच. सुब्रह्मण्यम, ए. ए. ए. सी. ए. सी. लि., कोलकाता

Sharma
05.10.2023
अधीक्षक (वै./पा.)
Dy. Manager (E&A)
श्री. एच. सुब्रह्मण्यम, ए. ए. ए. सी. ए. सी. लि., कोलकाता
O & AWC, AGBPS, NEEPCO LTD., SONAR JH

Bill no: NEEPCO/AUGPS/DA/NGC/OIL/2023-24/T-3(BIBB)/12 dtd. 15/11/2023



ऑयल इंडिया लिमिटेड
Oil India Limited
 Conquering Newer Horizons



CIN Number : L11101AS1959G0001148
 GST Regd. Number : 18759918502
 VAT Regd. Number : 18620023278
 Service Tax Regd. Number : AAACO2352CST007
 PAN Number : AAACO2352C
 GST Regd. No. : 18AAACO2352C1ZW

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2804752, Fax: 0374-2800544/2800535, e-mail: finmain@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
 Attn.: Project Manager
 North Eastern Electric Power Corpn. Ltd.
 P.O. No. 3, Bakulani, Dibrugarh
 786191, Assam
 Customer VAT Regd.No.:18420117090

Customer ID : 109040
 Invoice Number : 207154
 Invoice Date : 18.11.2023
 Billing Period : 01.10.2023 TO 31.10.2023
 Payment due date : 25.11.2023

TAX INVOICE

Oct 2023

Product: Natural Gas

ACCOUNT :NEEPCO

Pricing Considerations

Material Description	Basic Price (USD/MMBTU)	GCV (Kcal/SCM)	NCV (Kcal/SCM)	Exchange Rate (USD/INR)	NG Rate (INR/MSCM)	Marketing Margin @ 200 INR/MSCM adjusted with NCV
Ngas Subsidized	3.90	9185	8277	83.05	11,805.46	165.54
Ngas Non-Subsidized	6.50	9141.859	8239.881	83.05	19,583.35	164.80
Ngas Non-Nominated	9.20	8500	8566	83.05	28,803.85	171.32

Gas Price (INR) = [(BP) X 3.968254 X GCV X FE] / 1000

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
Ngas Subsidized	31000.000	365,969,220.49	5131740.00	371,100,960.49	53,809,639.27	424,910,599.76
Ngas Non-Subsidized	8025.154	157,159,465.66	1322545.39	158,482,011.04	22,979,891.60	181,461,902.64
Ngas Non-Nominated	1099.078	31,657,659.12	188294.01	31,845,953.16	4,617,665.21	36,463,618.37
Grand Total:	40124.232	554,786,345.27	6,642,579.42	561,428,924.69	81,407,194.08	642,836,118.77

Amount payable (Rounded to nearest Rupees):

Rupees Sixty-four Crore Twenty-eight Lakh Thirty-six Thousand One Hundred Nineteen Only

Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact A.O.J.A.R on Telephone no. 0374-2808571

I/We hereby verify that my/our registration certificate under the Assam Value Added Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by notes and that the transaction of sale covered by this tax invoice has been effected by notes.

Ngas Subsidized	31000.000	365969260.00	5131740.00	371101000.00	53809645.00	424910645.00
Ngas Non-Subsidized	8025.154	157159400.00	1322545.00	158481945.00	22979882.02	181461825.99
Ngas Non-nominated	1099.078	31657678.00	188294.00	31845972.00	4617665.90	36463637.82
Grand Total	40124.232	554786337.00	6642579.42	561428917.00	81407193.00	642836109.80

OIL INDIA LIMITED

[Signature]

For GENERAL MANAGER F&A
 For RESIDENT CHIEF EXECUTIVE

Bill verified for an amount of Rs.64,28,36,110.00(Rupees Sixty-four Crore Twenty-eight Lakh Thirty-six Thousand One Hundred and Ten) only for the month of October 2023. Entered into bill register.

[Signature]
 15.11.2023
 Dy. General Manager (EM)

[Signature]
 15/11/2023
 Dy. Manager (EM)

[Stamp]

Tax Invoice

Assam Gas Company Limited
 Dulaijan
 Dist Dibrugarh
 GSTIN/UIN: 18AABCA6977C12M
 State Name , Code
 CIN: U11101AS1962SGC001184
 E-Mail : acctts.agcl@gmail.com
 Consignee (Ship to)
 North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UIN : 18AAACN9991J3ZP
 State Name : Assam, Code : 18

Invoice No
 AGCL/IND/2310/01
 Delivery Note

Date
 6-Nov-23
 Mode/forms of Payment

Reference No. & Date

Other References
 Due Date: 07-12-23
 Inad

Buyer's Order No

Dispatch Doc No

Delivery Note Date

Dispatched through

Destination

Terms of Delivery



Buyer (Bill to)
 North Eastern Electric Power Corpn. Ltd.
 AGBPP
 P.O. Bakuloni
 Dist- Dibrugarh
 Place of Supply : Bakuloni, Dibrugarh
 GSTIN/UIN : 18AAACN9991J3ZP
 State Name : Assam, Code : 18

Sl. No.	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-10-2023 to 31-10-2023 Volume : 40124232 SCUM ✓ Rate : Rs 141.39 PER 1000 SCUM	996513				56,73,165.00
					6 %	3,40,390.00
					6 %	3,40,390.00
	Total					₹ 63,53,945.00

Oct 2023

Amount Chargeable (in words)
 INR Sixty Three Lakh Fifty Three Thousand Nine Hundred Forty Five Only

₹ 63,53,945.00
 E. & O.E

HSN/SAC	Taxable Value	Central Tax Rate	Central Tax Amount	State Tax Rate	State Tax Amount	Total Tax Amount
996513	56,73,165.00	6%	3,40,390.00	6%	3,40,390.00	6,80,780.00
Total	56,73,165.00		3,40,390.00		3,40,390.00	6,80,780.00

Tax Amount (in words) : INR Six Lakh Eighty Thousand Seven Hundred Eighty Only

Company's VAT TIN : 18170012516
 Company's PAN : AABCA6977C

for Assam Gas Company Limited

P. Das
 Authorised Signatory
 Sr. Manager (F & A)
 Assam Gas Co. Ltd.
 Dulaijan

This is a Computer Generated Invoice

Bill verified for an amount of Rs. 63,53,945.00 (Rupees Sixty three Lakhs fifty-three thousand nine hundred and forty-five) only for the month of October 2023. Entered into bill register.

उप-प्रबंधक (वे.वा.)
 Assistant Manager (F&A)

Assam
 07/11/2023
 BY MANAGER (F&A)
 BY MANAGER (F&A)

Bill No - NEEP 60 / AHC 13 / DA AWC / AHC - 1 / F-4/2023 / JS,
 dttd. 07/11/2023



CIN Number : 11101AS1900000148
 CST Regd. Number : 18759918502
 VAT Regd. Number : 18620023278
 Service Tax Regd. Number : AAACD2352CST007
 PAN Number : AAACD2352C
 GST Regd. No. : 18AAACO2352C1ZW

1019

Duliajan-786602, Assam (India), Ph.: 0374-2808541/2801752, Fax: 0374-2800544/2800535, e-mail: fin@mail@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
 Attn.: Project Manager
 North Eastern Electric Power Corpn. Ltd.
 P.O. No. 3, Bakulani, Dibrugarh
 786191, Assam
 Customer VAT Regd.No.:18420117090



Customer ID : 100040
 Invoice Number : 207190
 Invoice Date : 11.12.2023
 Billing Period : 01.11.2023 to 30.11.2023
 Payment due date : 25.12.2023

TAX INVOICE
 Product: Natural Gas

Nov 2023

ACCOUNT : NEEPCO

Pricing Considerations

Material Description	Basic Price (USD/MMBTU)	GCV (Kcal/MCM)	NCV (Kcal/MCM)	Exchange Rate (USD/INR)	NG Rate (INR)/MCM	Marketing Margin @ 200 INR/MSCM adjusted with NCV
Ngas Subsidized	3.90	9177	8269	83.24	11,823.16	165.35
Ngas Non-Subsidized	6.50	9020.945	8199.317	83.24	19,536.01	163.99
Ngas Non-Nominated	9.12	7674	6729	83.24	20,142.88	174.35

Gas Price (INR) = (BPP) X 3.968254 X GCV X FE / 1000

Description	Quantity (MCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
Ngas Subsidized	30000.009	355,664,436.46	4961400.00	359,625,836.46	52,145,746.79	411,771,583.25
Ngas Non-Subsidized	7410.221	144,766,790.54	1215202.14	145,981,992.68	21,167,301.94	167,148,694.62
Ngas Non-Nominated	1163.786	33,916,093.99	203173.76	34,119,267.75	4,947,293.82	39,066,561.57
Grand Total:	38,574.007	533,346,720.99	6,379,775.90	539,726,496.89	78,260,342.05	617,986,839.00

Amount payable (Rounded to nearest Rupees):

Rupees Sixty-one Crore Seventy-nine Lakh Eighty-six Thousand Eight Hundred Thirty-nine Only

Note: Payments received after due date will be subjected to interest as applicable in case of any discrepancy please contact A.U.(AR) on Telephone no. 0374-2808571

We hereby certify that our registration certificate under the Assam Late Surcharged Tax Act, 2003 is in force on the date on which the sale of goods specified in this tax invoice is made by us and that the transaction of sale covered by this tax invoice has been effected by us.

Description	Quantity (MCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50 %)	Total Amount (INR)
Ngas Subsidized	30000.000	354664800.00	4961400.00	359626200.00	52145799.00	411771999.00
Ngas Non-subsidized	7410.221	144766151.55	1215202.14	145981353.70	21167296.29	167148649.99
Ngas Non-nominated	1163.786	33916075.74	203173.76	34119249.50	4947291.18	39066540.68
Grand Total	38574.007	533347027.30	6379775.90	539726803.20	78260386.46	617,987,189.67

OIL INDIA LIMITED

For GENERAL MANAGER F&A
 For RESIDENT CHIEF EXECUTIVE

Bill verified for an amount of Rs.61,79,87,190.00 (Rupees Sixty-one Crore Seventy-nine Lakh Eighty-seven Thousand One Hundred and Ninety) only for the month of November 2023. Entered in to bill register.

Bill No. NEEPCO/AR/SP/18420117090/110/2023

13-12-23
 For GENERAL MANAGER F&A
 For RESIDENT CHIEF EXECUTIVE

Tax Invoice

B.I.U. No. AGBP INEER/DIBRUGARH/DGM(E)/AGCL/IT-11/23-24/09 dt. 11/12/23



Assam Gas Company Limited Dullajon Dist Dibrugarh GSTIN/UIN: 18AABCA6977C12M State Name : , Code : CIN: U11101AS1962SGC001184 E-Mail : acctls.agcl@gmail.com	Invoice No. AGCL/IND/2311/01	Dated 11-Dec-23
	Delivery Note	Mode/Terms of Payment
Consignee (Ship to) North Eastern Electric Power Corpn. Ltd. AGBPP P.O. Bakuloni Dist- Dibrugarh Place of Supply : Bakuloni, Dibrugarh GSTIN/UIN : 18AAACN9991J3ZP State Name : Assam, Code : 18	Reference No. & Date.	Other References Due Date: 12-01-24
	Buyer's Order No.	Dated
Buyer (Bill to) North Eastern Electric Power Corpn. Ltd. AGBPP P.O. Bakuloni Dist- Dibrugarh Place of Supply : Bakuloni, Dibrugarh GSTIN/UIN : 18AAACN9991J3ZP State Name : Assam, Code : 18	Dispatch Doc No.	Delivery Note Date
	Dispatched through	Destination
Terms of Delivery		

Sl No.	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-11-2023 to 30-11-2023 Volume : 38574007 Scum Rate : Rs 141.39 PER 1000 SCUM	996513				54,53,979.00
	CGS Tax				6 %	3,27,239.00
	SGS Tax				6 %	3,27,239.00
	Total					₹ 61,08,457.00

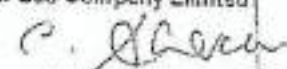
Nov'2023

Amount Chargesable (in words) **INR Sixty One Lakh Eight Thousand Four Hundred Fifty Seven Only** ✓
 E. & O.E

HSN/SAC	Taxable Value	Central Tax		State Tax		Total Tax Amount
		Rate	Amount	Rate	Amount	
996513	54,53,979.00	6%	3,27,239.00	6%	3,27,239.00	6,54,478.00
Total	54,53,979.00		3,27,239.00		3,27,239.00	6,54,478.00

Tax Amount (in words) : **INR Six Lakh Fifty Four Thousand Four Hundred Seventy Eight Only**

Company's VAT TIN : 18170012516
 Company's PAN : AABCA6977C

for Assam Gas Company Limited

 Authorized Signatory

This is a Computer Generated Invoice

S. Maracer (F 3 / 1)
 Assam Gas Co. Ltd.
 Dibrugarh

Bill verified for an amount of **₹. 61,08,457.00** (Rupees Sixty-one Lakh Eight Thousand Four Hundred and fifty seven) only for Nov'23. Entered into bill register.



Nov'2023





CIN Number: L11101AS1394G0001148
 GST Regd. Number: IN79918502
 VAT Regd. Number: IN020023278
 Service Tax Regd. Number: AAACV02352CST007
 PAN Number: AAAC02352C
 GNT Regd. No: HUAACV02352C127W

Duliajan-786002, Assam (India), Ph: 0374-2800541/2804752, Fax: 0374-2800544/2800576, e-mail: General@oilindia.in

Assam Gas Based Power Proj (NEEPCO)
 Attn.: Project Manager
 North Eastern Electric Power Corpn. Ltd.
 P.O. No. 3, Hakulani, Dibrugarh
 786191, Assam
 Customer VAT Regd.No.:18420117096

Customer ID: 16660
 Invoice Number: 207234
 Invoice Date: 09.01.2024
 Billing Period: 01.12.2023 TO 31.12.2023
 Payment due date: 25.01.2024

TAX INVOICE

Product: Natural Gas

Dec '2023

ACCOUNT : NEEPCO

Pricing Considerations

Material Description	Basic Price (USD/MSCFM)	GCY (Rs/dMSCM)	NCV (Kcal/MSCM)	Exchange Rate (USD/INR)	SG Rate (INR/MSCM)	Marketing Margins @ 200 INR/MSCM adjusted with NCV
Gas Subsidized	3.90	9117	8713	81.92	31.251.35	164.26
Gas Non-Subsidized	5.95	9094.979	8110.062	81.30	39.346.26	162.20
Gas Non-Subsidized	5.67	9085	8041	81.30	28.012.97	150.07

Gas Price (INR) = (GBP X 8.66335 X GCY X FE) / 1000

Description	Quantity (MSCM)	Total Value (INR)	Marketing Margin (INR)	Total with Marketing Margin (INR)	VAT (14.50%)	Total Amount (INR)
Gas Subsidized	31901000	164353707.94	507206000	671559707.94	97376160.85	768935868.79
Gas Non-Subsidized	8025604	455721905.34	130306517	586028422.67	84974120.72	670999543.39
Gas Non-Subsidized	1021591	28016392.09	18473406	46489797.15	6740931.14	53230728.29
Grand Total:	40058195	348091976.30	657984925	1014906901.65	147209147.11	1162106048.76

Amount payable (Rounded to nearest Rupee):
Rs. Sixty-three Crore Fifty-four Lakh Forty-two Thousand Seven Hundred Forty Only
 Note: Payments received after due date will be subjected to interest as applicable. In case of any discrepancy please contact O/G/A/P on Telephone no. 0374-2800571.
 I/We hereby certify that our registration certificate under the Assam Value Added Tax Act, 2001 is in force on the date on which this bill is issued and that the transaction of sale effected by this bill in case has been effected in accordance with the provisions of the said Act and that the transaction of sale effected by this bill in case has been effected in accordance with the provisions of the said Act.

OIL INDIA LIMITED

For GENERAL MANAGER F&A
 For RESIDENT CHIEF EXECUTIVE

Bill No. NEEPCO/ANBPS/Oil India/2023-24/T-3 (bills)/14

Bill verified for an amount of Rs. 63,54,42,740.00 (Rupees Sixty-three Crores Fifty-four Lakh Forty-two Thousand Seven Hundred Forty) only for the month of December 2023. Entered into bill register.

09.01.2024
 उप-प्रबंधक (व.पां.)
 By: General Manager (E&M)

09.01.24
 श्री. प्रबंधक (व.पां.)
 By: Manager (E&M)
 श्री. प्रबंधक (व.पां.)
 O & A ANBPS, NEEPCO LTD., KOKUL JN

Tax Invoice

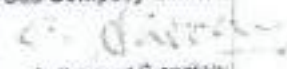
Assam Gas Company Limited Dibrugarh Dist Dibrugarh GSTIN/UIN : 18AABCA6977C1ZM State Name : , Code : CIN : U11101AB1982GGC001164 E-Mail : acc@assgcl@gmail.com Consignee (Ship to) North Eastern Electric Power Corpn. Ltd. AGBPP P O Bakuloni Dist- Dibrugarh Place of Supply : Bakuloni, Dibrugarh GSTIN/UIN : 18AAACN9991J3ZP State Name : Assam, Code : 18	Invoice No AGCL/IND/2312/01 Delivery Note Reference No. & Date Buyer's Order No Dispatch Doc No Dispatched through Terms of Delivery	Dated 6-Jan-24 Mode/Terms of Payment Other References Due Date: 06-02-2023 Dated Delivery Note Date Destination
Buyer (Bill to) North Eastern Electric Power Corpn. Ltd. AGBPP P O, Bakuloni Dist- Dibrugarh Place of Supply : Bakuloni, Dibrugarh GSTIN/UIN : 18AAACN9991J3ZP State Name : Assam, Code : 18		

Sl	Particulars	Quantity	Amount
1	Transmission Charges Natural Gas Transmission by Pipeline Period : 01-12-2023 to 31-12-2023 Volume : 40055285 Scum Rate : Rs 141.39 PER '000 SCUM 6% CGS Tax 6% SGS Tax		56,63,417.00 3,39,805.00 3,39,805.00
Total			₹ 63,43,027.00

Dec '2023

Amount Chargeable (in words)
INR Sixty Three Lakh Forty Three Thousand Twenty Seven Only

Company's VAT TIN : 18170012516
 Company's PAN : AABCA6977C

for Assam Gas Company Limited

 Authorized Signatory

This is a Computer Generated Invoice
 Bill verified for an amount of Rs. 63,43,027.00 (Rupees Sixty-three Lakh Forty-three Thousand Twenty-seven) only for the month of December 2023. Entered into bills register.

Sr. Manager (F & A)
 Assam Gas Co Ltd.
 Dibrugarh

Bill No: N E E P C O B A B E S / O B A B E S / A G C L / T - 4 (Bills) / 2023 33 / 10
 Date: 29.01.2024

09.01.2024
 Dy. General Manager (Bill)
 Assam Gas Company Limited, Dibrugarh

09.01.2024
 Dy. Manager (Elec)
 Assam Gas Company Limited, Dibrugarh

S: H/D (M)
Panna
3704/18

No. NEEPCO/AGBP/HOP/2018-19/W-8(A)

Dated

To: M/S Mitsubishi Corporation,
Power Systems International Deptt,
New Energy and Power Generation Division,
3-1, Marunouchi, 2-Chome, Chiyoda-Ku,
Tokyo – 100-8086, Japan. (Fax No. 011 – 4368 2333)

Sub: NEEPCO/AGBP – Detailed Order for Technical Advisory Services for Turbine Inspection of MHI make Gas Turbine Unit # 4 (Model No. MW251B)

- Ref: 1. Our letter No. NEEPCO/AGBP/GT&Aux./W-25/2017-18/268 Dated 19/01/2018
2. Your offer No. XAF-NEEPCO- 825P312-TA Dated 25/01/2018
3. Our LOI issued vide No. NEEPCO/AGBP/HOP/2018-19/W-8(A)/41 Dated 18/04/2018
4. Your acceptance letter No. ENY/XA-F652 Dated 24/04/2018

Dear Sir,

With reference to above, the Corporation is pleased to place this detailed order for Technical Advisory Services for Turbine Inspection of MHI make Gas Turbine Unit # 4 (Model No. MW251B) of Assam Gas Based Power Plant at your offered rates and as per the following terms and conditions.

1. Scope:

Mitsubishi Corporation shall provide NEEPCO AGBP with technical advisory services by deputing required Technical Advisors for Turbine Inspection of MHI make Gas Turbine Unit # 4.

2. Price:

A. Technical Advisory Services Fees:

The estimated price for the above referred services is JPY 12,414,040.00 (Japanese Yen Twelve Million Four Hundred Fourteen Thousand Forty) only excluding TDS. The above mentioned price is an estimated price which includes supervisory services fees for working days as well as journey periods, overtime fees, travel expenses (air fare) and lodging at New Delhi. The actual price payable shall be calculated based on the following rates:

Sl.	Item	Price (Japanese Yen)
i.	Normal working day rate (working hours shall be 8 hours or part thereof)	1,51,100 / man day
ii.	Overtime work hourly rate for any hours worked beyond 8 hours per day from Monday to Friday	24,500 / man hour
iii.	Normal work hourly rate for Saturday, Sunday & local holidays in India	24,500 / man-hour
iv.	Overtime work hourly rate for any hours worked beyond 8 hours per day on Saturday, Sunday & local holidays in India	26,700 / man-hour

The above rates for holidays shall be applicable for the New Year holidays in Japan (i.e. 29th December to 3rd January every year)

The above rates are net receivable amounts and do not include any kind of tax and duties levied in India which are to be paid at actuals by NEEPCO. LC shall be opened for an amount of JPY 14,896,848 which is 120% of the estimated amount of JPY 12,414,040 on receipt of confirmation of acceptance of this order.

B. Expenses:

- a) Traveling expenses such as airfares (business class for international flights) are invoiced at

actual cost.

- b) Lodging is arranged and paid for by the Purchaser to the concerned party.
- c) Telephone, Telefax and telex communications are invoiced at actual cost if such costs are paid and borne by the Supervisor(s) during the performance of their duties.
- d) Any miscellaneous expenses including food and drink during the stay at site will be reimbursed at actuals against documentary evidence.

3. Terms of payment:

Payment shall be made in Japanese Yen by an Irrevocable, confirmed and non-restricted Letter of Credit (LC) to be established for the estimated amount mentioned above in favour of Mitsubishi Corporation, Tokyo (Attn.: ENY/XA-F)) confirmed by a first class bank of Japan, Europe or USA and which shall be payable against presentation of at sight draft accompanied by the following documents, without restriction on negotiating bank with sufficient validity to cover bank negotiation. LC opening charges, confirmation charges and other bank charges in India shall be borne and paid by NEEPCO and bank charges outside India (except LC confirmation charges) shall be borne by Mitsubishi Corporation.

- i) Mitsubishi Corporation's detailed invoice
- ii) Copies of air tickets
- iii) Hotel Invoices
- iv) Working time sheet duly signed by NEEPCO

4. Schedule of inspection:

The tentative date for Turbine Inspection of MHI makes Gas Turbine Unit # 4 (Model No. MW251B) is scheduled tentatively in October / November, 2018. The exact date will be intimated in due course. Accordingly, your MHI TA must be available at site for commencement of the inspection activities during that period.

5. Documents:

Copies of documents shall be forwarded to the ordering authority with copies to the GM (Finance) Corporate Treasury, NEEPCO Ltd., Brook land Compound, Lower New Colony, Shillong - 793003 (Fax No. 0364 - 2228542).

6. Engineer -in- Charge:

Sr. Manager (E/M) GT& Aux or any other Engineer authorized by Head of Project, AGBP.

Kindly acknowledge receipt and confirm acceptance of this order. The above mentioned LC will be opened immediately on receipt of the confirmation of acceptance of this order.

Thanking you,

Yours faithfully,

Sr. Manager (E/M)
For & on behalf of
General Manager & Head of Project

NIO

Memo No. NEEPCO/AGBP/HOP/2018-19/W-8(A)/ 67-71

Dated 30/4/18

Copy to:

1. The Executive Director (O&M), NEEPCO Ltd., Shillong - for kind perusal please. This has reference to his approval conveyed vide U.O. No.52 Dated 11/04/2018
2. The GM (Fin), NEEPCO Ltd., Shillong, Enclosed a copy of the approval.
3. The Sr. Manager (E/M), GT & Aux, AGBP
4. The Sr. M (Fin), AGBP, NEEPCO Ltd., Bokuloni. Enclosed a copy of the approval.
5. The Sr. Manager (E/M), Vigilance wing, AGBP, NEEPCO Ltd


Sr. Manager (E/M)
For & on behalf of
General Manager & Head of Project

SGM/AGBP/2019
 For n/a
 23/11/19

No. NEEPCO/AGBP/HOP/2019-20/W-8(B)

Dated

To,

M/S BHEL-GE Gas Turbine Services Pvt. Ltd.
 Module No. A1, A2 & A3, Quadrant No. 1,
 Cyber Towers, HITEC City,
 Madhapur, Hyderabad,
 Telangana, India,
 PIN - 500 081

Sub: NEEPCO/AGBP - Work order for Technical Advisory Services for Major Inspection of Gas Turbine, Load Gear Box & Auxiliary Gear Box of BHEL supplied Frame VI B Gas Turbine Unit # 5.

- Ref:
1. Our letter No. NEEPCO/AGBP/GT&Aux./W-32/2019-20/43 Dated 29/05/2019
 2. Your offer No. QSE19/0076 Dated 06/06/2019
 3. Our letter No. NEEPCO/AGBP/GT&Aux./W-32/2019-20/62 Dated 18/06/2019
 4. Your letter No. QSE19/0076-clr.01 Dated 21/06/2019
 5. Our letter No. NEEPCO/AGBP/GT&Aux./W-32/2019-20/75 Dated 10/07/2019
 6. Your letter No. QSE19/0076-clr.02 Dated 12/07/2019
 7. Our letter No. NEEPCO/AGBP/GT&Aux./W-32/2019-20/91 Dated 25/07/2019
 8. Your letter No. QSE19/0076-clr.03 Dated 25/07/2019
 9. Our letter No. NEEPCO/AGBP/GT&Aux./W-32/2019-20/108 Dated 31/08/2019
 10. MOM Dated 09/09/2019 held between M/S BGGTS & NEEPCO Ltd.
 11. Our LOI issued vide No. NEEPCO/AGBP/HOP/2019-20/W-8(B)/350 Dated 17/10/2019
 12. Your acceptance vide E-mail Dated 18/10/2019

Dear Sirs,

With the above reference, the Corporation is pleased to place this Work Order for Technical Advisory Services for Major Inspection of Gas Turbine, Load Gear Box & Auxiliary Gear Box of BHEL supplied Frame VI B Gas Turbine Unit # 5 as per following terms & conditions.


Terms & Conditions:

1. **Scope of Contract:** BHEL-GE Gas Turbine Services Pvt. Ltd. shall provide NEEPCO, AGBP with technical advisory services by deputing required Technical Advisors for Major Inspection of Gas Turbine, Load Gear Box & Auxiliary Gear Box of BHEL supplied Frame VI B Gas Turbine Unit # 5.
2. **Prices:** The prices for Technical Advisory Services for Major Inspection of Gas Turbine, Load Gear Box & Auxiliary Gear Box of BHEL supplied Frame VI B Gas Turbine Unit # 5 is ₹ 59,84,000.00 (Rupees Sixty-Nine Lakhs Eighty-Four Thousand) only excluding of GST. The above mentioned prices are inclusive of supervisory services fees for working days as well as journey periods & travel expenses. The above prices are net receivable amounts and do not include any kind of taxes which are to be paid extra at actuals by NEEPCO.
3. **Payment:**
 - a) 100% payment shall be made after completion of works and within 15 (fifteen) days from the date of submission of invoices. The following documents should be submitted for the above payment.
 - (i) BGGTS detailed Invoice in triplicate.
 - (ii) Working time sheet duly signed by NEEPCO

4. **Taxes:** All taxes shall be paid extra as applicable. The present rate of GST is @ 18%.
5. **Schedule of Inspection:** The tentative date for Major Inspection of Gas Turbine, Load Gear Box & Auxiliary Gear Box of BHEL supplied Frame VI B Gas Turbine Unit # 5 is schedule for November – December, 2019. The exact date will be intimated in due course. Accordingly, BGGTS TA must be available at site for commencement of the inspection activities during their period.
6. **Paying Authority:**
The DGM (Fin.),
Assam Gas Based Power Plant, NEEPCO Ltd.,
No.3 Bokuloni Village,
Dist. Dibrugarh, Assam, PIN – 786 191.
7. **NEEPCO's obligation & input:**
- NEEPCO shall provide designated officer for necessary co-ordination between BGGTS and NEEPCO and supervise the entire work.
 - Accommodation and local transport facilities for Technical Advisors of BGGTS after arrival at nearest airport / railway station at Dibrugarh / Tinsukia will be provided by NEEPCO free of cost.
 - NEEPCO shall provide necessary operators and supervisors for shut and startup operations and skilled, semi-skilled and un-skilled workers as per requirement.
 - NEEPCO shall provide BGGTS Technical Advisors with drawings and technical information as provided by the original supplier and necessary instruments, test equipment's and special tools & tackles provided by the OEM for carrying out the work.
 - Necessary spares and materials as may be required will be provided by NEEPCO.
 - Basic facilities as available at the plant will be extended to BGGTS Technical Advisors, if necessary.
 - Photography / videography at site to record the inspection work will be allowed.
 - Providing safety of BGGTS Technical Advisors shall be responsibility of BGGTS.
8. **Records:**
The Technical Advisors of BGGTS will maintain and submit the following records to NEEPCO at the end of the work:
- Detail records relating to the works carried out.
 - Different technical parameters measured during the work.
 - Finding relating to conditions of various components with suggestive measures, if any.

Kindly acknowledge receipt of this order and convey your acceptance please.
Thanking you,

Yours faithfully,


DGM (E/M)
For & on behalf of
CGM & Head of Project

NIO

Memo No. NEEPCO/AGBP/HOP/2019-20/W-8(B)/ 368 - 71

Dated 23/10/19

Copy to:

- The Executive Director (O&M), NEEPCO Ltd., Shillong, for kind perusal please. This has reference to his approval Dated 01/10/2019 conveyed vide U.O. No. 608 Dated 01/10/2019.
- The DGM (F), AGBP, NEEPCO Ltd., Bokuloni, for information please. Enclosed a copy of the approval.
- The DGM (E/M), GT&AD, AGBP, NEEPCO Ltd., Bokuloni, for information please
- The DGM (Vigilance), AGBP, NEEPCO Ltd., Bokuloni, for information


DGM (E/M)
For & on behalf of
Chief General Manager &
Head of Project



ISO: 9001 – 2015
ISO: 14001 – 2015
OHSMS: 45001 – 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(मिनी रत्ना, श्रेणी १, भारत सरकार का उद्यम)
North Eastern Electric Power Corporation Limited,
(Mini Ratna Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, कां० संयंत्र प्रमुख
Assam Gas Based Power Plant, O/o the Head of Project
डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)



No. NEEPCO/AGBP/HOP/2020-21/W-8(B)/

Dated

To,

M/S BHEL-GE Gas Turbine Services Pvt. Ltd.,
Module No. A1, A2 & A3, Quadrant No.1,
Cyber Towers, HITEC City,
Modhupur, Hyderabad,
Telangana, India,
PIN – 500 081



Sub: NEEPCO/AGBP – Work order for Technical Advisory Services for Major Inspection of Gas Turbine with Load Gear Box & Auxillary Gear Box and repair/ installation of Exhaust Plenum of BHEL supplied Frame VI B Gas Turbine Unit # 6.

Ref: 1. Our letter No. NEEPCO/AGBP/GT&Aux./2019-20/W-32/266 Dated 24/01/2020
2. Your offer No. QSE19/0368-Rev.01 Dated 28/02/2020
3. Our letter No. NEEPCO/AGBP/GT&Aux./2020-21/W-32/07 Dated 18/05/2020
4. Your letter No. QSE19/0368-Rev.01-Clr.01 Dated 25/05/2020
5. Our letter No. NEEPCO/AGBP/GT&Aux./2020-21/W-32/24 Dated 30/05/2020
6. Your letter No. QSE19/0368-Rev.01-Clr.02 Dated 01/06/2020
7. Your letter No. QSE19/0368-Rev.01-Clr.03 Dated 04/06/2020
8. Your letter No. QSE19/0368-Rev.01-Clr.04 Dated 30/07/2020

Dear Sirs,

With the above reference, the Corporation is pleased to place this Work Order for Technical Advisory Services for Major Inspection of Gas Turbine with Load Gear Box & Auxiliary Gear Box and repair of Exhaust Plenum for BHEL supplied Frame VI B Gas Turbine Unit # 6 as per following terms & conditions.

Terms & Conditions:

- Scope of Contract:** BHEL-GE Gas Turbine Services Pvt. Ltd. shall provide NEEPCO, AGBP with technical advisory services by
 - Deputing required Technical Advisors for Major Inspection of Gas Turbine with Load Gear Box & Auxiliary Gear Box of BHEL supplied Frame VI B Gas Turbine Unit # 6.
 - Turnkey services (deployment of TA's and Craft manpower with tools and tackies) for disassembly, replacement & assembly of Exhaust Plenum of BHEL supplied Frame VI B Gas Turbine Unit # 6.
- Prices:** The prices for Technical Advisory Services for Major Inspection of Gas Turbine with Load Gear Box & Auxiliary Gear Box of BHEL supplied Frame VI B Gas Turbine Unit # 6 is ₹ 69,84,000.00 (Rupees Sixty-Nine Lakh Eighty-Four Thousand) and ₹ 56,00,000.00 (Rupees Fifty-Six Lakhs) only for Turnkey services for disassembly, replacement & assembly of

Exhaust Plenum. The above mentioned prices are lump sum prices inclusive of supervisory services & travel expenses.

The above prices are net receivable amounts and do not include any kind of taxes which are to be paid extra at actuals by NEEPCO.

3. Payment:

- a) 100% payment shall be made after completion of works and within 15 (fifteen) days from the date of submission of invoices. The following documents should be submitted for the above payment.
- (i) BGGTS detailed invoice in triplicate.
 - (ii) Work completion certificate.
 - (iii) Bank details for payment.

4. Taxes: All taxes shall be paid extra as applicable. The present rate of GST is @ 18%.

5. Schedule of Inspection: The tentative date for Major Inspection of Gas Turbine with Load Gear Box & Auxiliary Gear Box and Exhaust Plenum repair of BHEL supplied Frame VI B Gas Turbine, Unit # 6 is scheduled for October - November, 2020. The exact date will be intimated in due course. Accordingly, BGGTS TA must be available at site for commencement of the inspection activities during that period.

6. Paying Authority:

The DGM (Fin.),
Assam Gas Based Power Plant, NEEPCO Ltd.,
No.3 Bokuloni Village,
Dist. Dibrugarh, Assam, PIN - 786 191.

7. NEEPCO's obligation & input:

- i) NEEPCO shall provide designated officer for necessary co-ordination between BGGTS and NEEPCO and supervise the entire work.
- ii) Accommodation and local transport facilities for Technical Advisors of BGGTS after arrival at nearest airport / railway station at Dibrugarh / Tinsukia will be provided by NEEPCO free of cost.
- iii) NEEPCO shall provide necessary operators and supervisors for shut down and startup operations and skilled, semi-skilled and un-skilled workers for MI job as per requirement.
- iv) NEEPCO shall provide BGGTS Technical Advisors with drawings and technical information as provided by the original supplier and necessary instruments, test equipment's and special tools & tackles provided by the OEM for carrying out the MI Job.
- v) Necessary spares and materials as may be required for MI Job will be provided by NEEPCO.
- vi) Basic facilities as available at the plant will be extended to BGGTS Technical Advisors, if necessary.
- vii) Photography / videography at site to record the inspection work will be allowed.
- viii) Providing safety of BGGTS Technical Advisors shall be responsibility of BGGTS.

8. Records:

The Technical Advisors of BGGTS will maintain and submit the following records to NEEPCO at the end of the work.

- Detail records relating to the works carried out.
- Different technical parameters measured during the work
- Finding relating to conditions of various components with suggestive measures, if any.

Kindly acknowledge receipt of this order and convey your acceptance please.

Thanking you,

Yours faithfully,

DGM (E/M)
For & on behalf of
CGM & Head of Project


NIO

Memo No. NEEPCO/AGBP/ HOP/2020-21/W-8(B)/ 198-202

Dated 24/8/2020

Copy to:

1. The D(T), NEEPCO Ltd., Shillong - for kind perusal please. This has reference to his approval Dated 20/08/2020 conveyed vide E-mail Dated 21/08/2020 of ED (O&M).
2. The Executive Director (O&M), NEEPCO Ltd., Shillong - for kind perusal please.
3. The DGM (E/M), GT & Aux, AGBP, NEEPCO Ltd., Bokuloni, for information please
4. The DGM (Fin), AGBP, NEEPCO Ltd., Bokuloni. Enclosed a copy of the approval
5. The DGM (E/M), Vigilance wing, AGBP, NEEPCO Ltd

Handwritten signature and date: 24/08/2020

DGM (E/M)
For & on behalf of
Chief General Manager &
Head of Project

NEEPCO/AGBP/GT & Aux./W-38/2021-22/ 95

To

M/s. Garuda Power Pvt. Ltd.
Gillapukhuri Road, Bordoloi Nagar,
Tinsukia -786125.
Fax No. 0374-2305343

Sub: AGBP, NEEPCO Ltd-purchase order for supply of Cummins make Starting Diesel Engine, Model: KTA-1150C.

Ref: (i) Your quotation No.0400000022983 dated 27.07.2021.
(ii) Our Letter No. NEEPCO/AGBP/GT&AUX/W-38/21-22/62 dated 30.07.2021.
(iii) Your e-mail dated 10.08.2021.
(iv) Our Letter No. NEEPCO/AGBP/GT&AUX/W-38/21-22/83 dated 12.08.2021.
(v) Your e-mail dated 13.08.2021.
(vi) Our e-mail dated 13.08.2021.
(vii) Your e-mail dated 17.08.2021.

Dear Sir,

North Eastern Electric Power Corporation Ltd. is pleased to place this purchase order for supply of 1 (One) No. of Cummins make Starting Diesel Engine, Model: KTA-1150C (Part No. SO31453) at the price of ₹ 49,00,906.00 (Rupees Forty Nine Lac Nine Hundred Six) only with the with the terms and conditions as given below:

Terms and conditions:

1. **Delivery:** 5 months from the date of order, however you are requested to supply the items at the earliest.
2. **Taxes and Duties:** GST @ 28.0 % shall be paid extra. HSN code is 84089090. TCS, if applicable, shall be paid extra.
3. **Payments terms:** 100% payment shall be made within 10 days after receipt of materials in full and good conditions against submission of invoice in triplicate and E-payment format as per the attached Annexure-I for release of payment in electronic mode.
4. **Inspection:** Manufacturer's inspection before shipment shall be final. All expenses of NEEPCO's inspector such as traveling & living expenses shall be borne by NEEPCO in case NEEPCO's inspector inspects the material.
5. **Guarantee/Warranty:** 2 (Two) years from the date of delivery or 5,000 operating hours, whichever is earlier.
6. **Insurance:** Insurance during transit to cover transit risks from Pune to AGBP site shall be covered under NEEPCO's open marine Policy with National Insurance Company Limited, Ginoria Mansion, Chirwapatty Road, Tinsukia, Assam, PIN - 786125, (Fax No. 0374 - 2337191, Phone No. 0374 - 2331230). Supplier should give prior intimation in writing along with consignment note and copy of invoice to the above mentioned underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.
7. **Freight:** The material shall be dispatched on freight prepaid and full truck basis through a reputed transporter from Pune to AGBP site Bokuloni, Dibrugarh, Assam. The transportation charges shall be paid at actual on submission of documentary evidence.
8. **E-way Bill:** E-way bill may be generated at your end for dispatch of material. Our GSTN is 18AAACN9991J32P.

9. **LD Clause:** In case the Contractor fails to deliver the materials within contractual delivery period (or extension thereof) due to reason attributable to you, then the Corporation shall reserve the right to recover from the yours sum towards Liquidated Damage @ ½% (half percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from you on account of this shall, however, not exceed 10 % (ten percent) of the value of the undelivered portion of supply.

However the L.D. Clause will not be imposed if you fail to deliver the materials within the schedule delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, floods, explosion or fire not caused by your negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party."

10. **PBG clause:** The Contractor shall submit Security Deposit cum Performance Bank Guarantee @ 3 % of the order value drawn from any Indian PSU Bank within a period of 30(thirty) days from the date of issue of purchase order. The Security Deposit cum Performance Bank Guarantee shall remain valid till 90(ninety) days after expiry of Guarantee/Warranty period.
11. **Rejection of materials:** If materials are found defective at the time of receipt or found unsuitable for which these are intended, the same shall be rejected and the supplier shall replace the same at their cost up to destination.
12. **Consignee:** DGM (E/M), MMW, AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh-786191.
13. **Paying Authority:** DGM (Fin), AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh -786191.

We request you to acknowledge receipt of this order along with acceptance thereof.

Thanking You

Yours faithfully,

DGM (E/M)
GT & AUX. Divn.
AGBP, NEEPCO Ltd.

Memo No. NEEPCO/AGBP/GT & Aux./W-38/2021-22/96.99

dated 23.08.2021.

Copy to:

1. The CGM & HOP, AGBP, NEEPCO Ltd, Bokuloni for favour of information please. This order is placed as per the approval conveyed vide FLM dated 21.08.2021.
2. The DGM (E/M), Vigilance Wing, AGBP, NEEPCO Ltd., Bokuloni for information.
3. The DGM (E/M), MMW, AGBP, NEEPCO Ltd, Bokuloni for information.
4. The DGM (F), AGBP, NEEPCO Ltd, Bokuloni for information. Copy of approval is enclosed herewith for reference.

25/08/21
DGM (E/M)
GT & Aux. Divn., AGBP

NEEPCO/AGBP/GT & Aux./W-38/2021-22/150

dated 23.08.2021.

To

M/s. Garuda Power Pvt. Ltd.
Gillapukhuri Road, Bórdolbi Nagar,
Tinsukia - 786125.
Fax No. 0374-2305343.

Sub: AGBP, NEEPCO Ltd-purchase order for supply of Spares for Air intake system, Cooling system and Exhaust system for new Cummins makes Starting Diesel Engine, Model: KTA-1150C.

Ref: (i) Your quotation No.0400000022990 dated 28.07.2021.
(ii) Our Letter No. NEEPCO/AGBP/GT&AUX/W-38/21-22/63 dated 30.07.2021.
(iii) Your e-mail dated 09.08.2021.
(iv) Our Letter No. NEEPCO/AGBP/GT&AUX/W-38/21-22/84 dated 13.08.2021.
(v) Your e-mail dated 13.08.2021.
(vi) Our e-mail dated 13.08.2021.
(vii) Your e-mail dated 17.08.2021.

Dear Sir,

North Eastern Electric Power Corporation Ltd. is pleased to place this purchase order for supply of Spares for Air intake system, Cooling system and Exhaust system for new Cummins makes Starting Diesel Engine, Model: KTA-1150C at the price of ₹ 5,00,000.00 (Rupees Five Lac) only with the with the terms and conditions as given below:

Terms and conditions:

1. **Delivery:** 5 months from the date of order, however you are requested to supply the items at the earliest.
2. **Taxes and Duties:** GST @ 28.0 % shall be paid extra. HSN code is 84089090. TCS, if applicable, shall be paid extra.
3. **Payments terms:** 100% payment shall be made within 10 days after receipt of materials in full and good conditions against submission of invoice in triplicate and E-payment format as per the attached Annexure-I for release of payment in electronic mode.
4. **Inspection:** Manufacturer's inspection before shipment shall be final. All expenses of NEEPCO's inspector such as traveling & living expenses shall be borne by NEEPCO in case NEEPCO's inspector inspects the material.
5. **Gurantee/Warrantee:** 2 (Two) years from the date of delivery or 5,000 operating hours, whichever is earlier.
6. **Insurance:** Insurance during transit to cover transit risks from Pune to AGBP site shall be covered under NEEPCO's open marine Policy with National Insurance Company Limited, Ginoria Mansion, Chirwapatty Road, Tinsukia, Assam, PIN - 786125, [Fax No. 0374 - 2337191; Phone No. 0374 - 2331230]. Supplier should give prior intimation in writing along with consignment note and copy of invoice to the above mentioned underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.
7. **Freight:** The material shall be dispatched on freight prepaid basis through a reputed transporter from Pune to AGBP site Bokuloni, Dibrugarh, Assam. The transportation charges shall be paid at actual on submission of documentary evidence.
8. **E-way Bill:** E-way bill may be generated at your end for dispatch of material. Our GSTN is 18AAACN9991J32P.

9. **LD Clause:** In case the Contractor fails to deliver the materials within contractual delivery period (or extension thereof) due to reason attributable to you, then the Corporation shall reserve the right to recover from the yours sum towards Liquidated Damage @ ½% (half percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from you on account of this shall, however, not exceed 10 % (ten percent) of the value of the undelivered portion of supply.

However the L.D. Clause will not be imposed if you fail to deliver the materials within the schedule delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, floods, explosion or fire not caused by your negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party."

10. **PBG clause:** The Contractor shall submit Security Deposit cum Performance Bank Guarantee @ 3 % of the order value drawn from any Indian PSU Bank within a period of 30(thirty) days from the date of issue of purchase order. The Security Deposit cum Performance Bank Guarantee shall remain valid till 90(ninety) days after expiry of Guarantee/Warranty period.
11. **Rejection of materials:** If materials are found defective at the time of receipt or found unsuitable for which these are intended, the same shall be rejected and the supplier shall replace the same at their cost up to destination.
12. **Consignee:** DGM (E/M), MMW, AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh-786191.
13. **Paying Authority:** DGM (Fin), AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh -786191.

We request you to acknowledge receipt of this order along with acceptance thereof.

Thanking You

Yours faithfully,

DGM (E/M)
GT & AUX Divn
AGBP, NEEPCO Ltd.

N.I.O

Memo No. NEEPCO/AGBP/GT & Aux./W-38/2021-22/101-04

dated 23.08.2021.

Copy to:

1. The CGM & HOP, AGBP, NEEPCO Ltd, Bokuloni for favour of information please. This order is placed as per the approval conveyed vide FLM dated 21.08.2021.
2. The DGM (E/M), Vigilance Wing, AGBP, NEEPCO Ltd., Bokuloni for information.
3. The DGM (E/M), MMW, AGBP, NEEPCO Ltd, Bokuloni for information.
4. The DGM (F), AGBP, NEEPCO Ltd, Bokuloni for information. Copy of approval is enclosed herewith for reference.

MJ
23/08/21
DGM (E/M)
GT & Aux. Divn., AGBP



DATE
FILE NO.

STAMP



No. NEEPCO/AGBP/HOP/2013-14/W-5(A) 205
To

Dated 28/05/2013

M/S Mitsubishi Corporation,
Power Systems Export Unit,
Power and Electrical Systems Division,
3-1, Marunouchi, 2-Chome, Chiyoda-ku
Tokyo - 100-6083, Japan.
(Fax No. 011 - 4300 2333)

SUB: NEEPCO/AGBP - Purchase order for procurement of new GT Rotor and Work Order for Compressor Rotor Refurbishment (CRR) & Comprehensive Rotor Inspection (CRI) of MHI make Gas Turbine # 1 to 4 (Model No. N1W201B)

- Ref:**
1. MHI document No. ME-136434 (R1) Dated November 2010
 2. MC Offer No. MPB/XA-F-YOKAS-D-829W364 Dated 02/12/2011
 3. MC letter No. MPB/XA-F-YOKAS-D-829W364-2 & 829W364 Dated 25/08/2011
 4. Our letter No. NEEPCO/AGBP/GT&AUXW-23/2011-12/27 Dated 30/05/2011
 5. MC letter No. MPB/XA-F-YOKAS-D-829W364-3 Dated 16/06/2011
 6. Our letter No. NEEPCO/AGBP/GT&AUXW-23/2011-12/151 Dated 28/07/2011
 7. MC letter No. MPB/XA-F-YOKAS-D-829W364-5 Dated 04/09/2011
 8. Our letter No. NEEPCO/AGBP/GT&AUXW-23/2011-12/152 Dated 12/09/2011
 9. MC letter No. MPB/XA-F-YOKAS-D-829W364-6 Dated 03/09/2011
 10. Our letter No. NEEPCO/AGBP/GT&AUXW-23/2011-12/174 Dated 21/09/2011
 11. Our letter No. NEEPCO/AGBP/GT&AUXW-23/2011-12/194 Dated 19/10/2011
 12. MC letter No. MPB/XA-F-YOKAS-D-829W364-7 Dated 20/10/2011
 13. Our letter No. NEEPCO/AGBP/GT&AUXW-23/2011-12/210 Dated 15/11/2011
 14. MC letter No. MPB/XA-F-YOKAS-D-829W364-8 Dated 02/12/2011
 15. MC letter No. MPB/XA-F-YOKAS-D-829W364-10 Dated 26/12/2011
 16. Our letter No. NEEPCO/AGBP/GT&AUXW-23/2011-12/300 Dated 05/03/2012
 17. MC letter No. ENY/XA-F-YOKAS-D-829W364-11 Dated 20/04/2012
 18. Our letter No. NEEPCO/AGBP/GT&AUXW-23/2012-12/50 Dated 25/09/2012
 19. MC letter No. ENY/XA-F-YOKAS-D-829W364-12 Dated 05/08/2012
 20. MOM held between MC and NEEPCO Ltd., Dated 06/08/2012
 21. Your letter No. ENY/XA-F-YOKAS-D-829W364-14 Dated 26/09/2012
 22. Your letter No. ENY/XA-F-YOKAS-D-829W364-13 Dated 27/09/2012
 23. Your letter No. ENY/XA-F-YOKAS-D-829W364-15 Dated 18/10/2012
 24. Your letter No. ENY/XA-F-YOKAS-D-829W364-16 Dated 21/12/2012
 25. Our letter No. NEEPCO/ED(O&M)/AGBP-01/1474 Dated 10/01/2013
 26. Your letter No. ENY/XA-F-YOKAS-D-829W364-17 Dated 15/01/2013
 27. Our letter No. NEEPCO/ED(O&M)/AGBP-01/1517 Dated 21/01/2013
 28. Your letter No. ENY/XA-F-YOKAS-D-829W364-18 Dated 22/01/2013
 29. MOM held between MC and NEEPCO Ltd., Dated 24/01/2013
 30. Our letter No. NEEPCO/AGBP/HOP/2013-14/W-5(A)46 Dated 11/03/2013
 31. Your letter No. ENY/XA-F-YOKAS-D-829W364-20 Dated 11/04/2013
 32. Our letter No. NEEPCO/AGBP/HOP/2011-12/W-5(A)36 Dated 19/04/2013

33. Your letter No. ENY/XA-F-YOKAS-D-829W364 Integrity Test Dated 25/04/2013
 33. Our LOI issued vide No. NEEPCO/AGBP/10P/2011-12/W-8(A)/65 Dated 26/04/2013
 34. Your acceptance letter No. ENY/XA-F-YOKAS-D-829W364 LOI Dated 09/05/2013

Dear Sirs,

With the above reference, the Corporation is pleased to place this Purchase Order for supply of new GT Rotor and Work Order for Compressor Rotor refurbishment & comprehensive Rotor Inspection of 3 units of MHI make Gas Turbine as per following terms & conditions.

Terms & Conditions:

1. **Scope:** The scope shall include
 - a) Supply of new GT Rotor with compressor blades, turbine blade (assembled condition) and disc (MGA10D) for MHI make Gas Turbine Model No MW251B as per the Schedule of Item and Prices (Annexure-I) enclosed along with this order on FCA or FOB, Japan basis. The new GT Rotor will be supplied after High Speed Balance Test
 - b) Compressor Rotor Refurbishment and Comprehensive Rotor Inspection for 3 (three) units of MHI make Gas Turbine Model No. MW251B as per the Schedule of Item and Prices (Annexure-I) enclosed along with this order on FCA or FOB, Japan basis
2. **Engineering Kick off Meeting:** An Engineering Kick off Meeting shall be held at site upon acceptance of this purchase order/work order for discussion on detail scope of supply and works and finalizing up detail schedule of delivery, schedule of Letter of Credits and schedule of submission of BGS and other techno-commercial issues.
3. **Prices:** The total price payable to MHI/MC is JPY 1,033,391,400 (Japanese Yen one billion thirty three million three ninety one thousand four hundred) only for supply of new Gas Turbine Rotor alongwith container, CRR & CRI of 3 Gas Turbine units at Takasago, Japan and supply of necessary spare parts for CRR & CRI (Schedule of Items & Prices at Annexure-I). The prices will remain firm till completion of supply and completion of works. The prices are including packing and forwarding but excluding freight, insurance and any tax, duty or levy that may be imposed in India, which, if applicable, shall be paid by NEEPCO at actual. Freight charges will be paid by NEEPCO at actual in Indian Rupees at the time of delivery of the rotor at Indian Port directly to the carrier against raising of bills. All taxes, charges, duties etc. leviable outside India shall be to your account only. No agency commission is payable by us.
4. **Terms of Payment:** 100% contract price shall be made in Japanese Yen by an irrevocable, confirmed and non restricted Letter of Credit to be established for the full amount in favour of Mitsubishi Corporation, Tokyo, (ATTN: MPB/XA-F) confirmed by a first class bank in Japan or Europe or USA, acceptable to Mitsubishi Corporation and payable at sight draft to be opened in favour of Mitsubishi Corporation, Tokyo against presentation of shipping

documents and with sufficient validity to cover contract time of shipment plus 24 days for negotiation but within validity of LC. Any amendment charges which will be required due to the reason not attributable to seller shall be borne by Buyer. Total 4(four) Nos. of LCs will be opened as detailed below:

- a) 1st LC for supply of Spare GT Rotor shall be opened after submission of 1st Bank Guarantee for supply of Spare GT Rotor.
- b) 2nd LC for 1st CRI shall be opened prior to 6 (six) months of dispatch of rotor from site and after submission of 2nd Bank Guarantee to facilitate manufacturing of compressor shaft in advance.
- c) 3rd LC for 2nd CRI shall be opened prior to six months of dispatch of rotor from site and after submission of 3rd Bank Guarantee to facilitate manufacturing of compressor shaft in advance.
- d) 4th LC for 3rd CRI shall be opened prior to six months of dispatch of rotor from site and after submission of 4th Bank Guarantee to facilitate manufacturing of compressor shaft in advance.

5. Insurance:

Insurance for supply of spare rotor during transit to cover transit risks from Japanese port of origin to NEEPCO's warehouse at AGDP site shall be covered under NEEPCO's open marine policy No. 200404/21/2/4200009014 with National Insurance Company Limited, Ginoria Mansion, Chirwapatty Road, Tinsukia, Assam, PIN - 786125. (Fax No. 0374 - 2337191; Phone No. 0374 - 2331230). NEEPCO shall settle any claim directly with the underwriters. A copy of the insurance policy shall be provided to Mitsubishi Corporation for arranging shipment upto Kolkata. Supplier should give prior intimation in writing to the above mentioned underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.

6. Delivery Period:

- a) Shipment of spare rotor shall be made within 13 (thirteen) months from the date of receipt of order or opening of relative irrevocable Letter of Credit acceptable to Mitsubishi Corporation whichever is later.
- b) Shipment of CRI Rotor shall be made within 17.5 (seventeen and half) months from the date of receipt of materials of Takasago Machinery Works, Japan.

7. Inspection:

The new Gas Turbine Rotor shall be high speed balance tested at manufacturer's works in accordance with relevant standard prior to shipment. Notice shall be given for deputation of NEEPCO's authorized representative(s) to witness the test at manufacturer's works. NEEPCO reserves the right to depute authorized representative to witness the test or may waive witnessing of the test. In the event of waiver, manufacturer's test report prior to shipment shall be final. However, all responsibility for fulfilling the technical requirement shall lie with the contractor till expiry of warranty period, even if testing is witnessed by NEEPCO's representative. The same condition shall be applicable for CRR & CRI also.

8. **Packing:**
Manufacturer's standard export packing shall be applied.
9. **Port of Destination:**
Kolkata port.
10. **Transportation:**
- Supply of Spare GT Rotor:** Inland transportation from Kolkata Port to the Plant Site including port clearance shall be responsibilities of NEEPCO. The Corporation will pay freight charges in Indian Rupees
 - CRI & CRR:** The responsibility of transportation of old GT Rotor from Assam Gas Based Power Plant (India) to Kobe (Japan) is on NEEPCO. The responsibility of transportation of the same from Kobe (Japan) to Takasego (Japan) shall be on MC. Entry/Exit point is Kobe port. Same term shall be applicable for return journey from Takasego, Japan
11. **Custom Clearance in India:**
The responsibility of custom clearance shall be with NEEPCO. The "Coordinator, NEEPCO, Kolkata" shall take all necessary action towards arranging custom clearance expeditiously so that no demurrage charge is involved. Custom Clearance of old GT Rotor for CRI & CRR at Kobe, Japan will be done by MC.
12. **Security-cum-Performance Guarantee:**
Within 30(Thirty) days from the date of issue of purchase order, the supplier shall furnish bank guarantee from a scheduled nationalized bank for an amount equivalent to 10% (ten percent) of the contract value towards faithful performance of the contract. The Bank Guarantee shall be valid for a period to cover 90(ninety) days after expiry of warranty period. The schedule of submission of BG shall be as mentioned in "Terms of Payment" at Sl. No. 4 above. Bank charges for processing of BG will be borne by supplier
13. **Warranty Period:**
The contractor warrants that goods supplied in accordance with this contract shall be free from defects in design, material and workmanship (excluding defects caused by normal wear and tear) for the period until the earlier of, a) 12 (twelve) months after the installation of the goods, and b) 9,000 EOH from the installation of the spare rotor into the gas turbine subject to the owners recording EOH as per O&M manual, and c) 18 (eighteen) months from the date of delivery at the relevant spare rotor to EPB Repair Facility's port of export (within the meaning of INCOTERMS 2000)
- Any defects observed in the goods supplied shall be informed to contractor within 7(seven) days and contractor shall repair or replace the part. Repaired goods shall be further warranted for the same period as original warranty

14. Buy Back of Rotor: Cost of Buy Back of old compressor rotors shall be adjusted and deducted from each CR1&CR2 price @ 200 000 JPY as per Annexure 1.

15. Limitation of Liability and Indemnity:

a) Indirect, Incidental and Collateral Loss or Damage

In no event, whether as a result of breach of the contract, warranty, indemnity, tort (including negligence), strict liability, or otherwise, shall the Contractor be liable to the owner for loss of profit or revenues, loss of business, loss of use of the Facility including, but not limited to, any associated equipment; cost of capital; cost of substitute equipment, facilities, services or replacement power; downtime costs; costs of collateral or downstream damage, howsoever caused; incidental expenses, including the costs of opening and closing the Gas Turbine; Transportation costs, incurred for whatever reason; claims of the owner's customers for such damages; or for any special, consequential, incidental, indirect, punitive or exemplary damages.

b) Maximum Liability

The aggregate liability of the Contractor under or in connection with this contract, on all claims of any kind, whether in contract, warranty, indemnity tort (including negligence), strict liability, errors or omission or otherwise, arising out of the supply of any goods or services supplied, shall be 100% of the amount equal to Contract price.

16. Liquidated Damage:

In case the supplier fails to deliver the materials within contractual delivery period due to reasons attributable to the supplier, then the Corporation reserve the right to recover from the supplier's sum towards Liquidated Damage @ 1/4 % (half percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account of this shall, however, not exceed 10% (ten percent) of the value of the undelivered portion of supply. However, the Liquidated Damage will not be imposed if the supplier fails to deliver the materials within the scheduled delivery period due to force majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, floods, explosion or fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.

17. Place of Arbitration: Shillong, Meghalaya, India

18. Rejection of Defective Materials:

If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall replace the same at their own cost. Transportation cost for the replacement of the materials will be borne by the supplier.

19. Consignee:

The materials shall be received by the Coordinator, Kolkata, NEEPCO, DS-1, Manikola Civic Centre, 1/16 VIP Road, CIT Scheme No. VII IA, P.O. Kankungram, Kolkata-700 054 who will thereafter forward the same to the ultimate consignee as detailed below:

The Senior Manager (E&M) Material Management Wing
 Assam Gas Based Power Plant, NEEPCO,
 P.O. Bokuloni, District Dibrugarh, Assam.
 PIN: - 786191

20. Shipping Document:

Shipping documents shall include:

- a) Mitsubishi Corporation's Invoice
- b) Packing list
- c) Proof of shipment
- d) Certificate of Origin

Copies of shipping documents shall be forwarded in advance to the ordering authority with copies to:

- a) The 'Coordinator, Kolkata', NEEPCO, DSJ, Maniktoia, 14/0, VIP Road, CIT Scheme No. VII IA, P.O. Kankargachi, Kolkata - 700 054
- b) The Head Of Project, Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist - Dibrugarh, Assam, PIN: 786 191
- c) The Deputy General Manager (F) CT, NEEPCO Ltd. Shillong - 793 003
- d) The ultimate consignee as mentioned above under clause No. 19.

21. Address for correspondence:

All correspondences in respect of this order shall be made with -

The General Manager &

Head of Project,

Assam Gas Based Power Plant, NEEPCO Ltd.,

P. O. Bokuloni Chariali,

Dist. Dibrugarh, Assam, PIN - 786191.

(Fax No. 0374-2625217/2325349)

Kindly acknowledge receipt of this Purchase order and convey your acceptance.

Thanking you,

End: As stated above

Yours faithfully,


(H. K. Deka),
 GM & Head of Project,
 AGBP, NEEPCO Ltd

NIO

Memo No NEEPCO/AGBP/HOR/2013 14/W/3(A) 206-213, Dated 28/05/2013

Copy to

1. The Director (Tech.), NEEPCO Ltd., Shilong for kind perusal. This has reference to CMO's approval Dated 14/03/2013.
2. The Executive Director (OGM), NEEPCO Ltd., Shilong for kind perusal.
3. The DGM (F) CT, NEEPCO Ltd., Shilong - for information please.
4. The DGM (E/M), AGBP, NEEPCO Ltd., Bokuloni, please
5. The Sr Manager (E/M), GT&AD, AGBP, NEEPCO Ltd., Bokuloni, please
6. The Sr Manager (E/M), MSA, AGBP, NEEPCO Ltd., Bokuloni, for information please.
7. The Manager (F), F&A Wing, AGBP, NEEPCO Ltd., Bokuloni, for information please. Enclosed a copy of the approval
8. The Dy. Manager (Vigilance), AGBP, NEEPCO Ltd., Bokuloni, for information please.


GM & Head of Project,
AGBP, NEEPCO Ltd

Annex

P. O. No. NLEPCO/AGBP/HOP/W-B[A]/2013-14/205, Dt. 28/05/2013

SCHEDULE OF ITEMS & PRICES

Sl. No.	Description of Items	Qty	Unit Rate (JPY)	Total Amount (JPY)
1	New GT Rotor (Scope of supply & Technical Specifications at Annexure-II & III)	1	430,000,000	430,000,000
2	Container	1	5,459,000	5,459,000
3	CRK & CRD of MHI rack Gas Turbine with newly manufactured Compressor Rotor with upgraded MGA100 material (Scope is as per Technical Proposal ME101068)	3	181,503,000	544,509,000
4	Necessary Spares parts (Detail list of spares at Annexure-III)	2	17,807,800	35,615,600
	Total			1,033,391,400

Japanese Yen one billion thirty three million three ninety one thousand four hundred only

*Note:

Original proposed price	JPY 182,303,000
Less discount as per Buyer of Old Compressor Rotor	JPY 800,000
Current Price after discount	JPY 181,503,000

12/25

4

Annexure-II

P. O. No. NCEPCO/AGEP/HOP/W S(A)/2013-14/203, Dt.28/05/2013

SCOPE OF SUPPLY

(Technical Proposal ME-110029)

1. Scope of Supply:

M25188 Gas Turbine rotor

With:

- Compressor blades
- All of associated parts for compressor (Spring, Pin)
- Turbine blades (assembled)
- All of associated parts of turbine blades (seal pin, seal plate, etc)
- Container
- Weight (without blades) : 15 ton

P. O. No. NEEPCO/AGBP/HOP/W-8(A)/2013-14/205, Dt.28/05/2013

TECHNICAL SPECIFICATION OF NEW GT ROTOR**(Technical Proposal ME-110029)**

Compressor Portion: 18 rows and shrink fitted rotor

Turbine Portion: 3 rows and bolted rotor

Table - 1 Rotor main components

Item No.	Parts	Qty	Material	Remarks
1	Compressor main shaft	1	10325GP	
2	Disc compressor # 1 - # 12	Each 1	10325PA	
3	Disc compressor # 13 - # 15	Each 1	MGA10D	Upgraded from 10325PA
4	Disc compressor # 16 - # 18	Each 1	MGA10D	Upgraded from 10325PA
5	Spacer ring	5	10325DL	
6	Air separator	1	10325TG	
7	Torque tube	1	10325TG	
8	Coupling bolt	40	IN-718	Upgraded from IN-X750
9	Nut coupling bolt	40	10305DU	
10	Disc turbine row # 1	1	10325TG	
11	Bolt special	40	IN-718	Upgraded from IN-X750
12	Nut self lock	40	10305DU	
13	Side plate	1	10325TG	
14	Disc turbine row # 2	1	10325TG	
15	Disc turbine row # 3	1	10325TG	
16	Spindle bolt	10	IN-718	Upgraded from IN-X750
17	Washer spindle	10	SUS316S	
18	Hex nut	20	10305DU	
19	Baffle half turbine disc row #2 (between row 1 & 2)	2	Hastelloy X	
20	Baffle half turbine disc row # 3 (between row 2 & 3)	2	Hastelloy X	

P. O. No. NEEPCO/AGBP/ROP/W-B(A)/2013-14/205, Dt.28/05/2013

TECHNICAL SPECIFICATION OF NEW GT ROTOR

(Technical Proposal ME-110029)

Table - 2 Compressor blades and associated parts which are supplied with the Rotor

Item No.	Parts	Qty
1	Compressor blade row # 1	30
2	Compressor blade row # 2	30
3	Compressor blade row # 3	39
4	Compressor blade row # 4	45
5	Compressor blade row # 5	45
6	Compressor blade row # 6	45
7	Compressor blade row # 7	45
8	Compressor blade row # 8	45
9	Compressor blade row # 9	45
10	Compressor blade row # 10	81
11	Compressor blade row # 11	81
12	Compressor blade row # 12	81
13	Compressor blade row # 13	81
14	Compressor blade row # 14	81
15	Compressor blade row # 15	81
16	Compressor blade row # 16	81
17	Compressor blade row # 17	81
18	Compressor blade row # 18	81
19	IGV Blade	1028
20	Spring blade	1028
21	Balance plug	1028

2. Documentation to be supplied

- Inspection and test plan for rotor
- Inspection and test results.
- Minimum weight and assembly chart for blades.

No. NEEPCO/AGBP/HOP/2016-19/W-8(A)

Dated 17.12.2018

To:

M/S Mitsubishi Corporation,
Power System Export Unit,
Power and Electrical Systems Division,
3-1, Marunouchi, 2-Chome,
Chiyoda-Ku, Tokyo - 1008086, Japan

Sub. NEEPCO/AGBP - Purchase Order for additional Spares and Consumables for CRR & CRI of the original rotor of MHI supplied Gas Turbine Unit 3

Ref (i) Our P O No. NEEPCO/AGBP/HOP/W-23/13-14/W-8(A)/205 Dated 26/05/2013
(ii) Minutes of FCOM held in AGBP Dated 05/12/2013
(iii) Our letter No. NEEPCO/AGBP/GT&AUX.W-23/17-18/249 Dated 29/12/2017
(iv) Your Offer No. XAF-NEEPCO-825P6M5 Dated 09/07/2018
(v) Our letter No. NEEPCO/AGBP/GT&AUX.W-23/18-19/40 Dated 21/07/2018
(vi) Your Offer No. XAF-NEEPCO-825P6L7-R2 Dated 27/08/2018
(vii) Our letter No. NEEPCO/AGBP/GT&AUX.W-23/18-19/108 Dated 11/09/2018
(viii) Your letter No. ENY/XA-F686 Dated 13/09/2018
(ix) Your letter No. ENY/XA-F688 Dated 19/09/2018
(x) Our letter No. NEEPCO/AGBP/GT&AUX.W-23/18-19/152 Dated 15/11/2018
(xi) Your letter No. ENY/XA-F702 Dated 22/11/2018
(xii) Our LOI ref: NEEPCO/AGBP/HOP/2017-18/W-8(A)/492 Dated 04/12/2018
(xiii) Your acceptance letter No. ENY/XA-F704 Dated 07/12/2018

Dear Sirs,

With the above reference, the Corporation is pleased to place this Purchase Order for supply of additional Spares and Consumables for CRR & CRI of the original rotor of MHI supplied Gas Turbine Unit 3 as per following terms & conditions.

Terms & Conditions:

1. Scope.

The scope shall include supply of additional Spare and Consumables for CRR & CRI of the original rotor of MHI supplied Gas Turbine Unit 3 as per the Schedule of Item and Prices (Annexure-I) enclosed along with this order on FOB, Japan basis

2. Prices:

The prices for supply of spare parts and consumables as detailed in the schedule of Item and Prices (Annexure-I) is JY 87,738,400 (Japanese Yen Eighty Seven Million Seven Hundred Thirty Eight Thousand Four Hundred) only on FOB Japan basis which shall remain firm till completion of supply. The prices are including packing and forwarding but excluding freight, insurance and any tax, duty or levy that may be imposed in India which, if applicable, shall be paid by NEEPCO at actual. Freight charges will be paid by NEEPCO at actual in Indian Rupees at the time of delivery of the spares at Indian Port directly to the carrier against raising of bills. All taxes, charges duties etc. leviable outside India shall be to your account. No agency commission is payable by us.

3. Terms of Payment:

100% contract price shall be made in Japanese Yen by an irrevocable, confirmed and non-restricted Letter of Credit to be established for the full amount in favour of Mitsubishi Corporation, Tokyo, (ATTN: ENY/XA-F) confirmed by a first class bank in Japan or Europe or USA, acceptable to Mitsubishi Corporation and payable at sight draft to be opened in favour of Mitsubishi Corporation, Tokyo against presentation of Invoice and Certificate of Origin with sufficient validity to cover contract actual time of shipment plus 21 days for negotiation but within validity of L/C. Any amendment charges which will be required due to the reason not attributable to seller shall be borne by buyer. Part payment against part shipment is allowed.

4. Insurance.

Insurance during transit to cover transit risks from Japanese export/port of origin to NEEPCO's warehouse at AGBP site shall be covered under NEEPCO's open marine Policy No. 200400211810000003 with National Insurance Company Limited, Gironia Manston, Chirwapatty Road, Tinsukia, Assam, PIN - 786125, (Fax No. 0374 - 2337191; Phone No. 0374 - 2331230) NEEPCO shall settle any claim directly with the underwriters. Supplier should give prior intimation in writing to the underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.

5. Delivery Period:

Shipment of the items shall be made within 12.5 months from the date of receipt of order or opening of relative irrevocable letter of credit acceptable to Mitsubishi Corporation whichever is later.

6. Inspection:

Manufacturer's inspection before shipment shall be final. All expenses of NEEPCO's inspector such as traveling & living expenses shall be borne by NEEPCO in case NEEPCO's inspector inspects them.

7. Packing:

Manufacturer's standard export packing shall be applied.

8. Port of Destination:

Airport seaport, Kolkata

9. Inland Transportation:

Inland transport from Kolkata to the Plant Site including port clearance shall be responsibilities of NEEPCO. The Corporation here will pay freight charges in Indian Rupees. Your documents like bill should indicate "Freight to pay" or "Freight to collect".

10. Custom Clearance:

The responsibility of custom clearance shall lie with NEEPCO. The "Coordinator, NEEPCO, Kolkata" shall take all necessary action towards arranging custom clearance expeditiously so that no demurrage charge is involved.

11. Warranty Period:

All the materials supplied shall be warranted against any defect of design, material, manufacturing or faulty workmanship for a period of 12 (twelve) months after arrival to the site or 18 (eighteen) months after FOB, whichever comes earlier.

12. Rejection of Defective Materials:

If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall replace the same at their own cost. Transportation cost for the replacement of the materials will be borne by the supplier.

14. Consignee:

The materials shall be received by the Coordinator, Kolkata, NEEPCO, DS-1, Maniktola Civic Centre, 1/16, VIP Road, CIT Scheme No. VII M, P.O.: Kankurgachi, Kolkata-700 054 who will thereafter forward the same to the ultimate consignee as detailed below:

The Senior Manager (E/M) Material Management Wing
Assam Gas Based Power Plant, NEEPCO,
P.O. Bokuloni, District. Dibrugarh, Assam,
PIN - 786191

15. Shipping Document:

Shipping documents shall include:

- i. Mitsubishi Corporation's Invoice
- ii. Packing list
- iii. Proof of shipment
- iv. Certificate of Origin
- v. Copies of Airway Bills

Copies of shipping and above documents shall be forwarded in advance to the ordering authority with copies to:

- i) The "Coordinator, Kolkata", NEEPCO, DS-1, Maniktola, 1/16, VIP Road, CIT Scheme No. VII M, P.O. Kankurgachi, Kolkata - 700 054
- ii) The Head Of Project, Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam, PIN 786 191
- iii) The GM (F) C, NEEPCO Ltd., Brookland Compound Lower New Colony, Shillong - 783 003
- iv) The ultimate consignee as mentioned above under clause No. 14.



16 Address for correspondence:

All correspondences in respect of this order shall be made with –
The General Manager (E/M) & Head of Project,
Assam Gas Based Power Plant NEEPCO Ltd.,
No.3 Bokuloni Village,
Dist. Dibrugarh, Assam, PIN – 786191.
(Fax No. 0374-2825349/2825217)

Kindly acknowledge receipt of this Purchase order and convey your acceptance.

Thanking you,

Encl: As stated above

Yours faithfully,

(D. Goswami)
 Sr. Manager (E/M)
 For & on behalf of
 General Manager (E/M) & Head of Project

N/O

Memo No. NEEPCO/AGBP/HOP/2018-19/W-8(A) 529-36

Dated 17/12/18

Copy to:

- i) The Director (Tech.), NEEPCO Ltd., Shillong, for kind perusal please. This has reference to the approval of CMD Dated 30/11/2018 conveyed vide U.O No. 938 Dated 30/11/2018 of O/O the ED (O&M), Shillong.
- ii) The GM (E/M) w/o O&M, NEEPCO Ltd., Shillong for kind information please.
- iii) The GM (Fin) CT, NEEPCO Ltd., Shillong – for kind information please
- iv) The Sr. Manager (E/M), MMW, AGBP, NEEPCO Ltd., Bokuloni for information.
- v) The Sr. Manager (E/M), GT&AD, AGBP, NEEPCO Ltd., Bokuloni for information.
- vi) The Sr. Manager (Fin), AGBP, NEEPCO Ltd., Bokuloni for information. Enclosed a copy of the approval dated 20.09.18
- vii) The Sr. Manager (Vigilance), AGBP, NEEPCO Ltd., Bokuloni for information.
- viii) The Coordinator, NEEPCO Ltd., DS-1, Manikola Civic Centre, CIT Scheme No VII M 1/16, VIP Road, P O Kankurgachi, Kolkata – 700 054 - for information please.

Sr. Manager (E/M)
 For & on behalf of
 General Manager (E/M) & Head of Project

SPARES & CONSUMABLES REQUIRED FOR CRR & CRI OF GT # 3 ROTOR

SL NO.	DESCRIPTION	ASSY. DWG.NO.	DETAIL DWG.NO.	UOM	Qty. Reqd.	Unit Price (₹)	Total Price (₹)
1	Turbine Blade Row # 1	09-53810-03	09-54104-01	Pcs	80	5,16,700.00	4,13,36,000.00
2	Turbine Blade Row # 3 (Standard)	09-53810-06	09-40142-01	Pcs	61	5,20,800.00	3,17,68,800.00
3	Turbine Blade Row # 3 (1st-End)	09-53810-07	09-40142-02	Pcs	4	5,20,800.00	20,83,200.00
4	Air Separator Bolt	09-53814-05	09-53668-04	Pcs	46	8,300.00	3,81,800.00
5	12 Point Self Lock Nut (For Air Separator Bolt)	09-53814-05	09-41222-02	Pcs	46	11,700.00	5,38,200.00
6	Side Plate Bolt	09-53813-06	09-53667-03	Pcs	40	47,800.00	19,12,000.00
7	12 Point Self Lock Nut (For Side Plate Bolt)	09-53813-05	09-41222-04	Pcs	40	13,900.00	5,56,000.00
8	Seal Plate (15)		09-53941-01	Pcs	20	33,300.00	6,66,000.00
9	Seal Pin (35)		09-34317-01	Pcs	65	4,600.00	2,99,000.00
10	Seal Plate (15 Up)		09-35014-01	Pcs	20	62,100.00	12,42,000.00
11	Seal Plate (15 Down)		09-40110-01	Pcs	80	33,600.00	26,88,000.00
12	Seal Plate (35 Up)		09-40109-02	Pcs	61	17,400.00	10,61,400.00
13	Seal Plate (35 Up)		09-56377-01	Pcs	2	1,30,300.00	2,60,600.00
14	Seal Plate (35 Up)		09-56377-02	Pcs	2	1,30,300.00	2,60,600.00
15	Seal Plate (35 Down)		09-40110-03	Pcs	63	29,600.00	18,64,800.00
16	Seal Plate (35 Down)		09-40110-05	Pcs	2	1,19,400.00	2,38,800.00
17	Set Screw		09-53957-01	Pcs	20	9,700.00	1,94,000.00
18	Hexagon Socket Set Screw		09-53957-02	Pcs	80	1,800.00	1,44,000.00
19	Set Screw		09-44685-01	Pcs	12	6,200.00	74,400.00
20	Set Screw		09-44685-02	Pcs	12	5,000.00	60,000.00
21	Washer		09-35017-01	Pcs	20	3,100.00	62,000.00
22	Washer		09-25062-04	Pcs	12	1,100.00	13,200.00
23	Washer		09-25062-05	Pcs	12	2,800.00	33,600.00
						FOB Japan Total	8,77,38,400.00

No: NEEPCO/AGBP/HOP/2018-19/W-23/ 03

Dated 05.04.2019

To:

M/S Mitsubishi Corporation,
Power System Export Unit,
Power and Electrical Systems Division,
3-1, Marunouchi, 2-Chome,
Chiyoda-Ku, Tokyo - 1006086, Japan

Sub: NEEPCO/AGBP - Purchase Order for Compressor Blades required for CRR & CRI of the original Rotor of MHPS supplied Gas Turbine Unit # 3.

Ref: (i) Our PO No. NEEPCO/AGBP/HOP/13-14/W-8(A)/205 dated 28.05.13.
(ii) Minutes of EKOM held in AGBP dated 05.12.13.
(iii) MC's Report No. ENY/XA-F713 dated 18.01.19.
(iv) MC's offer No. XAF-NEEPCO-825P7LU dated 21.01.19.
(v) Our letter No. NEEPCO/AGBP/GT&Aux/W-23/18-19/199 dated 14.02.19.
(vi) MC's letter No. ENY/XA-F725 dated 21.02.19.
(vii) MC's letter No. ENY/XA-F731 dated 13.03.19.

Dear Sirs,

With the above reference, the Corporation is pleased to place this Purchase Order for supply of additional Spares and Consumables for CRR & CRI of the original rotor of MHT supplied Gas Turbine Unit 3 as per following terms & conditions:

Terms & Conditions:

1. **Scope:**

The scope shall include supply of Compressor Blades required for CRR & CRI of the original Rotor of MHPS supplied Gas Turbine Unit # 3 as per the Schedule of Item and Prices (Annexure-I) enclosed along with this order on FOB, Japan basis.

2. **Prices:**

The prices for supply of spare parts and consumables as detailed in the schedule of Item and Prices (Annexure-I) is JY 1,080,200.00 (Japanese Yen One Million Eighty Thousand Two Hundred) only on FOB Japan basis which shall remain firm till completion of supply. The prices are including packing and forwarding but excluding freight, insurance and any tax, duty or levy that may be imposed in India, which, if applicable, shall be paid by NEEPCO at actual. Freight charges will be paid by NEEPCO at actual in Indian Rupees at the time of delivery of the spares at Indian Port directly to the carrier against raising of bills. All taxes, charges duties etc. leviable outside India shall be to your account. No agency commission is payable by us.

3. **Terms of Payment:**

100% contract price shall be made in Japanese Yen by an irrevocable, confirmed and non-restricted Letter of Credit to be established for the full amount in favour of Mitsubishi Corporation, Tokyo, (ATTN: ENY/XA-F) confirmed by a first class bank in Japan or Europe or USA, acceptable to Mitsubishi Corporation and payable at sight draft to be opened in favour of Mitsubishi Corporation, Tokyo against presentation of Invoice and Certificate of Origin with sufficient validity to cover contractual time of shipment plus 21 days for negotiation but within validity of L/C. Any amendment charges which will be required due to the reason not attributable to seller shall be borne by buyer. Part payment against part shipment is allowed

4. Insurance:

Insurance during transit to cover transit risks from Japanese airport/port of origin to NEEPCO's warehouse at AGBP site shall be covered under NEEPCO's open marine Policy No. 200400211810000003 with National Insurance Company Limited, Ginoria Mansion, Chirwapatty Road, Tinsukia, Assam, PIN - 786125, (Fax No. 0374 - 2337191; Phone No. 0374 - 2331230). NEEPCO shall settle any claim directly with the underwriters. Supplier should give prior intimation in writing to the underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.

5. Delivery Period:

Delivery of the materials will match the delivery of the Rotor currently undergoing CRR & CRI.

6. Inspection:

Manufacturer's inspection before shipment shall be final. All expenses of NEEPCO's inspector such as traveling & living expenses shall be borne by NEEPCO in case NEEPCO's inspector inspects them.

7. Packing:

Manufacturer's standard export packing shall be applied

8. Port of Destination:

Airport/ seaport, Kolkata.

9. Inland Transportation:

Inland transport from Kolkata to the Plant Site including port clearance shall be responsibilities of NEEPCO. The Corporation here will pay freight charges in Indian Rupees. Your documents like bill should indicate "Freight to pay" or "Freight to collect".

10. Custom Clearance:

The responsibility of custom clearance shall lie with NEEPCO. The "Coordinator, NEEPCO, Kolkata" shall take all necessary action towards arranging custom clearance expeditiously so that no demurrage charge is involved.

11. Warranty Period:

All the materials supplied shall be warranted against any defect of design, material, manufacturing or faulty workmanship for a period of 12 (twelve) months after arrival to the site or 18 (eighteen) months after FOB, whichever comes earlier.

12. Rejection of Defective Materials:

If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall replace the same at their own cost. Transportation cost for the replacement of the materials will be borne by the supplier.

14. Consignee:

The materials shall be received by the Coordinator, Kolkata, NEEPCO, DS-1, Maniktola Civic Centre, 1/16, VIP Road, CIT Scheme No. VII M, P.O.: Kankurgachi, Kolkata-700 054 who will thereafter forward the same to the ultimate consignee as detailed below.

The Senior Manager (E/M) Material Management Wing
Assam Gas Based Power Plant, NEEPCO,
P.O. Bokuloni, District: Dibrugarh, Assam
PIN: - 786191

15. Shipping Document:

Shipping documents shall include:

- i. Mitsubishi Corporation's Invoice
- ii. Packing list
- iii. Proof of shipment
- iv. Certificate of Origin
- v. Copies of Airway Bills

Copies of shipping and above documents shall be forwarded in advance to the ordering authority with copies to:

- i) The "Coordinator, Kolkata", NEEPCO, DS-I, Maniktola, 1/16, VIP Road, CIT Scheme No. VII M, P.O. Kankurgachi, Kolkata - 700 054
- ii) The Head Of Project, Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam, PIN: 786 191
- iii) The GM (F) CT, NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong - 793 003
- iv) The ultimate consignee as mentioned above under clause No. 14.

16. Address for correspondence:

All correspondences in respect of this order shall be made with -
 The General Manager (E/M) & Head of Project,
 Assam Gas Based Power Plant, NEEPCO Ltd.,
 No.3 Bokuloni Village,
 Dist. Dibrugarh, Assam, PIN - 786191.
 (Fax No. 0374-2825349/2825217)

Kindly acknowledge receipt of this Purchase order and convey your acceptance.

Thanking you,

Encl: As stated above

Yours faithfully,

(U. Hazarika)

Sr. Manager (E/M)
 GT & Aux. Divn., AGBP
 NEEPCO Ltd., Bokuloni

NIO

Memo No. NEEPCO/AGBP/HOP/2018-19/W-23/ 04-07

Dated 05.04.2019

Copy to:

1. The GM & HOP, AGBP, NEEPCO Ltd, Bokuloni for favour of Information please. This order is placed as per the approval conveyed vide U. U. No. NEEPCO/HOP/22 dated 04.04.2019.
2. The Sr. Manager (E), Vigilance Wing, AGBP, NEEPCO Ltd., Bokuloni for information please.
3. The Sr. Manager (E), MMW, AGBP, NEEPCO Ltd, Bokuloni for information and necessary action please.
4. The Sr. Manage (F), AGBP, NEEPCO Ltd, Bokuloni for information please. Copy of approval is enclosed herewith.

Sr. Manager (E/M),
 GT & Aux. Divn., AGBP

For Sl. No. 2.

No. NEEPCO/AGBP/HOP/2019-20/W-8(A)/575

Dated 28/02/2020

To:

M/S Mitsubishi Corporation,
Power System Export Unit,
Power and Electrical Systems Division,
3-1, Marunouchi, 2-Chome,
Chiyoda-Ku, Tokyo - 1008086, Japan

Sub: NEEPCO/AGBP - Purchase Order for additional Spares and Consumables for CRR & CRI of the original rotor of MHI supplied Gas Turbine Unit 2.

Ref: (i) Our P.O. No. NEEPCO/AGBP/HOP/W-23/13-14/W-8(A)/205 Dated 28/05/2013
(ii) Minutes of EKOM held in AGBP Dated 05/12/2013
(iii) Your Offer No. XAF-NEEPCO-825P8CQ Dated 17/09/2019
(iv) Our letter No. NEEPCO/AGBP/GT&AUX.W-23/19-20/145 Dated 25/10/2019
(v) Your E-mail Dated 11/11/2019
(vi) Our letter No. NEEPCO/AGBP/GT&AUX.W-23/19-20/194 Dated 19/12/2019
(vii) Your letter No. ENY/XA-F789 Dated 06/01/2020

Dear Sirs,

With the above reference, the Corporation is pleased to place this Purchase Order for supply of additional Spares and Consumables for CRR & CRI of the original rotor of MHI supplied Gas Turbine Unit 2 as per following terms & conditions:

Terms & Conditions:**1. Scope:**

The scope shall include supply of additional Spare and Consumables for CRR & CRI of the original rotor of MHI supplied Gas Turbine Unit 2 as per the Schedule of Item and Prices (Annexure-I) enclosed along with this order on FOB, Japan basis.

2. Prices:

The prices for supply of spare parts and consumables as detailed in the schedule of Item and Prices (Annexure-I) is JY 128,897,720 (Japanese Yen One Hundred Twenty-Eight Million Eight Hundred Ninety-Seven Thousand Seven Hundred Twenty) only on FOB Japan basis which shall remain firm till completion of supply. The prices are including packing and forwarding but excluding freight, insurance and any tax, duty or levy that may be imposed in India, which, if applicable, shall be paid by NEEPCO at actual. Freight charges will be paid by NEEPCO at actual in Indian Rupees at the time of delivery of the spares at Indian Port directly to the carrier against raising of bills. All taxes, charges duties etc. leviable outside India shall be to your account. No agency commission is payable by us.

3. Terms of Payment:

100% contract price shall be made in Japanese Yen by an irrevocable, confirmed and non-restricted Letter of Credit to be established for the full amount in favour of Mitsubishi Corporation, Tokyo, (ATTN: ENY/XA-F) confirmed by a first class bank in Japan or Europe or USA, acceptable to Mitsubishi Corporation and payable at sight draft to be opened in favour of Mitsubishi Corporation, Tokyo against presentation of Invoice and Certificate of Origin with sufficient validity to cover contractual time of shipment plus 21 days for negotiation but within validity of L/C. Any amendment charges which will be required due to the reason not attributable to seller shall be borne by buyer. Part-payment against part shipment is allowed.

4. Insurance:

Insurance during transit to cover transit risks from Japanese export/port of origin to NEEPCO's warehouse at AGBP site shall be covered under NEEPCO's open marine Policy No. 2004/00211910000006 with National Insurance Company Limited, Gioria Mansion, Chirwapatty Road, Tinsukia, Assam, PIN - 786125, (Fax No. 0374 - 2337191; Phone No. 0374 - 2331230) NEEPCO shall settle any claim directly

with the underwriters. Supplier should give prior intimation in writing to the underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.

5. **Delivery Period:**
Shipment of the items shall be made within 20 (Twenty) months from the date of receipt of order or opening of relative irrevocable letter of credit acceptable to Mitsubishi Corporation whichever is later.
6. **Inspection:**
Manufacturer's inspection before shipment shall be final. All expenses of NEEPCO's inspector such as traveling & living expenses shall be borne by NEEPCO in case NEEPCO's inspector inspects them.
7. **Packing:**
Manufacturer's standard export packing shall be applied.
8. **Port of Destination:**
Airport/ seaport, Kolkata.
9. **Inland Transportation:**
Inland transport from Kolkata to the Plant Site including port clearance shall be responsibilities of NEEPCO. The Corporation here will pay freight charges in Indian Rupees. Your documents like bill should indicate "Freight to pay" or "Freight to collect".
10. **Custom Clearance:**
The responsibility of custom clearance shall be with NEEPCO. The "Coordinator, NEEPCO, Kolkata" shall take all necessary action towards arranging custom clearance expeditiously so that no demurrage charge is involved.
11. **Warranty Period:**
All the materials supplied shall be warranted against any defect of design, material, manufacturing or faulty workmanship for a period of 12 (twelve) months after arrival to the site or 18 (eighteen) months after FOB, whichever comes earlier.
12. **Liquidated Damage:**
In case the supplier fails to deliver the materials within offered contractual delivery period due to reasons attributable to the supplier, then the Corporation reserve the right to recover from the supplier's sum towards Liquidated Damage @ 1/2% (half percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account of this shall, however, not exceed 10% (ten percent) of the value of the undelivered portion of supply. However, the Liquidated Damage will not be imposed if the supplier fails to deliver the materials within the scheduled delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, floods, explosion or fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.
13. **Security-cum- Performance Guarantee:**
Within 30 (thirty) days from the date of issue of purchase order, the supplier shall furnish bank guarantee from a scheduled nationalized bank for an amount equivalent to 10% (ten percent) of the contract value towards faithful performance of the contract. The Bank Guarantee shall be valid for a period to cover 90 (ninety) days after expiry of warranty period.
14. **Rejection of Defective Materials:**
If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall replace the same at their own cost. Transportation cost for the replacement of the materials will be borne by the supplier.
15. **Consignee:**
The materials shall be received by the Coordinator, Kolkata, NEEPCO, DS-1, Maniktola Civic Centre, 1/16, VIP Road, CIT Scheme No. VII M, P.O.: Kankurgachi, Kolkata-700 054 who will thereafter forward the same to the ultimate consignee as detailed below.
The DGM (E/M) Material Management Wing
Assam Gas Based Power Plant, NEEPCO,
P.O. Bokudoni, District Dibrugarh, Assam.
PIN - 786191
16. **Shipping Document:**
Shipping documents shall include:
 - i. Mitsubishi Corporation's Invoice

Our P.O. ref: NEEPCO/AGBP/HOP/2019-20/W-8(A)/575

date 28.02.2020

SCHEDULE OF ITEMS AND PRICES

Sl. NO.	DESCRIPTION	DETAIL DWG.NO.	UOM	Qty. Reqd.	Unit Price (₹)	Total Price (₹)
1	Set Screw	09-53957-01	Pcs	20	9,660.00	1,93,200.00
2	Hexagon Socket Set Screw	09-53957-02	Pcs	80	1,800.00	1,44,000.00
3	Set Screw	09-44685-01	Pcs	12	6,160.00	73,920.00
4	Set Screw	09-44685-02	Pcs	12	4,990.00	59,880.00
5	Washer	09-35017-01	Pcs	20	3,070.00	61,400.00
6	Washer	09-25062-05	Pcs	12	2,780.00	33,360.00
7	Washer	09-25062-04	Pcs	12	1,100.00	13,200.00
8	Turbine Blade Row # 1	00-19099-01	Pcs	80	5,16,670.00	4,13,33,600.00
9	Turbine Blade Row # 2 (Standard)	(09-33090)-(01)	Pcs	66	4,89,000.00	3,22,74,000.00
10	Turbine Blade Row # 2 (1st-End)	(09-33090)-(02)	Pcs	4	4,89,000.00	19,56,000.00
11	Turbine Blade Row # 3 (Standard)	09-40142-01	Pcs	61	5,20,830.00	3,17,70,630.00
12	Turbine Blade Row # 3 (1st-End)	09-40142-02	Pcs	4	5,20,830.00	20,83,320.00
13	Seal Plate Row # 1	09-40110-01	Pcs	80	33,620.00	26,89,600.00
14	Seal Plate Row # 2	09-40109-01	Pcs	66	42,280.00	27,90,480.00
15	Seal Plate Row # 2	09-59596-02	Pcs	2	1,26,670.00	2,53,340.00
16	Seal Plate Row # 2	09-59596-01	Pcs	2	1,26,670.00	2,53,340.00
17	Seal Plate Row # 2	09-40110-03	Pcs	68	27,710.00	18,84,280.00
18	Seal Plate Row # 2	09-40110-04	Pcs	2	1,16,370.00	2,32,740.00
19	Seal Plate Row # 3	09-40109-02	Pcs	61	17,410.00	10,62,010.00
20	Seal Plate Row # 3	09-56377-02	Pcs	2	1,30,290.00	2,60,580.00
21	Seal Plate Row # 3	09-56377-01	Pcs	2	1,30,290.00	2,60,580.00
22	Seal Plate Row # 3	09-40110-03	Pcs	63	29,620.00	18,66,060.00
23	Seal Plate Row # 3	09-40110-05	Pcs	2	1,19,370.00	2,38,740.00
24	Seal Plate (D)	09-35014-01	Pcs	20	62,150.00	12,43,000.00
25	Seal Plate (C)	09-53941-01	Pcs	20	33,300.00	6,66,000.00
26	Seal Pin Row # 2	09-53669-01		70	21,650.00	15,15,500.00
27	Seal Pin Row # 3	09-34317-01	Pcs	65	4,580.00	2,97,700.00
28	Air Separator Bolt	09-53668-04	Pcs	46	8,340.00	3,83,640.00
29	12 Point Self Lock Nut (For Air Separator Bolt)	09-41222-02	Pcs	46	11,670.00	5,36,820.00
30	Side Plate Bolt	09-53667-03	Pcs	40	47,780.00	19,11,200.00
31	12 Point Self Lock Nut (For Side Plate Bolt)	09-41222-04	Pcs	40	13,890.00	5,55,600.00
FOB Japan Total						12,88,97,720.00

रिजिस्ट्रार



- ii. Packing list
- iii. Proof of shipment
- iv. Certificate of Origin

Copies of shipping and above documents shall be forwarded in advance to the ordering authority with copies to:

- i) The "Coordinator, Kolkata", NEEPCO, DS-I, Manikola, 1/16, VIP Road, CIT Scheme No VII M, P.O. Kankurgachi, Kolkata - 700 054.
- ii) The Head of Project, Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam, PIN: 786 191
- iii) The CGM (F) CT, NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong - 793 003
- iv) The ultimate consignee as mentioned above under clause No 15

17. Address for correspondence:

All correspondences in respect of this order shall be made with -
 The Chief General Manager (E/M) & Head of Project,
 Assam Gas Based Power Plant, NEEPCO Ltd.,
 No.3 Bokuloni Village,
 Dist. Dibrugarh, Assam, PIN - 786191
 (Fax No 0374-2825349/2825217)

Kindly acknowledge receipt of this Purchase order and convey your acceptance.

Thanking you,

Encl: As stated above

Yours faithfully,

DGM (E/M)
 For & on behalf of
 CGM (E/M) & Head of Project

Dated 28/02/2020

1 NIO

Memo No. NEEPCO/AGBP/HOP/2019-20/W-8(A)/576-583
 Copy to.

1. The Director (Tech.), NEEPCO Ltd., Shillong, for kind perusal please. This has reference to the approval of CMD Dated 24/02/2020 conveyed vide U.O. No. 1134 Dated 25/02/2020 of O/O the ED (O&M), Shillong.
2. The ED (O&M), NEEPCO Ltd., Shillong for kind information please
3. The CGM (Fin) CT, NEEPCO Ltd., Shillong for kind information please.
4. The DGM (E/M), MINW, AGBP, NEEPCO Ltd., Bokuloni for information.
5. The DGM (E/M), ST&AD, AGBP, NEEPCO Ltd., Bokuloni for information.
6. The DGM (Fin), AGBP, NEEPCO Ltd., Bokuloni for information. Enclosed a copy of the approval dated 20.09.16
7. The DGM (Vigilance), AGBP, NEEPCO Ltd., Bokuloni for information.
8. The Coordinator, NEEPCO Ltd., DS-I, Manikola Civic Centre, CIT Scheme No. VII M 1/16, VIP Road, P.O. Kankurgachi, Kolkata - 700 054 - for information please

DGM (E/M)
 For & on behalf of
 CGM (E/M) & Head of Project



No NEEPCO/AGBP/HOP/2021-22/W-8(A)/ 154

Dated 02/8/2021

To,

M/s Mitsubishi Corporation,
Power Systems Export Unit,
Power and Electrical Systems Division,
3-1, Marunouchi, 2-Chome, Chiyoda-Ku,
Tokyo - 100-8386, Japan
(Fax No: 011 4368 2333)

Sub: NEEPCO/AGBP - Purchase order for supply of Spare parts and Consumables required for replacement of Turbine Blade Ring and Torque Tube cover of MHPS supplied Gas Turbine Unit # 1.

Ref: (i) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/20-21/80 dated 23.07.2020

(ii) Your Offer No. XAF-NEEPCO-825P7V0 dated 30.07.2020.

(iii) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/20-21/115 dated 14.08.2020

(iv) Your letter No. ENY/XA-F833 dated 18.08.2020

(v) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/20-21/162 dated 05.10.2020

(vi) Your letter No. ENY/XA-F854 dated 09.10.2020.

(vii) Your revised Offer No. XAF-NEEPCO-825P7V0-R1 dated 09.10.2020

(viii) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/20-21/184 dated 29.10.2020

(ix) Your letter No. ENY/XA-F862 dated 09.11.2020

(x) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/20-21/262 dated 17.02.2021

(xi) Your letter No. ENY/XA-F883 dated 25.02.2021

(xii) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/21-22/20 dated 03.05.2021.

(xiii) Your letter No. MCY/XA-F897 dated 07.05.2021

(xiv) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/21-22/22 dated 28.05.2021.

(xv) Your letter No. MCY/XA-F903 dated 01.06.2021.

(xvi) Our Letter of Intent No. NEEPCO/AGBP/HOP/21-22/W-8(A)/142 dated 23.07.2021.

(xv) Your letter No. MCY/XA-F911 dated 29.07.2021.

Dear Sirs,

With the above reference, the Corporation is pleased to place this Purchase Order for Spare parts and Consumables required for replacement of Turbine Blade Ring and Torque Tube cover of MHPS supplied Gas Turbine Unit # 1 as per following terms & conditions.

Terms & Conditions:

1. Scope:

The scope shall include supply of spare parts and consumables required for replacement of Turbine Blade Ring and Torque Tube cover of MHPS supplied Gas Turbine Unit # 1 as per the Schedule of Item and Prices (Annexure I) enclosed along with this order on FOB, Japan basis.

2. Prices:

The prices for supply of spare parts and consumables required for replacement of Turbine Blade Ring and Torque Tube cover of MHPS supplied Gas Turbine Unit # 1 as detailed in the schedule of Item and Prices (Annexure-I) is JPY 155,665,170.00 (Japanese Yen One Hundred Fifty Five Million Six Hundred Sixty Five Thousand One Hundred Seventy) only on FOB, Japan, which shall remain firm till completion of supply. The prices are including packing and forwarding but excluding freight, insurance and any tax, duty or levy that may be imposed in India, which, if applicable, shall be paid by NEEPCO at actual. Freight charges will be paid by NEEPCO at actual in Indian Rupees at the time of delivery of the spares at Indian Port directly to the carrier against raising of bills. All taxes, charges, duties etc. leviable outside India shall be to your account only. No agency commission is payable by us.

3. Terms of Payment:

100% contract price shall be made in Japanese Yen by an irrevocable, confirmed and non-restricted Letter of Credit to be established for the full amount in favour of Mitsubishi Corporation, Tokyo, (ATTN: ENV/XA-F) confirmed by a first class bank in Japan or Europe or USA, acceptable to Mitsubishi Corporation and payable at sight draft to be opened in favour of Mitsubishi Corporation, Tokyo, against presentation of shipping documents and with sufficient validity to cover contractual time of shipment plus 21 days for negotiation but within validity of L/C. Any amendment charges which will be required due to the reason not attributable to seller shall be borne by Buyer. Part payment against part shipment is allowed.

4. Insurance:

Insurance during transit to cover transit risks from Japanese airport/port of origin to NEEPCO's warehouse at AGEF site shall be covered under NEEPCO's open marine Policy No. 200400712030000024 with National Insurance Company Limited, Ghoria Mansion, Chirrapally Road, Tinsukia, Assam, PIN - 786125, (Fax No. 0374 - 2337191; Phone No. 0374 - 2331230). NEEPCO shall settle any claim directly with the underwriters. A copy of the insurance policy shall be provided to Mitsubishi Corporation for arranging shipment upto Kolkata. Supplier should give prior intimation in writing to the above mentioned underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.

5. Delivery Period:

Shipment of the items under Annexure-I shall be made within 19.5 (Nineteen and half) months from the date of receipt of order or opening of relative irrevocable letter of credit acceptable to Mitsubishi Corporation whichever is later. Partial shipment shall be allowed. However, Mitsubishi Corporation will be requested to complete the delivery of materials as soon as possible so that the work can be started as per schedule.

6. Inspection:

Manufacturer's inspection before shipment shall be final. All expenses of NEEPCO's inspector such as traveling & living expenses shall be borne by NEEPCO in case NEEPCO's inspector inspects them.

7. Packing:

Manufacturer's standard export packing shall be applied.

8. Port of Destination:

Airport, Kolkata.

9. Inland Transportation:

Inland transport from Kolkata Airport to the Plant Site including port clearance shall be responsibilities of NEEPCO. The Corporation here will pay Air freight charges in Indian Rupees. Your documents like Airway bill should indicate "Freight to pay" or "Freight to collect".

10. Custom Clearance:

The responsibility of custom clearance shall be with NEEPCO. The "Coordinator, NEEPCO, Kolkata" shall take all necessary action towards arranging custom clearance expeditiously so that no demurrage charge is involved.

11. Warranty Period:

All the materials supplied shall be warranted against any defect of design, material, manufacturing or faulty workmanship for a period of 12 (twelve) months after arrival to the site or 18 (eighteen) months after FCB, whichever comes earlier.

12. Rejection of Defective Materials:

If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall replace the same at their own cost. Transportation cost for the replacement of the materials will be borne by the supplier.

13. Consignee:

The materials shall be received by the Coordinator, Kolkata, NEEPCO, OS-1, Manikola Civic Centre, 1/16, VIP Road, CIT Scheme No. VII A, P.O.: Bhubaneswar, Kolkata 700 054 who will thereafter forward the same to the ultimate consignee as detailed below:

The DGM (E/M) Material Management Wing
Assam Gas Based Power Plant, NEEPCO,
P.O. Bokuloni, District: Dibrugarh, Assam.
PIN - 786191



14. Shipping Document:

Shipping documents shall include:

- i. Mitsubishi Corporation's Invoice
- ii. Packing list
- iii. Proof of shipment
- iv. Certificate of Origin
- v. Copies of Airway Bills

Copies of shipping documents shall be forwarded in advance to the ordering authority with copies to:

- i) The "Coordinator, Kolkata", NEEPCO DS-1, Maniktola, 1/16, VIP Road, CIT Scheme No VII M, P.O Kankurgachi, Kolkata - 700 054
- ii) The Head Of Project, Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist - Dibrugarh, Assam, PIN: 786 191
- iii) The DGM (E) CT, NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong - 793 003
- iv) The ultimate consignee as mentioned above under clause No. 15.

15. Address for correspondence:

All correspondences in respect of this order shall be made with -
 The Chief General Manager & Head of Project,
 Assam Gas Based Power Plant, NEEPCO Ltd.,
 No 3 Bokuloni Village,
 Dist Dibrugarh, Assam, PIN - 785191.
 (Fax No. 0374-2825349/2825217)

Kindly acknowledge receipt of this Purchase order and convey your acceptance.

Thanking you,

Encl. As stated above

Yours faithfully,


 DGM (E/M)

For & on behalf of
 DGM (E/M) & Head of Project

NFO

Memo No. NEEPCO/AGBP/HOP/2021-22/W 3(A), ISS-62

Dated 02/8/2021

Copy to:

1. The Director (T), NEEPCO Ltd., Shillong - for kind perusal please. This has reference to approval of CMD Dated 14/07/2021 conveyed vide e-mail dated 14/07/2021 of EO (O&M).
2. The Executive Director (O&M), NEEPCO Ltd., Shillong - for kind perusal please.
3. The DGM (Fin) CT, NEEPCO Ltd., Shillong, Enclosed a copy of the approval.
- ✓ 4. The DGM (C/M), GT&Aux, AGBP, NEEPCO Ltd., Bokuloni, for information please.
5. The DGM (Fin), AGBP, NEEPCO Ltd., Bokuloni, for information.
6. The DGM (E/M), MIAW, AGBP, NEEPCO Ltd., Bokuloni, for information.
7. The DGM (Vigilance), AGBP, NEEPCO Ltd., Bokuloni, for information.
8. The Coordinator, NEEPCO Ltd., DS-1, Manikrola Civic Centre, CIT Scheme No. VII M 1/15, VIP Road, P.O. Kankurgachi, Kolkata - 700 054 - for information please.


02/08/21
DGM (E/M)For & on behalf of
CGM (E/M) & Head of Project

**Spares and consumables required for replacement of Turbine Blade Ring and Torque Tube cover in
Gas Turbine Unit # 1**

Sl. No.	Description	ASS'Y Drawing No.	Drawing No.	UOM	QTY	Unit Price (₹)	Amount (₹)
1	TORQUE TUBE COVER	GO-27774-04	09-54039-01	SET	1	66,97,570.00	66,97,570.00
2	SEAL RING No 5, 7(16PCS = 1SET)	GO-27774-54	09-53869-01	SET	2	13,08,330.00	26,16,660.00
3	SEAL RING No 6(8PCS = 1SET)	GO-27774-55	09-53870-01	SET	1	12,10,000.00	12,10,000.00
4	RETAINER PLATE	GO-27774-59	09-54427-01	PCS	28	5,920.00	1,65,760.00
5	LEAF SPRING	GO-27774-60	09-54427-04	PCS	24	25,920.00	6,22,080.00
6	HEX BOLT	GO-27774-66	09-35412-03	PCS	28	2,690.00	75,320.00
7	BOLT	GO-27774-64	09-54430-02	PCS	6	6,480.00	38,880.00
8	SLOT HEAD SCREW	GO-27774-66	09-54430-05	PCS	28	13,700.00	3,83,600.00
9	SEAL PLATE(4PCS = 1SET)	GO-27774-16	09-54434-12	PCS	4	76,750.00	3,07,000.00
10	HEX SOC HEAD CAP SCREW	GO-27774-68	09-54439-01	PCS	8	8,060.00	64,480.00
11	SEAL RING(8PCS = 1SET)	GO-27774-17	09-56033-09	PCS	8	2,77,640.00	22,21,120.00
12	SEAL RING(20PCS = 1SET)	GO-27774-70	09-35407-09	SET	1	33,16,670.00	33,16,670.00
13	RETAINER PLATE	GO-27774-71	09-35408-01	PCS	20	10,000.00	2,00,000.00
14	RETAINER PLATE	GO-27774-72	09-35408-02	PCS	20	8,330.00	1,66,600.00
15	SPRING	GO-27774-73	09-35409-01	PCS	40	7,590.00	3,03,600.00
16	KEY	GO-27774-74	09-35410-01	PCS	2	29,440.00	58,880.00
17	KEY	GO-27774-75	09-35410-02	PCS	18	25,990.00	4,67,820.00
18	LINK	GO-27774-76	09-35411-01	PCS	2	23,620.00	47,240.00
19	LINK	GO-27774-77	09-35411-02	PCS	18	31,480.00	5,66,640.00
20	HEX SOC HEAD CAP SCREW	GO-27774-80	09-35412-01	PCS	20	6,780.00	1,35,600.00
21	SCREW	GO-27774-81	09-35412-07	PCS	20	12,890.00	2,57,800.00
22	HONEYCOMB SEAL	GO-27774-76	09-53727-01	PCS	10	1,71,000.00	17,10,000.00
23	HONEYCOMB SEAL	GO-27774-80	09-53727-02	PCS	10	1,68,000.00	16,80,000.00
24	HEX BOLT	GO-27774-79	09-53728-01	PCS	60	8,500.00	5,10,000.00
25	WASHER	GO-27774-85	09-53728-02	PCS	60	3,100.00	1,86,000.00
26	TAPER PIN	GO-27774-49	09-54039-04	PCS	2	780.00	1,560.00
27	SEAL STRIP		09-54039-05	PCS	4	31,140.00	1,24,440.00
28	LOCKING STRIP		09-54039-06	PCS	4	24,440.00	97,760.00
29	STOPPER PLATE	GO-27774-63	09-54427-07	PCS	2	1,000.00	2,000.00
30	TURBINE BLADE RING	09-74378-02	09-72802-01	SET	1	3,98,25,170.00	3,98,25,170.00
31	TORQUE PIN	GO-30173-07	09-72803-06	PCS	4	22,500.00	90,000.00
32	REAMER BOLT	GO-30173-36	09-55185-01	PCS	4	19,170.00	76,680.00
33	HEX SOC HEAD SCREW	GO-30173-37	09-72800-05	PCS	16	12,420.00	2,19,960.00
34	BOX NUT	GO-30173-35	09-72800-08	PCS	8	5,830.00	46,640.00
35	BOX NUT	GO-30173-40	09-72800-09	PCS	18	39,080.00	7,03,440.00
36	HEX SOC HEAD SCREW	GO-30173-64	09-72800-06	PCS	2	9,440.00	18,880.00
37	BOX NUT	GO-30173-65	09-72800-10	PCS	2	10,560.00	21,120.00
38	HEX SOC HEAD SCREW	GO-30173-89	09-72800-07	PCS	4	13,610.00	54,440.00
39	BOX NUT	GO-30173-90	09-72800-11	PCS	4	9,600.00	38,400.00
40	ORIFICE BOLT	09-74378-19	09-57269-01	PCS	23	21,260.00	4,88,980.00
41	ORIFICE BOLT	09-74378-20	09-57269-02	PCS	22	18,790.00	4,13,380.00
42	CAP	09-74378-21	09-34797-01	PCS	24	11,810.00	2,83,440.00
43	STOPPER PIN	09-74378-22	09-34797-02	PCS	24	20,790.00	4,98,960.00
44	SEAL DIAPHRAGM	09-74378-23	09-54127-01	PCS	40	1,03,000.00	41,20,000.00
45	PIN	09-74378-24	09-54702-04	PCS	40	8,800.00	3,52,000.00
46	BAFFLE	09-74378-25	09-54463-02	PCS	7	1,58,330.00	3,16,660.00
47	BAFFLE	09-74378-26	09-54464-04	PCS	7	7,13,330.00	4,76,660.00
48	BAFFLE	09-74378-27	09-54465-02	PCS	2	1,78,590.00	3,57,780.00
49	BAFFLE	09-74378-28	09-54466-04	PCS	2	1,97,780.00	3,95,560.00
50	PIN	09-74378-29	09-54702-03	PCS	38	19,780.00	7,51,640.00
51	PIN	09-74378-31	09-54702-04	PCS	12	27,970.00	3,34,440.00

Spares and consumables required for replacement of Turbine Blade Ring and Torque Tube cover in
Gas Turbine Unit # 1

Sl. No.	Description	ASSY Drawing No.	Drawing No.	UOM	QTY	Unit Price (INR)	Amount (INR)
52	SPECIAL BOLT	09-74378-42	09-44783-01	PCS	12	23,000.00	2,60,800.00
53	BUSHING	09-74378-43	09-44783-02	PCS	12	30,490.00	3,65,880.00
54	HEX NUT	09-74378-44	09-44783-03	PCS	12	18,500.00	2,22,000.00
55	RETAINER BLOCK	09-74378-46	09-53703-02	PCS	58	12,70,560.00	4,82,81,280.00
56	RETAINER BLOCK	09-74378-47	09-54705-05	PCS	2	63,88,890.00	1,27,77,780.00
57	SQUARE SEAL ASSY	09-74378-49	09-55979-01	SET	8	14,18,330.00	1,13,46,640.00
58	LOCK WIRE (SUS304)	09-74378-53		PCS	1	2,100.00	2,100.00
59	HEX BOLT	09-74378-54	09-54704-02	PCS	8	7,090.00	56,720.00
60	#2 PLATE (STANDARD)		09-72802-03	PCS	3	1,03,440.00	3,10,320.00
61	#2 PLATE (T/C)		09-72802-04	PCS	2	1,05,560.00	2,11,120.00
62	#2 PLATE (B/S)		09-72802-05	PCS	1	1,05,560.00	1,05,560.00
63	#3 PLATE (STANDARD)		09-72802-06	PCS	4	90,280.00	3,61,120.00
64	#3 PLATE (T/C)		09-72802-07	PCS	1	1,14,440.00	1,14,440.00
65	#3 PLATE (B/S)		09-72802-08	PCS	1	1,14,440.00	1,14,440.00
66	SPACER		09-72802-09	PCS	36	1,760.00	63,360.00
67	PIN		09-72802-10	PCS	36	5,240.00	1,88,640.00
68	SPECIAL BOLT		09-72802-11	PCS	18	3,020.00	54,360.00
69	HEX BOLT		09-72802-12	PCS	18	3,110.00	55,980.00
70	PLUG	09-55049-05	09-44678-02	PCS	4	33,890.00	1,35,560.00
71	BAR	09-55049-13	09-55052-01	PCS	2	21,440.00	42,880.00
72	BAR	09-55049-14	09-55052-02	PCS	2	21,440.00	42,880.00
73	WASHER	09-55049-29	09-44705-04	PCS	4	1,440.00	5,760.00
74	TEMPORARILY TORQUE PIN		8L-00206-02	PCS	4	1,55,780.00	6,23,120.00
	RETAINER PLATE		8L-00206-03	PCS	4	Price included in SI No. 74.	Price included in SI No. 74.
	LINER		8L-00206-04	PCS	8	Price included in SI No. 74.	Price included in SI No. 74.
	LINER		8L-00206-05	PCS	8	Price included in SI No. 74.	Price included in SI No. 74.
	LINER		8L-00206-06	PCS	8	Price included in SI No. 74.	Price included in SI No. 74.
	LINER		8L-00206-07	PCS	8	Price included in SI No. 74.	Price included in SI No. 74.
	LINER		8L-00206-08	PCS	8	Price included in SI No. 74.	Price included in SI No. 74.
	HEX SOG HEAD CAP SCREW		8L-00206-09	PCS	16	Price included in SI No. 74.	Price included in SI No. 74.
75	FLEXIBLE TUBE		G7-12531-01	PCS	2	28,77,060.00	57,54,120.00
76	MARMAN COUPLING	68-27735-00	09-61747-04	PCS	2	40,000.00	80,000.00
PCA Jansu Total							1,95,56,65,170.00

/s/

NEEPCO MEETING on Sep, 2018

Discussion Item	Price (JPY)	Delivery period	Reference Document		Remarks
			Technical	Commercial	
1 3rd Comprehensive Rotor Inspection	¥259,154,390	20 Month FOB/FCA	ME-101868 ME-180890	XAF-NEEPCO-825P800	Procurement process is easy and fast
[Long Term Parts Management]	To be submitted	To be submitted			
[Renovation & Modernization]					
Spare Parts of AGV and Compressor Diaphragms	¥143,286,200	20 Month FOB			
Replacement of Torque Yaw Cover	¥24,200,200	17 Month FOB			
Replacement of Turbine Blade Ring	¥81,118,200	17 Month FOB			
2 Upgraded Turbine Blade and Vane	To be submitted	18-20 Month FOB			
Modification of Inter Stage Seal Housing	¥1,544,600	7 Month FOB			Reliable and Economical Operation for further 10years Operation
Replacement of Exhaust Casing	¥193,753,600	17 Month FOB			
Preparation for Next Outage					
3 #2 Major Inspection (including Rotor replacement)	¥148,049,620	Will be delivered around June, 2020 from MHP5		NEEPCO/AGBP/NIOP/2018-19/W-BIAY/681	
	¥18,416,700	-		XAF-NEEPCO-825P7TR	
	¥2,827,700	4 Month FOB		XAF-NEEPCO-825P8E7	Discussion the timing of next outage and the preparation for necessary equipments, TA, tools)
#1 Major Inspection	¥198,649,730	20 Month FOB/FCA		XAF-NEEPCO-825P8S0	
#3 Turbine Inspection	To be submitted	To be submitted		To be submitted	
#4 Major Inspection	¥240,188,620	19.5 Month FOB/FCA	MRGF19-0006	XAF-NEEPCO-825P84MR1	Since it is already in the Cargo Read we need to discuss the shipping preparation.
4 Shipping for 2nd CRT			MRGF19-0047		
Recommendation after Previous Outage					
5 #1 Turbine Inspection in 2017	¥164,385,150	18.5 Month FOB/FCA	MRGF17-0031	XAF-NEEPCO-825P7V0	

No. NEEPCO/AGBP/HOP/2019-20/W-8(A)/537

Dated 12/02/2020

To,

M/S Mitsubishi Corporation,
Power Systems International Office,
New Energy and Power Generation Division,
3-1, Marunouchi, 2-Chome, Chiyoda-Ku,
Tokyo - 100-8086, Japan.

Sub: NEEPCO/AGBP - Detailed Order for Technical Advisory Services for Major Overhauling Inspection of MHI make Gas Turbine Unit # 2 (Model No. MW251B).

Ref: 1. Our letter No. NEEPCO/AGBP/GT&Aux./W-25/2018-19/211 Dated 08/03/2019
2. Your offer No. XAF-NEEPCO- 825P7TR Dated 14/08/2019
3. Our E-mail Dated 09/10/2019
4. Your E-mail Dated 11/10/2019
5. Our E-mail Dated 02/12/2019
6. Your E-mail Dated 09/12/2019

Dear Sir,

With reference to above, the Corporation is pleased to place this detailed order for Technical Advisory Services for Major Overhauling Inspection of MHI make Gas Turbine Unit # 2 (Model No. MW251B) of Assam Gas Based Power Plant at your offered rates and as per the following terms and conditions.

1. Scope:

Mitsubishi Corporation shall provide NEEPCO AGBP with technical advisory services by deputing required Technical Advisors for Major Overhauling Inspection of MHI make Gas Turbine Unit # 2 (Model No. MW251B).

2. Price:**A. Technical Advisory Services Fees:**

The estimated price for the above referred services is JPY 17,000,030.00 (Japanese Yen Seventeen Million Thirty) only excluding TDS. The above mentioned price is an estimated price which includes supervisory services fees for working days as well as journey periods, overtime fees, travel expenses (air fare) and lodging at New Delhi. The actual price payable shall be calculated based on the following rates:

Sl.	Item	Price (Japanese Yen)
i.	Normal working day rate (working hours shall be 8 hours or part thereof)	1,51,100 / man day
ii.	Overtime work hourly rate for any hours worked beyond 8 hours per day from Monday to Friday	24,500 / man hour
iii.	Normal work hourly rate for Saturday, Sunday & local holidays in India	24,500 / man-hour
iv.	Overtime work hourly rate for any hours worked beyond 8 hours per day on Saturday, Sunday & local holidays in India	28,700 / man-hour

The above rates for holidays shall be applicable for the New Year holidays in Japan (i.e. 29th December to 3rd January every year).

The above rates are net receivable amounts and do not include any kind of tax and duties levied in India which are to be paid at actuals by NEEPCO. LC shall be opened for an amount of JPY 20,400,036 which is 120% of the estimated amount of JPY 17,000,030 on receipt of confirmation of acceptance of this order.

B. Expenses:

a) Traveling expenses such as airfares (business class for international flights) are invoiced at actual cost.

ok

Sanjiv
Raj

P-149

- b) Lodging is arranged and paid for by the Purchaser to the concerned party.
 c) Telephone, Telefax and telex communications are invoiced at actual cost if such costs are paid and borne by the Supervisor(s) during the performance of their duties.
 d) Any miscellaneous expenses including food and drink during the stay at site will be reimbursed at actuals against documentary evidence.

3. Terms of payment:

Payment shall be made in Japanese Yen by an irrevocable, confirmed and non-restricted Letter of Credit (LC) to be established for the estimated amount mentioned above in favour of Mitsubishi Corporation, Tokyo (Attr.: ENY/XA-F) confirmed by a first class bank of Japan, Europe or USA and which shall be payable against presentation of at sight draft accompanied by the following documents, without restriction on negotiating bank with sufficient validity to cover bank negotiation. LC opening charges, confirmation charges and other bank charges in India shall be borne and paid by NEEPCO and bank charges outside India (except LC confirmation charges) shall be borne by Mitsubishi Corporation.

- i) Mitsubishi Corporation's detailed invoice
- ii) Copies of air tickets
- iii) Hotel Invoices
- iv) Working time sheet duly signed by NEEPCO

4. Schedule of Inspection:

The date for Major Overhauling Inspection of MHI make Gas Turbine Unit # 2 (Model No. MW251B) is scheduled tentatively in June / July, 2020. The exact date will be intimated in due course. Accordingly, your MHI TA must be available at site for commencement of the inspection activities during that period.

5. Documents:

Copies of documents shall be forwarded to the ordering authority with copies to the GM (Finance) Corporate Treasury, NEEPCO Ltd., Brook land Compound, Lower New Colony, Shillong - 793003 (Fax No. 0364 - 2228542).

6. Engineer -In- Charge:

DGM (E/M) GT & Aux or any other Engineer authorized by Head of Project, AGBP

Kindly acknowledge receipt and confirm acceptance of this order. The above mentioned LC will be opened immediately on receipt of the confirmation of acceptance of this order.

Thanking you,

Yours faithfully,

[Signature]
12/02/2020

DGM (E/M)

For & on behalf of
General Manager & Head of Project

NIO

Memo No. NEEPCO/AGBP/HCP/2019-20/W-B(A)/538-43

Dated 12/02/2020

Copy to:

1. The D(T), NEEPCO Ltd., Shillong - for kind perusal please. This has reference to his approval Dated 09/01/2020 conveyed vide U.O. No. 948 Dated 10/01/2020 of ED (O&M).
2. The Executive Director (O&M), NEEPCO Ltd., Shillong - for kind perusal please.
3. The GM (Fin) CT, NEEPCO Ltd., Shillong. Enclosed a copy of the approval
4. The DGM (E/M), GT & Aux, AGBP
5. The DGM (Fin), AGBP, NEEPCO Ltd., Bokulani. Enclosed a copy of the approval
6. The DGM (E/M), Vigilance wing, AGBP, NEEPCO Ltd

[Signature]
12/02/2020

DGM (E/M)

For & on behalf of
General Manager & Head of Project



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

That 1719 for Compliance at Shillong

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191
E-mail : agbp.bokuloni@gmail.com

DO NOT



No. NEEPCO/AGBPS/HOP/2022-23/W-8(A)/ 280

Dated 01.11.2022

To,

M/s Mitsubishi Corporation,
Power Systems Export Unit,
Power and Electrical Systems Division,
3-1, Marunouchi, 2-Chome, Chiyoda-Ku,
Tokyo – 100-8086, Japan.
(Fax No. 011 – 4368 2333)

Sub: NEEPCO/AGBPS – Purchase order for supply of Spare parts and Consumables required for replacement of Turbine Blade Ring and Torque Tube cover of MHPS supplied Gas Turbine Unit # 4.

Ref: (i) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/21-22/239 dated 19.01.2022.

(ii) Your Offer No. XAF-NEEPCO-825PFMV dated 23.03.2022.

(iii) Our letter No. NEEPCO/AGBP/GT&AUX./W-23/22-23/97 dated 13.06.2022.

(iv) Your email dated 07.07.2022.

(v) Your revised Offer No. XAF-NEEPCO-825PFMV -R1 dated 12.07.2022.

(vi) Our letter No. NEEPCO/AGBPS/GT&AUX./W-23/22-23/168 dated 16.09.2022.

(vii) Your email dated 20.09.2022.

Dear Sirs,

With the above reference, the Corporation is pleased to place this Purchase Order for Spare parts and Consumables required for replacement of Turbine Blade Ring and Torque Tube cover of MHI supplied Gas Turbine Unit # 4 as per following terms & conditions:

Terms & Conditions:

1. Scope:

The scope shall include supply of spare parts and consumables required for replacement of Turbine Blade Ring and Torque Tube cover of MHI supplied Gas Turbine Unit # 4 as per the Schedule of Item and Prices (Annexure-I) enclosed along with this order on FOB, Japan basis.

2. Prices:

The prices for supply of spare parts and consumables required for replacement of Turbine Blade Ring and Torque Tube cover of MHI supplied Gas Turbine Unit # 4 as detailed in the schedule of Item and Prices (Annexure-I) is JPY 154,211,060.00 (Japanese Yen One Hundred Fifty-Four Million Two Hundred Eleven Thousand Sixty) only on FOB, Japan, which shall remain firm till completion of supply. The prices are including packing and forwarding but excluding freight, insurance and any tax, duty or levy that may be imposed in India, which, if applicable, shall be paid by NEEPCO at actual. Freight charges will be paid by NEEPCO at actual in Indian Rupees at the time of delivery of the spares at Indian Port directly to the carrier against raising of bills. All taxes, charges, duties etc. leviable outside India shall be to your account only. No agency commission is payable by us.

B. B. B.



ISO 14001: 2015
ISO 9001: 2015
ISO 45001: 2018

Not for Compliance in Details

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 101

E-mail : agbp.bokuloni@gmail.com



3. **Terms of Payment:**

100% contract price shall be made in Japanese Yen by an irrevocable, confirmed and non-restricted Letter of Credit to be established for the full amount in favour of Mitsubishi Corporation, Tokyo, (ATTN: ENY/XA-F) confirmed by a first class bank in Japan or Europe or USA, acceptable to Mitsubishi Corporation and payable at sight draft to be opened in favour of Mitsubishi Corporation, Tokyo, against presentation of shipping documents and with sufficient validity to cover contractual time of shipment plus 21 days for negotiation but within validity of L/C. Any amendment charges which will be required due to the reason not attributable to seller shall be borne by buyer. Part payment against part shipment is allowed.

4. **Insurance:**

Insurance during transit to cover transit risks from Japanese airport/port of origin to NEEPCO's warehouse at AGBP site shall be covered under NEEPCO's open marine Policy No. 200402212210000011 with National Insurance Company Limited, Duliajan Branch, New Market, Station Road, Duliajan, Assam, PIN - 786602. NEEPCO shall settle any claim directly with the underwriters. A copy of the insurance policy shall be provided to Mitsubishi Corporation for arranging shipment up to Kolkata. Supplier should give prior intimation in writing to the above-mentioned underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.

5. **Delivery Period:**

Shipment of the items under Annexure-I shall be made within 19.5 (Nineteen and half) months from the date of receipt of order or opening of relative irrevocable letter of credit acceptable to Mitsubishi Corporation whichever is later. Partial shipment shall be allowed. However, Mitsubishi Corporation will be requested to complete the delivery of materials as soon as possible so that the work can be started as per schedule.

6. **Inspection:**

Manufacturer's inspection before shipment shall be final. All expenses of NEEPCO's inspector such as traveling & living expenses shall be borne by NEEPCO in case NEEPCO's inspector inspects them.

7. **Packing:**

Manufacturer's standard export packing shall be applied.

8. **Port of Destination:**

Airport, Kolkata.

9. **Inland Transportation:**

Inland transport from Kolkata Airport to the Plant Site including port clearance shall be responsibilities of NEEPCO. The Corporation here will pay Air freight charges in Indian Rupees. Your documents like Airway bill should indicate "Freight to pay" or "Freight to collect".

B. S. S.



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

Shel 1178 for Suppliers and Clients

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloni@gmail.com



10. Custom Clearance:

The responsibility of custom clearance shall lie with NEEPCO. The "Coordinator, NEEPCO, Kolkata" shall take all necessary action towards arranging custom clearance expeditiously so that no demurrage charge is involved.

11. Warranty Period:

All the materials supplied shall be warranted against any defect of design, material, manufacturing or faulty workmanship for a period of 12 (twelve) months after arrival to the site or 18 (eighteen) months after FOB, whichever comes earlier.

12. Rejection of Defective Materials:

If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall replace the same at their own cost. Transportation cost for the replacement of the materials will be borne by the supplier.

13. Consignee:

The materials shall be received by the Coordinator, Kolkata, NEEPCO, DS-1, Maniktola Civic Centre, 1/16, VIP Road, CIT Scheme No. VII M, P.O.: Kankurgachi, Kolkata-700 054 who will thereafter forward the same to the ultimate consignee as detailed below:

The DGM (E/M) Material Management Wing
Assam Gas Based Power Station, NEEPCO,
P.O. Bokuloni, District: Dibrugarh, Assam.
PIN: - 786191

14. Shipping Document:

Shipping documents shall include:

- i. Mitsubishi Corporation's Invoice
- ii. Packing list
- iii. Proof of shipment
- iv. Certificate of Origin
- v. Copies of Airway Bills

Copies of shipping documents shall be forwarded in advance to the ordering authority with copies

to:

- i) The "Coordinator, Kolkata", NEEPCO, DS-I, Maniktola, 1/16, VIP Road, CIT Scheme No. VII M, P.O. Kankurgachi, Kolkata – 700 054
- ii) The Head Of Project, Assam Gas Based Power Station, NEEPCO Ltd., Bokuloni, Dist – Dibrugarh, Assam, PIN: 786 191
- iii) The DGM (F) CT, NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong – 793 003
- iv) The ultimate consignee as mentioned above under clause No. 13.



ISO 9001 : 2015
ISO 14001 : 2015
ISO 45001 : 2018

For all the Complaints at Shantinagar

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

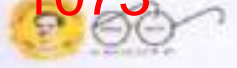
NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloni@gmail.com

1073



15. Address for correspondence:

All correspondences in respect of this order shall be made with –
The Chief General Manager & Head of Project,
Assam Gas Based Power Station, NEEPCO Ltd.,
No.3 Bokuloni Village,
Dist. Dibrugarh, Assam, PIN – 786191.

Kindly acknowledge receipt of this Purchase order and convey your acceptance.
Thanking you,

Endo: As stated above

Yours faithfully,

B. Singh
20/11/2022
General Manager (B)
For & on behalf of
CGM (E/M) & Head of Project

Spares and consumables required for replacement of Turbine Blade Ring and Torque Tube cover in Gas Turbine Unit

4

46	CAP	09-74378-21	09-34797-01	24	PCS	¥	11,810	¥	2,83,440
47	STOPPER PIN	09-74378-22	09-34797-02	24	PCS	¥	20,790	¥	4,98,960
48	SEAL DIAPHRAGM	09-74378-23	09-54127-01	40	PCS	¥	1,03,000	¥	41,20,000
49	PIN	09-74378-24	09-54702-04	40	PCS	¥	8,800	¥	3,52,000
50	BAFFLE	09-74378-25	09-54463-02	2	PCS	¥	1,58,330	¥	3,16,660
51	BAFFLE	09-74378-26	09-54464-04	2	PCS	¥	2,13,330	¥	4,26,660
52	BAFFLE	09-74378-27	09-54465-02	2	PCS	¥	1,78,890	¥	3,57,780
53	BAFFLE	09-74378-28	09-54466-04	2	PCS	¥	1,97,780	¥	3,95,560
54	PIN	09-74378-29	09-54702-03	38	PCS	¥	19,780	¥	7,51,640
55	PIN	09-74378-31	09-54702-01	12	PCS	¥	27,870	¥	3,34,440
56	SPECIAL BOLT	09-74378-42	09-44783-01	12	PCS	¥	23,900	¥	2,86,800
57	BUSHING	09-74378-43	09-44783-02	12	PCS	¥	30,490	¥	3,65,880
58	HEX NUT	09-74378-44	09-44783-03	12	PCS	¥	18,500	¥	2,22,000
59	RETAINER BLOCK	09-74378-46	09-53703-02	38	PCS	¥	12,70,560	¥	482,81,280
60	RETAINER BLOCK	09-74378-47	09-54705-05	2	PCS	¥	63,88,890	¥	127,77,780
61	SQUARE SEAL ASSY	09-74378-49	09-55979-01	1	SET	¥	113,46,670	¥	113,46,670
62	LOCK WIRE (SJS304)	09-74378-53	-	1	PCE	¥	2,100	¥	2,100
63	HEX BOLT	09-74378-54	09-54704-02	8	PCS	¥	7,090	¥	56,720
64	#2 PLATE (STANDARD)	-	09-72802-03	3	PCS	¥	1,04,440	¥	3,13,320
65	#2 PLATE (T/C)	-	09-72802-04	2	PCS	¥	1,05,560	¥	2,11,120
66	#2 PLATE (B/S)	-	09-72802-05	1	PCE	¥	1,05,560	¥	1,05,560
67	#3 PLATE (STANDARD)	-	09-72802-06	4	PCS	¥	90,280	¥	3,61,120
68	#3 PLATE (T/C)	-	09-72802-07	1	PCE	¥	1,14,440	¥	1,14,440
69	#3 PLATE (B/S)	-	09-72802-08	1	PCE	¥	1,14,440	¥	1,14,440
70	SPACER	-	09-72802-09	36	PCS	¥	1,760	¥	63,360
71	PIN	-	09-72802-10	36	PCS	¥	5,240	¥	1,88,640
72	SPECIAL BOLT	-	09-72802-11	18	PCS	¥	3,020	¥	54,360
73	HEX BOLT	-	09-72802-12	18	PCS	¥	3,110	¥	55,980
74	COVER	09-55049-04	09-55051-01	4	PCS	¥	1,88,780	¥	7,55,120
75	PLUG	09-55049-05	09-44678-02	4	PCS	¥	33,890	¥	1,35,560
76	BAR	09-55049-13	09-55052-01	2	PCS	¥	21,440	¥	42,880
77	BAR	09-55049-14	09-55052-02	2	PCS	¥	21,440	¥	42,880
78	WASHER	09-55049-29	09-44705-04	4	PCS	¥	1,440	¥	5,760
79	TEMPORARILY TORQUE PIN	-	8L-00206-02	4	PCS	¥	1,55,780	¥	6,23,120
80	RETAINER PLATE	-	8L-00206-03	4	PCS		The price has been included in No. 79		The price has been included in No. 79
81	LINER	-	8L-00206-04	8	PCS		The price has been included in No. 79		The price has been included in No. 79
82	LINER	-	8L-00206-05	8	PCS		The price has been included in No. 79		The price has been included in No. 79
83	LINER	-	8L-00206-06	8	PCS		The price has been included in No. 79		The price has been included in No. 79
84	LINER	-	8L-00206-07	8	PCS		The price has been included in No. 79		The price has been included in No. 79
85	LINER	-	8L-00206-08	8	PCS		The price has been included in No. 79		The price has been included in No. 79
86	HEX SOC HEAD CAP SCREW	-	8L-00206-09	16	PCS		The price has been included in No. 79		The price has been included in No. 79
FCA Japan Total								¥	1542,11,060

Spares and consumables required for replacement of Turbine Blade Ring and Torque Tube cover in Gas Turbine Unit

4

Sl. No.	Description	ASS'Y Drawing No.	Drawing No.	QTY	UOM	Unit Price	Total Price
1	TORQUE TUBE COVER	G0-27774-04	09-54039-01	1	SET	¥ 66,97,570	¥ 66,97,570
2	SEAL RING No 5.7(16PCS = 2SET)	G0-27774-54	09-53869-01	2	SET	¥ 13,08,330	¥ 26,16,660
3	SEAL RING No 6(8PCS = 1SET)	G0-27774-55	09-53870-01	1	SET	¥ 12,10,000	¥ 12,10,000
4	RETAINER PLATE	G0-27774-59	09-54427-01	28	PCS	¥ 5,920	¥ 1,65,760
5	LEAF SPRING	G0-27774-60	09-54427-04	24	PCS	¥ 25,920	¥ 6,22,080
6	HEX BOLT	G0-27774-66	09-35412-03	28	PCS	¥ 2,690	¥ 75,320
7	BOLT	G0-27774-64	09-54430-02	6	PCS	¥ 6,480	¥ 38,880
8	SLOT HEAD SCREW	G0-27774-66	09-54430-05	28	PCS	¥ 13,700	¥ 3,83,600
9	SEAL PLATE(4PCS = 1SET)	G0-27774-16	09-54434-12	1	SET	¥ 3,07,000	¥ 3,07,000
10	HEX SOC HEAD CAP SCREW	G0-27774-68	09-54439-01	8	PCS	¥ 8,060	¥ 64,480
11	SEAL RING(8PCS = 1SET)	G0-27774-17	09-56033-09	1	SET	¥ 22,21,110	¥ 22,21,110
12	SEAL RING(20PCS = 1SET)	G0-27774-70	09-35407-09	1	SET	¥ 33,16,670	¥ 33,16,670
13	RETAINER PLATE	G0-27774-71	09-35408-01	20	PCS	¥ 10,000	¥ 2,00,000
14	RETAINER PLATE	G0-27774-72	09-35408-02	20	PCS	¥ 8,330	¥ 1,66,600
15	SPRING	G0-27774-73	09-35409-01	40	PCS	¥ 7,590	¥ 3,03,600
16	KEY	G0-27774-74	09-35410-01	2	PCS	¥ 29,440	¥ 58,880
17	KEY	G0-27774-75	09-35410-02	18	PCS	¥ 25,990	¥ 4,67,820
18	LINK	G0-27774-76	09-35411-01	2	PCS	¥ 23,620	¥ 47,240
19	LINK	G0-27774-77	09-35411-02	18	PCS	¥ 31,480	¥ 5,66,640
20	HEX SOC HEAD CAP SCREW	G0-27774-80	09-35412-01	20	PCS	¥ 6,280	¥ 1,25,600
21	SCREW	G0-27774-81	09-35412-02	20	PCS	¥ 12,890	¥ 2,57,800
22	HONEYCOMB SEAL	G0-27774-78	09-53727-01	1	SET	¥ 33,90,000	¥ 33,90,000
23	HONEYCOMB SEAL	G0-27774-F0	09-53727-02	10	PCS		
24	HEX BOLT	G0-27774-79	09-53728-01	60	PCS	¥ 8,500	¥ 5,10,000
25	WASHER	G0-27774-C5	09-53728-02	60	PCS	¥ 3,100	¥ 1,86,000
26	TAPER PIN	G0-27774-A9	09-54039-04	2	PCS	¥ 780	¥ 1,560
27	SEAL STRIP		09-54039-05	4	PCS	¥ 31,110	¥ 1,24,440
28	LOCKING STRIP		09-54039-06	4	PCS	¥ 24,440	¥ 97,760
29	NOZZLE RING	G0-27774-56	09-54043-01	1	SET	¥ 28,50,670	¥ 28,50,670
30	STOPPER PLATE	G0-27774-63	09-54427-07	2	PCS	¥ 1,000	¥ 2,000
31	TURBINE BLADE RING	09-74378-02	09-72802-01	1	SET	¥ 398,25,170	¥ 398,25,170
32	TORQUE PIN	G0-30173-07	09-72935-06	4	PCS	¥ 22,500	¥ 90,000
33	GASKET	G0-30173-17	09-54432-03	4	PCS	¥ 830	¥ 3,320
34	HEX SOC HEAD CAP SCREW	G0-30173-46	G0-13903-11	88	PCS	¥ 7,780	¥ 6,84,640
35	HEX SOC HEAD CAP SCREW	G0-30173-48	G0-13903-10	112	PCS	¥ 770	¥ 86,240
36	REAMER BOLT	G0-30173-36	09-55186-01	4	PCS	¥ 19,170	¥ 76,680
37	HEX SOC HEAD SCREW	G0-30173-37	09-72800-05	18	PCS	¥ 12,220	¥ 2,19,960
38	BOX NUT	G0-30173-39	09-72800-08	8	PCS	¥ 5,830	¥ 46,640
39	BOX NUT	G0-30173-40	09-72800-09	18	PCS	¥ 39,080	¥ 7,03,440
40	HEX SOC HEAD SCREW	G0-30173-64	09-72800-06	2	PCS	¥ 9,440	¥ 18,880
41	BOX NUT	G0-30173-65	09-72800-10	2	PCS	¥ 10,560	¥ 21,120
42	HEX SOC HEAD SCREW	G0-30173-89	09-72800-07	4	PCS	¥ 13,610	¥ 54,440
43	BOX NUT	G0-30173-90	09-72800-11	4	PCS	¥ 9,600	¥ 38,400
44	ORIFICEBOLT	09-74378-19	09-57269-01	23	PCS	¥ 21,260	¥ 4,88,980
45	ORIFICEBOLT	09-74378-20	09-57269-02	22	PCS	¥ 18,790	¥ 4,13,380



3-1, MARUNOUCHI 2-CHOME, CHYUO-KU, TOKYO 100-8086, JAPAN

ESTIMATE

No. XAF-NEEPCO-825PFMT

Date: 22-Jul-22

Messrs. North Eastern Electric Power Corporation Ltd.

(A Govt. of India Enterprise)

Assam Gas Based Power Project

P. O. Bokuloni Chariali - 785 191 Dist. Dibrugarh (Assam)

In response to your inquiry, we provide you with our estimate for the parts described below on the following basis:

1. Terms of Delivery	FOB/FCA JAPAN
2. Time of Shipment	Below mentioned
3. Port of Shipment	Japanese airport or seaport
4. Port of Destination	Indian airport or seaport
5. Payment	Below mentioned
6. Packing	-
7. Manufacturer	Mitsubishi Heavy Industries, Ltd.
8. Remarks	Below mentioned

Description of Goods	Quantity	Unit Price	Amount FOB/FCA JAPAN (In Japanese Yen)
INDIA/NEEPCO/ASSAM UNIT#1 GT Spare Parts for Exhaust Cylinder & Exhaust Manifold			
-Details are as per the attached-	1 LOT	-	¥332,383,560
TOTAL :			¥332,383,560

Terms and Conditions**1. Time of Shipment :**

Shipment shall be made on FOB/FCA Japan basis within Nineteen (19) months after Seller's receipt of purchase order and the relative irrevocable letter of credit opened by Buyer acceptable to Seller, subject to availability of vessel and approval of Japanese Government for export, if necessary.

2. Terms of Payment :

100% Contract amount shall be paid by an irrevocable, confirmed, and non-restricted Letter of Credit payable at sight draft to be opened in favor of Mitsubishi Corporation, Tokyo (Attn : MCY/XA-F) with validity long enough to cover Time of Shipment stipulated in Clause 1 above plus at least 21 days for Seller's bank negotiation.

LC shall be confirmed by a first class bank in Europe or U.S.A. or Japan acceptable to Seller.

LC opening charge, confirmation charge and all bank charges outside Japan, including collection charges and stamp duties, if any, shall be paid by Buyer.

Any amendment charges which will be required due to the reason not attributable to Seller shall be borne by Buyer.

Please indicate following points in L/C without fail:

- 1) "Attn: MCY/KA-F section"
(We have more than 450 independent sections and L/C might not reach right section in time without such indication).
- 2) Port of shipment: Any Japanese airport /seaport.
- 3) Partial shipment: Permitted
- 4) Transshipment: Permitted

L/C has to be opened subject to the Uniform Customs and Practice for Documentary Credit of the International Chamber of Commerce (2007 revision) Publication No. 600.

Note : Please request L/C opening bank to appoint any of the following banks as advising bank at the time of opening L/C.

- MUFU Bank, Ltd Head Office (swift code : BOTKJPJT)
- Sumitomo Mitsui Banking Corporation, Tokyo (swift code : SMBCJPJT)
- Mizuho Bank, Ltd Head Office (swift code : MHCBJPJT)

*This request is for the appoint of advising bank and the above banks shall not be restricted as a negotiating bank.

3. Estimated Packing Data :

To be informed.

4. Inspection :

Manufacturer's factory inspection prior to shipment shall be deemed as final.

Third Party's inspection fee and Customer's witness inspection fee are not included in above price.

5. Warranty:

Seller warrants to Buyer that these parts are free from any defect of design, material, manufacturing and workmanship for a period of twelve (12) months after arrival to the site or eighteen (18) months after FOB/FCA, whichever comes earlier.

However, Seller's warranty will not cover the items damaged by items including but not limited to the following items.

- Damage or rust by improper storage
- Damage by the Buyer's improper use
- Normal wear and tear

Further, in any case, Seller's liability is limited to repair of the defective parts and any indirect or consequential damages will not be borne by Seller.

6. Offer Validity :

This quotation is valid until October 31, 2022, thereafter subject to Seller's confirmation

Seller's receipt of written order confirmation issued by Buyer.

7. Effective Date of the Contract

Effective date of the contract is the date on which Seller accepts Buyer's purchase order and receives the letter of credit acceptable for Seller.



3-1, MARUOUCHI 2-CHOME, CHYUO-KU, TOKYO 106-8002, JAPAN

8. Remarks :

- 1) Delivery term is FOB/FCA Japan (Kobe Port or Kansai Airport) base. Seller's price is not including marine insurance and freight from Japan to site which shall be arranged by Buyer.
- 2) Taxes and/or duties to be incurred outside of Japan shall be borne and paid by Buyer, if applicable.
- 3) Seller's prices mentioned above are quoted under the condition that all of the items and quantity offered shall be ordered in one lot at the same time within the validity period. In case of partial order, prices shall be re-quoted.
- 4) The terms and conditions which are not specified in this quotation shall be discussed and mutually agreed before signing the contract.

9. Others :

- 1) The costs for TA dispatchment are not included in Seller's prices.
- 2) Because of COVID-19 pandemic, please kindly note that the delivery time may be longer than mentioned in this quotation. After we receive your PO, we will inform you fixed delivery time.
- 3) The name of products may be subject to change after receipt of your PO/procurement.
- 4) Flexible hoses, pull boxes, and angle materials for vibrometers are not included in this quotation because existing ones are planned to be re-used.

MITSUBISHI CORPORATION


A. NAKAMURA
General Manager
Infrastructure EPC Management Office

E. & O.E.

No.	Description	ASST Drawing No.	Drawing No.	Qty	PCB		Remarks
					Unit Price	Total Price	
[Richard Dyllader Complete replacement]							
1	Pin	09-53118-02	09-53118-02	2	PCS	400,000	800,000
2	PNH	09-53118-02	09-53118-02	2	PCS	400,000	800,000
3	EDUNIST CYLINDER	G1-C6122-01	G1-C6122-01	1	SE	1170,000,000	1170,000,000
4	HEX SOC HEAD PLUG P100	G1-C6122-01	G1-C6122-01	1	PCS	1000	1000
5	COVER	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
6	COVER	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
7	PACKING W/ B	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
8	PACKING W/ B	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
9	PNH P100	G1-C6122-01	G1-C6122-01	50	PCS	100,000	5,000,000
10	CONSOLE LOCK SW SHEET PIN	G1-C6122-01	G1-C6122-01	50	PCS	100,000	5,000,000
11	Pin	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
12	COVER	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
13	PACKING W/ B	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
14	COVER	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
15	HEX BOLT M10X30	G1-C6122-01	G1-C6122-01	20	PCS	100,000	2,000,000
16	HEX BOLT M10X40	G1-C6122-01	G1-C6122-01	10	PCS	100,000	1,000,000
17	HEX SOC HEAD BOLT M10X10	G1-C6122-01	G1-C6122-01	6	PCS	100,000	600,000
18	HEX SOC HEAD BOLT M10X20	G1-C6122-01	G1-C6122-01	14	PCS	100,000	1,400,000
19	HEX SOC HEAD BOLT M12X30	G1-C6122-01	G1-C6122-01	10	PCS	100,000	1,000,000
20	HEX SOC HEAD BOLT M12X40	G1-C6122-01	G1-C6122-01	17	PCS	100,000	1,700,000
21	HEX NUT M8	G1-C6122-01	G1-C6122-01	20	PCS	100,000	2,000,000
22	HEX NUT M10	G1-C6122-01	G1-C6122-01	14	PCS	100,000	1,400,000
23	GASKET	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
24	HEX SOC HEAD NUT M10X10	G1-C6122-01	G1-C6122-01	6	PCS	100,000	600,000
25	TAPER PIN 32	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
26	CONSOLE W/IT REMOVER BOLT M10X30	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
27	HEX NUT M10	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
28	HEX SOC HEAD NUT M10X10	G1-C6122-01	G1-C6122-01	6	PCS	100,000	600,000
29	TAPER PIN WITH THREAD 0.500	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
30	HEX NUT M8	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
31	HEX SOC HEAD BOLT M12X40	G1-C6122-01	G1-C6122-01	8	PCS	100,000	800,000
32	LOCK W/RE W/0.500	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
33	SPECIAL HEX SOC HEAD BOLT W/IT M10X20	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
34	HEX SOC HEAD BOLT W/IT M12X30	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
35	HEX SOC HEAD BOLT M12X40	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
36	HEX SOC HEAD BOLT M12X50	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
37	HEX SOC HEAD PLUG 01 34	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
38	HEX SOC HEAD PLUG 01 34	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
39	HEX SOC HEAD PLUG 01 34	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
40	PACKING	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
41	PLUG - NPT 1/4"	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
42	PNH	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
43	HEX CONE BOLT M10X70	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
44	HEX BOLT M10X30	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
45	HEX BOLT M10X40	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
46	HEX BOLT M10X50	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
47	HEX BOLT M10X60	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
48	HEX BOLT M10X70	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
49	HEX BOLT M10X80	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
50	HEX BOLT M10X90	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
51	RETAINER PLATE	G1-C6122-01	G1-C6122-01	6	PCS	100,000	600,000
52	SEAL PLATE	G1-C6122-01	G1-C6122-01	6	PCS	100,000	600,000
53	WASHER	G1-C6122-01	G1-C6122-01	20	PCS	100,000	2,000,000
54	HEX BOLT M10X20	G1-C6122-01	G1-C6122-01	60	PCS	100,000	6,000,000
55	HEX BOLT M10X30	G1-C6122-01	G1-C6122-01	24	PCS	100,000	2,400,000
56	BRACKET	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
57	WRE	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
58	PIPE SUPPORT Pipe 4.22x1	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
59	BUNG FLANGE W/ B	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
60	RING GASKET W/ B	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
61	HEX BOLT M10X20	G1-C6122-01	G1-C6122-01	3	PCS	100,000	300,000
62	HEX BOLT M10X30	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
63	HEX BOLT M10X40	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
64	HEX NUT M10	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
65	HEX NUT M10	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
66	SPRING WASHER 0	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
67	SEAL RING	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
68	WRE W/ B	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
69	Plug 02	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
70	PACKING	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
71	SEAL PLATE	G1-C6122-01	G1-C6122-01	6	PCS	100,000	600,000
72	HEX WASHER	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
73	WRE	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
74	SLOT HEAD SCREW W/ B	G1-C6122-01	G1-C6122-01	4	PCS	100,000	400,000
75	HEX BOLT M10X30	G1-C6122-01	G1-C6122-01	40	PCS	100,000	4,000,000
76	HEX SOC HEAD BOLT M12X30	G1-C6122-01	G1-C6122-01	12	PCS	100,000	1,200,000
77	HEX SOC HEAD BOLT M12X40	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
78	SEAL RING	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
79	SEAL RING	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
80	SLOT HEAD SCREW W/ B	G1-C6122-01	G1-C6122-01	7	PCS	100,000	700,000
81	X RIBBED PAN HEAD SCREW W/ B	G1-C6122-01	G1-C6122-01	2	PCS	100,000	200,000
82	DRIP PLATE	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
83	INSULATION SHEET	G1-C6122-01	G1-C6122-01	1	PCS	100,000	100,000
84	HEX BOLT M10X100	G1-C6122-01	G1-C6122-01	35	PCS	100,000	3,500,000

No.	Description	J&S's Drawing No.	Drawing No.	Qty	PCB	PCB		Remarks
						Unit Price	Total Price	
85	TAPER PIN Type A 2x1.70	04-0422-03	01-05170-03	2	PCB	110.400	220.800	
86	NO. 14 NUT 1/4	04-0804-04		2	PCB	4.110	8.220	
87	BASE	04-3270-02	04-3270-01	1	PCB	10,345.710	10,345.710	
88	SUPPORT PLATE	04-3270-03	04-3270-01	2	PCB	11,661.760	23,323.520	
89	PCB	04-3270-04	04-3270-15	1	PCB	145.830	145.830	
89	BRACKET	04-3270-04	04-3270-04	1	PCB	165.750	165.750	
94	PLATE	04-3270-05	04-3270-13	4	PCB	400.780	1,603.120	
92	ADJUSTMENT PLATE	04-3270-01	04-3270-14	1	PCB	18.860	18.860	
93	REINFORCE RING 2x1.70	04-3270-06		4	PCB	14.220	56.880	
94	HEX BOLT HEAD 20x1.70	04-3270-08	04-3270-08	4	PCB	14.440	57.760	
95	ORANGE RING 1/4	04-3270-12	04-3270-12	4	PCB	12.240	48.960	
96	HEX BOLT 1/4x1.70	04-3270-13		4	PCB	12.240	48.960	
97	T WCD: 4x1.70 Type A, 1.70x1.70	01-0000-02		2	PCB	14.440	28.880	
98	HEX NUT 1/4	01-0000-03		2	PCB	14.440	28.880	
99	FIXING BRACKET	01-0000-02	04-3270-01	1	ST	375.780	375.780	
100	FIXING BRACKET	01-0000-03		1	ST			Included in No. 99
101	WASHER	01-0000-04		4	PCB			Included in No. 99
102	HEX BOLT 1/4x1.70	01-0000-05		12	PCB			Included in No. 99
103	HEX BOLT 1/4x1.70	01-0000-06		4	PCB			Included in No. 99
104	PLATE WASH-20x1.70	01-0000-07		4	PCB			Included in No. 99
105	HEX NUT 1/4	01-0000-08		4	PCB			Included in No. 99
106	MANDREL	BL-0010-01	BL-0010-01	1	PCB	44,375.140	44,375.140	
107	STOPPER	BL-0010-02	BL-0010-01	1	PCB			Included in No. 106
108	STOPPER	BL-0010-03	BL-0010-01	1	PCB			Included in No. 106
109	HEX BOLT 1/4x1.70	BL-0010-04	BL-0010-01	2	PCB			Included in No. 106
110	HEX BOLT 1/4x1.70	BL-0010-05	BL-0010-01	4	PCB			Included in No. 106
111	HEX BOLT 1/4x1.70	BL-0010-06		4	PCB			Included in No. 106
112	PIPE 1/4x1.70	03-0710-01	03-0710-01	1	ST	149.410	149.410	
113	PIPE 1/4x1.70	03-0710-02	03-0710-01	1	PCB	11.830	11.830	
114	UPON 1/4	03-0710-03	03-0710-01	1	PCB	102.330	102.330	
115	PIPE 1/4x1.70	03-0710-04	03-0710-01	1	ST	149.410	149.410	
116	PIPE 1/4x1.70	03-0710-05	03-0710-01	1	PCB	11.830	11.830	
117	UPON 1/4	03-0710-06	03-0710-01	1	PCB	102.330	102.330	
118	Speed Dia 20 1.10x1.70	01-0000-07	01-0000-07	2	PCB	116.170	232.340	
119	Speed Dia 20 1.10x1.70	01-0000-08	01-0000-08	2	ST	116.170	232.340	
120	WASHER	01-0000-09	01-0000-09	2	PCB	14.440	28.880	
121	HEX NUT 1/4			2	PCB	14.440	28.880	
[Included in No. 106 Complete replacement]								
122	HEX BOLT 1/4x1.70	04-3270-09	04-3270-10	1	ST	149.410	149.410	
123	HEX BOLT 1/4x1.70	04-3270-10	04-3270-11	21	PCB	212.820	4,469.220	
124	HEX BOLT 1/4x1.70	04-3270-11	04-3270-12	88	PCB	212.820	18,648.160	
125	HEX BOLT 1/4x1.70	04-3270-12	04-3270-13	66	PCB	14.440	950.840	
126	HEX BOLT 1/4x1.70	04-3270-13	04-3270-14	50	PCB	14.440	722.000	
127	HEX BOLT 1/4x1.70	04-3270-14	04-3270-15	88	PCB	14.440	1,270.720	
128	HEX BOLT 1/4x1.70	04-3270-15	04-3270-16	50	PCB	14.440	722.000	
129	PLATE WASH-1/4	04-3270-16	04-3270-17	20	PCB	14.440	288.800	
130	HEX BOLT 1/4x1.70	04-3270-17	04-3270-18	4	PCB	14.440	57.760	
131	HEX BOLT 1/4x1.70	04-3270-18	04-3270-19	21	PCB	14.440	303.240	
132	WASHER	04-3270-19	04-3270-20	1	PCB	14.440	14.440	
133	RETAINER PLATE	04-3270-20	04-3270-21	2	PCB	21.440	42.880	
134	TAPER PIN Type A 1.70x1.70	04-3270-21	04-3270-22	4	PCB	11.000	44.000	
135	HEX NUT 1/4	04-3270-22	04-3270-23	4	PCB	11.000	44.000	
136	PLATE WASH-1/4	04-3270-23	04-3270-24	4	PCB	11.000	44.000	
137	PIPE	04-1610-01	04-1610-01	1	PCB	114.200	114.200	
138	PIPE	04-1610-02	04-1610-01	1	PCB	114.200	114.200	
139	PIPE	04-1610-03	04-1610-01	1	PCB	114.200	114.200	
140	PIPE	04-1610-04	04-1610-01	1	PCB	114.200	114.200	
141	PIPE	04-1610-05	04-1610-01	1	PCB	114.200	114.200	
142	U BOLT 1/4	04-1610-06	04-1610-01	2	PCB	114.200	228.400	
143	U BOLT 1/4	04-1610-07	04-1610-01	2	PCB	114.200	228.400	
144	SPRING WASHER 1/4	04-1610-08	04-1610-01	2	PCB	114.200	228.400	
145	PIPE	04-1610-09	04-1610-01	1	PCB	114.200	114.200	
146	PIPE	04-1610-10	04-1610-01	1	PCB	114.200	114.200	
147	PIPE	04-1610-11	04-1610-01	1	PCB	114.200	114.200	
148	PIPE	04-1610-12	04-1610-01	1	PCB	114.200	114.200	
149	PIPE	04-1610-13	04-1610-01	1	PCB	114.200	114.200	
150	U BOLT 1/4	04-1610-14	04-1610-01	1	PCB	114.200	114.200	
151	U BOLT 1/4	04-1610-15	04-1610-01	2	PCB	114.200	228.400	
152	BRACKET	04-1610-16	04-1610-01	1	PCB	114.200	114.200	
153	BRACKET	04-1610-17	04-1610-01	1	PCB	114.200	114.200	
154	BRACKET	04-1610-18	04-1610-01	1	PCB	114.200	114.200	
155	BOLT 1/4	04-1610-19	04-1610-01	2	PCB	114.200	228.400	
156	U NUT 1/4	04-1610-20	04-1610-01	2	PCB	114.200	228.400	
157	PIPE 1/4x1.70	04-1610-21	04-1610-01	1	PCB	114.200	114.200	
158	PIPE 1/4x1.70	04-1610-22	04-1610-01	1	PCB	114.200	114.200	
159	PIPE 1/4x1.70	04-1610-23	04-1610-01	1	PCB	114.200	114.200	
160	PIPE 1/4x1.70	04-1610-24	04-1610-01	1	PCB	114.200	114.200	
161	PIPE 1/4x1.70	04-1610-25	04-1610-01	1	PCB	114.200	114.200	
162	PIPE 1/4x1.70	04-1610-26	04-1610-01	1	PCB	114.200	114.200	
163	Turn Back	04-1610-27	04-1610-01	1	ST	114.200	114.200	
164	HEX BOLT 1/4x1.70	04-1610-28	04-1610-01	1	PCB	114.200	114.200	
165	HEX BOLT 1/4x1.70	04-1610-29	04-1610-01	1	PCB	114.200	114.200	
166	WASHER 1/4	04-1610-30	04-1610-01	1	PCB	114.200	114.200	

No.	Description	APSY Drawing No.	Drawing No.	Qty	PCB	PCB		Remarks
						Unit Price	Total Price	
248	LINER 110	03-08020-28	03-08020-14	1	PCB	114,780	114,780	
250	LINER 105	03-08020-35	03-08020-16	2	PCB	410,443	820,886	
251	LINER 103	03-08020-36	03-08020-17	2	PCB	160,980	321,960	
252	LINER 101	03-08020-37	03-08020-18	2	PCB	145,870	291,740	
253	LINER 110	03-08020-39	03-08020-20	4	PCB	298,448	1,193,792	
254	LINER 105	03-08020-40	03-08020-21	4	PCB	160,000	640,000	
255	LINER 103	03-08020-41	03-08020-22	4	PCB	167,720	670,880	
256	LINER 101	03-08020-42	03-08020-23	4	PCB	165,110	660,440	
257	PLAN HYDRAULIK	03-1004	03-1004-24	14	PCB	41,760	584,640	
258	GASKET-3	03-1004	03-1004-22	2	PCB	11,436,220	22,872,440	
259	BOLT & NUT : M16x75	03-1004	03-1004-21	10	ST	4036	40,360	
260	TEUPORABILTY TORQUE PIN		03-08020-02	9	WI	110,000	990,000	
[Detail Tool for Ball Racecourse]								
261	HYDRAULIC TORQUE WRENCH	100T		2	PCB	12,492,300	24,984,600	
262	HYDRAULIC TORQUE WRENCH	50mm		1	PCB	117,000	117,000	
263	HYDRAULIC TORQUE WRENCH	HYDROPC 40L		1	PCB	12,655,800	12,655,800	
264	TANCHI PW REAMER	TFR00		2	PCB	4,214,076	8,428,152	
265	HYDRAULIC JACK	PCJ-100		2	PCB	11,133,320	22,266,640	
266	HYDRAULIC JACK	PCJ-100J		2	PCB	11,100,000	22,200,000	
267	ALUMINUM JACK	AJ-2T-10		5	PCB	1204,888	6,024,440	
268	SPRILL	SPRILL-10		1	PCB	11,100,000	11,100,000	
269	DRILL	D2-10mm		2	PCB	438,888	877,776	
270	DRILL	D2-10mm/MT90		2	PCB	121,328	242,656	
271	DRILL	20 Green/MT90		2	PCB	166,256	332,512	
272	DRILL	22 Green/MT90		2	PCB	173,128	346,256	
273	Green Drill for Drilling Machine	PCD-250-11		1	PCB	11,084,280	11,084,280	
274	DRILL SHANK	DR-127		1	PCB	49,180	49,180	
275	PLATE 300	PCD-300x300		2	PCB	43,880	87,760	
[Detailing Tool for Ball Racecourse]								
276	Spinning Basecap		03-30767-31	10	PCB	1000	10,000	
277	Holder		03-30767-33	20	PCB	112,000	2,240,000	
278	DRILL Nut		03-30767-34	20	PCB	117,000	2,340,000	
279	Washer			1	PCB	166,000	166,000	
280	Steel Plate			1	PCB	11,000,000	11,000,000	

FORM-04 Suppl

03/03/2018

Revisions		ECT	-	SL	2	Doc. No.	ME-220500		
Rev.	Description	Revised			Checked	Approved	Date		
0	First issue	-	-	-	-	-	-	-	-

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	-------------	-----------

1. Preface

Requests for quotation were received from the customer on Jan. 20, 2022. Estimation specifications are summarized in this document.

< RFQ >

- 1) Exhaust Cylinder for Unit #1GT
- 2) Exhaust Cylinder for Unit #4GT

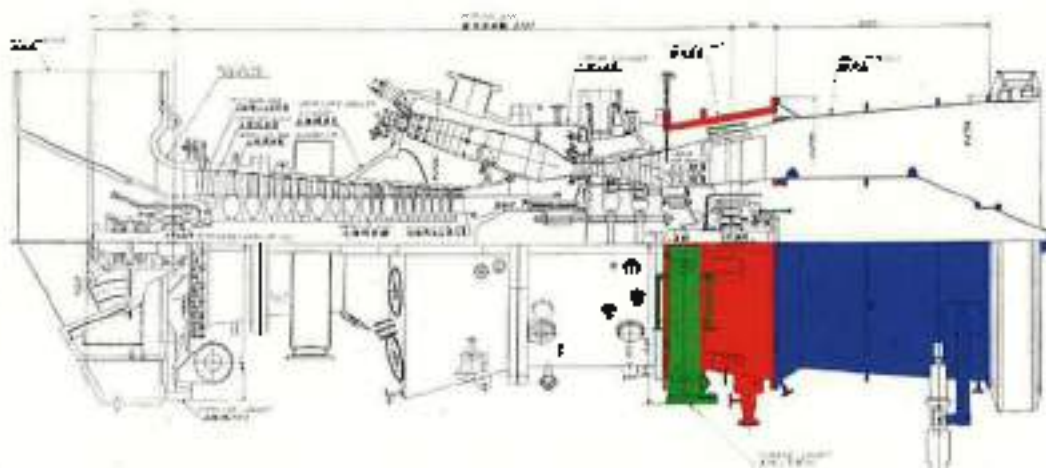
2. Scope of Supply

Parts and Installation jigs (tools)

3. Contents of Estimate

The contents of the estimate are summarized below.

No.	Contents of Estimate	
1	Exhaust cylinder	Replace
2	Base & Support for Exhaust cylinder	Replace
3	Exhaust manifold(+1)	Replace
4	Piping(+2) , others	Replace



Exhaust Cylinder (Red Part), Base/Support (Green Part), Exhaust Manifold (Blue Part)

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

ECT	-	SL	2	Doc. No	ME-220508
-----	---	----	---	------------	-----------

(Remarks)

*1: In addition to replacing the exhaust cylinder, the replacement of the exhaust manifold for the following reasons.

1) From the past regular inspection records, many cracks were confirmed in the exhaust manifold, and welding repair was repeated. The major inspection of the GT#2 conducted in April 2022 confirmed the heavy damage of the exhaust manifold and recommended replacement of the exhaust manifold in the inspection report.

2) It will be difficult to install the exhaust manifold due to the strain caused by the aging of the existing manifold and the welding repair for many years.

Please refer to ATTACHMENT for the condition of the exhaust manifold.

*2: Piping which are connected to Exhaust cylinder & support and exhaust manifold and the existing piping. New piping needs to be adjusted and assembled in site.

4. Specification of Exhaust cylinder

The exhaust cylinder is estimated with the following improvements.

- 1) To increase the number of horizontal flange fixing bolts as a countermeasure against opening due to deformation of outer diffuser horizontal flange.
- 2) In consideration of maintainability, manholes are provided in a horizontal portion on the outside of exhaust cylinder.
- 3) To reduce the risk of cracking, the slit of the horizontal flange of the outer diffuser was eliminated.
- 4) Socket-and-spigot structure (positioning) is provided at the joint between the exhaust cylinder and the turbine casing. Since the turbine casing is not new (existing part), the clearance of the socket-and-spigot section of the turbine casing is widened to accommodate the effect of deformation into consideration.

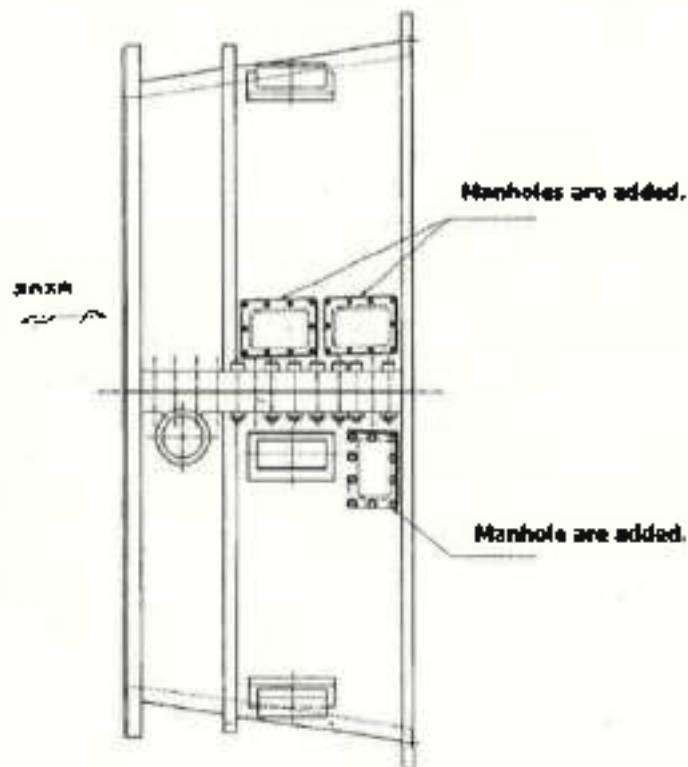
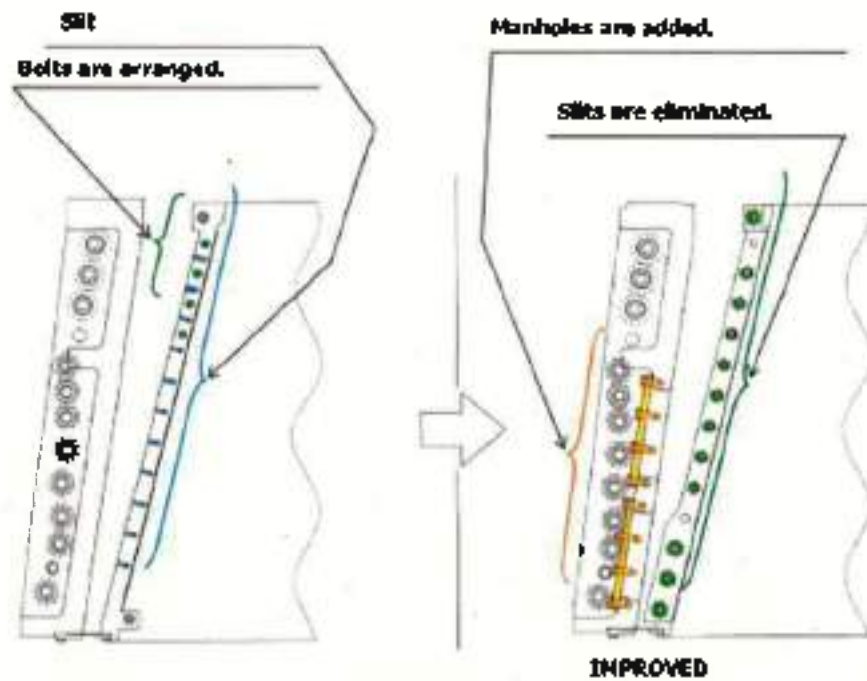
In order to widen the clearance between the exhaust cylinder and the turbine casing, exhaust cylinder cannot be positioned, so a taper pin is added and positioned.

For additional installation of the taper pin, co-drilling of the turbine casing and exhaust cylinder is required. Therefore, the exhaust cylinder is temporarily assembled, and the positioning taper pin drilling is performed before installation of the exhaust cylinder.

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

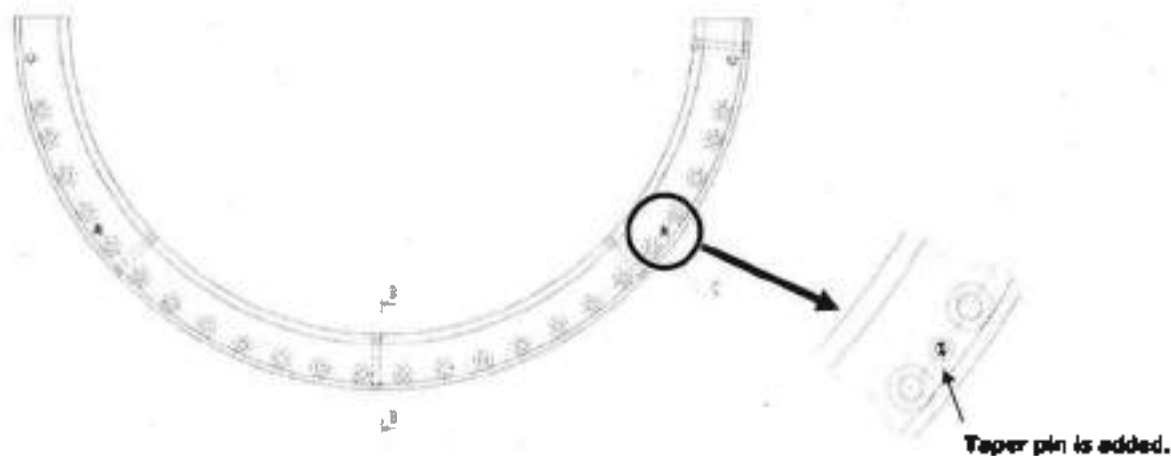
ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	----------	-----------



CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	-------------	-----------



[End OF DOCUMENT]

CONFIDENTIAL

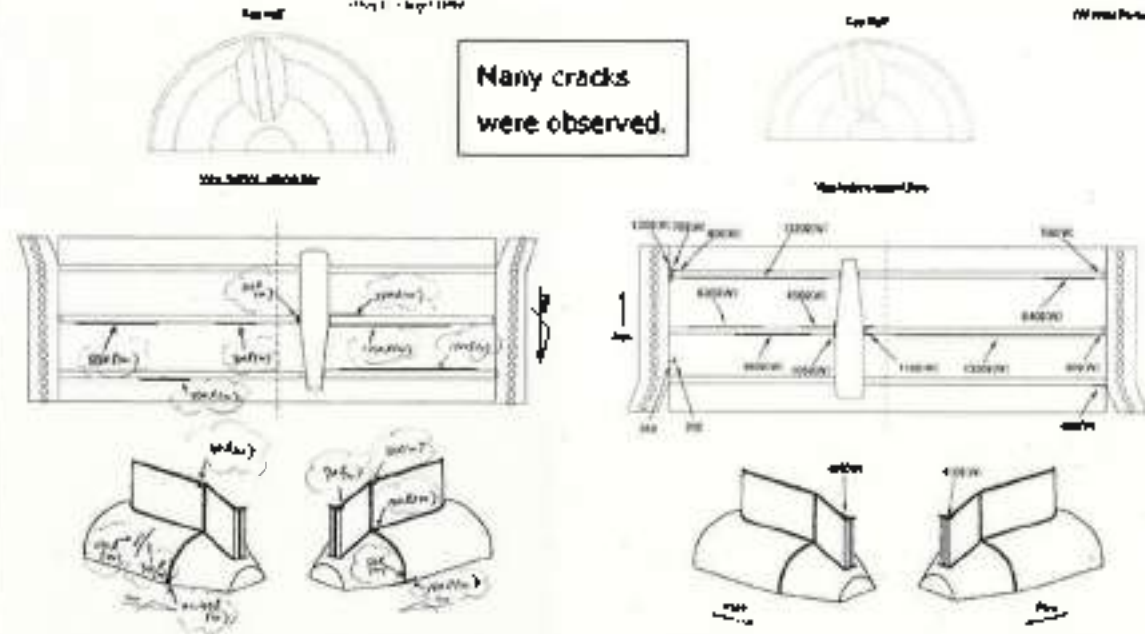
THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	----------	-----------

ATTACHMENT : The condition of the Exhaust manifold

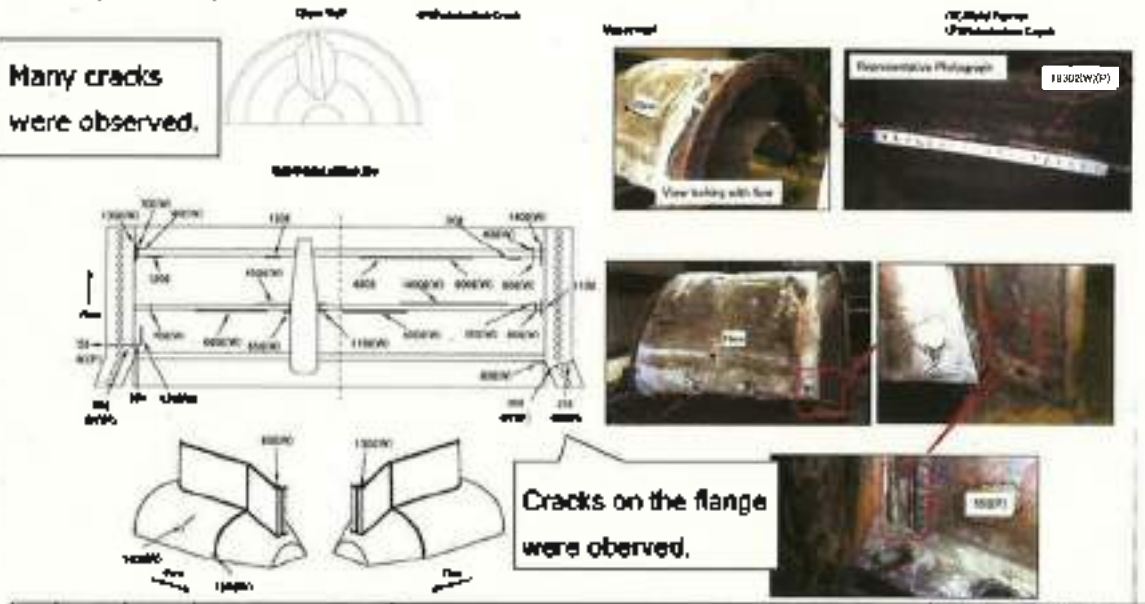
GT#1 (2017 TI) /Refer MRGF17-0031

GT#2 (2016 TI) /Refer MRGF16-0090



GT#2 (2022 MI) /Refer MRGF22-0015

Many cracks were observed.









7	Apr.22	G11	Exhaust Cylinder (replacement)	Exhaust cylinder has heavy damage, and it was difficult to repair it	It is recommended to replace new one
8	Apr.22	G12	Exhaust manifold (replacement)	Exhaust manifold has heavy damage, and it was difficult to repair it	It is recommended to replace new one

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

1. Reassembling and Disassembling Tools

General Tool for Exh. Replacement					
Item	Tool/Equipment	No.	Size/mm/Spec	Quantity	Remarks
1-1	Hydraulic Forklift Forks (Socket and Power Unit)  HY-1MKT HYTORC AIR	(1)	200 mm	2	For loosening and tightening of bolts on vertical flange between turbine cylinder and exhaust casing
1-2	TAPER PIN REAMER 	(1)	TPR20	2	For drilling taper reamer hole
1-3	Hydraulic Jack with Pump 	(1)	3000	2	For correction of deformation of turbine cylinder
1-4	Vertical Jack 	(1)	2500	5	For tapping each casing member when space of EG casing and EMI casing. The jack would be required for inlet valve face and outflow face of turbine case.
1-5	Air Drill 	(1)	12.0mm	2	Stainless steel For drilling seized bolts
1-6	Corner Drill (Air Drilling Machine) F-226CN-1S 	(1) (2) (3) (4)	12.0mm(MTR1) 20.0mm(MTR2) 22.0mm(MTR2) MTR2 = MTR1	2 2 2 1	Taper shaft Taper shaft Taper shaft Crisl sleeve For drilling seized bolts and pilot hole of reamer hole
1-7	Prism box 	(1)	Size 300, Weight 300g	2	For measuring the right angle of turbine support

1. Disassembly and Reassembly Tools

Mandatory Tool for **Est.** Replacement

Item	Tool/Equipment	NO	Sub/Part Spec.	Quantity	Remarks
2-1	Slipping bolt for Exh. Expansion Joint	(1)	Setting Bolt Nut	10	
		(2)	Washer	20	
		(3)	Bolt Nut	20	
					For Assembly of Exh. Expansion
2-2	Universal connecting tool	(1)	Universal connecting tool	1 set	



3-1, MARUNOUCHI 2-CHOME, CHYODA-KU, TOKYO 100-8285, JAPAN

ESTIMATE

No. XAF-NEEPCO-825PFMUJ

Date: 22-Jul-22

Messrs. North Eastern Electric Power Corporation Ltd.
 (A Govt. of India Enterprise)
 Assam Gas Based Power Project
 P.O. Bokuloni Chariali - 786 181 Dist. Dibrugarh (Assam)

In response to your inquiry, we provide you with our estimate for the parts described below on the following basis:

1. Terms of Delivery	FOB/FCA JAPAN
2. Time of Shipment	Below mentioned
3. Port of Shipment	Japanese airport or seaport
4. Port of Destination	Indian airport or seaport
5. Payment	Below mentioned
6. Packing	-
7. Manufacturer	Mitsubishi Heavy Industries, Ltd.
8. Remarks	Below mentioned

Description of Goods	Quantity	Unit Price	Amount FOB/FCA JAPAN (in Japanese Yen)
INDIANEEPCO/ASSAM UNIT#4 GT Spare Parts for Exhaust Cylinder & Exhaust Manifold			
-Details are as per the attached-	1 LOT	-	¥332,363,560
TOTAL :			¥332,363,560

Terms and Conditions**1. Time of Shipment :**

Shipment shall be made on FOB/FCA Japan basis within Nineteen (19) months after Seller's receipt of purchase order and the relative irrevocable letter of credit opened by Buyer acceptable to Seller, subject to availability of vessel and approval of Japanese Government for export, if necessary.

2. Terms of Payment :

100% Contract amount shall be paid by an Irrevocable, confirmed, and non-restricted Letter of Credit payable at sight draft to be opened in favor of Mitsubishi Corporation, Tokyo (Attn : MCY/XA-F) with validity long enough to cover Time of Shipment stipulated in Clause 1 above plus at least 21 days for Seller's bank negotiation.

L/C shall be confirmed by a first class bank in Europe or U.S.A. or Japan acceptable to Seller.

L/C opening charge, confirmation charge and all bank charges outside Japan, including collection charges and stamp duties, if any, shall be paid by Buyer.

Any amendment charges which will be required due to the reason not attributable to Seller shall be borne by Buyer.



3-1, MARUNOUCHI 2-CHOME, CHYODOKU, TOKYO 100-8086, JAPAN

Please indicate following points in L/C without fail:

- 1) "Attn: MICY/CA-F section"
(We have more than 450 independent sections and L/C might not reach right section in time without such indication).
- 2) Port of shipment: Any Japanese airport/ seaport.
- 3) Partial shipment: Permitted
- 4) Transshipment: Permitted

L/C has to be opened subject to the Uniform Customs and Practice for Documentary Credit of the International Chamber of Commerce (2007 revision) Publication No. 600.

Note : Please request L/C opening bank to appoint any of the following banks as advising bank at the time of opening L/C.

- MUFG Bank, Ltd Head Office (swift code : BOTKJPJT)
- Sumitomo Mitsui Banking Corporation, Tokyo (swift code : SMBCJPJT)
- Mizuho Bank, Ltd Head Office (swift code : MHCBJPJT)

*This request is for the appoint of advising bank and the above banks shall not be restricted as a negotiating bank.

3. Estimated Packing Data :

To be informed.

4. Inspection :

Manufacturer's factory inspection prior to shipment shall be deemed as final.

Third Party's inspection fee and Customer's witness inspection fee are not included in above price.

5. Warranty:

Seller warrants to Buyer that these parts are free from any defect of design, material, manufacturing and workmanship for a period of twelve (12) months after arrival to the site or eighteen (18) months after FOB/FCA, whichever comes earlier.

However, Seller's warranty will not cover the items damaged by items including but not limited to the following items.

- Damage or rust by improper storage
- Damage by the Buyer's improper use
- Normal wear and tear

Further, in any case, Seller's liability is limited to repair of the defective parts and any indirect or consequential damages will not be borne by Seller.

6. Offer Validity :

This quotation is valid until October 31, 2022, thereafter subject to Seller's confirmation

Seller's receipt of written order confirmation issued by Buyer.

7. Effective Date of the Contract

Effective date of the contract is the date on which Seller accepts Buyer's purchase order and receives the letter of credit acceptable for Seller.

8. Remarks :

- 1) Delivery term is FOB/FCA Japan (Kobe Port or Kansai Airport) base. Seller's price is not including marine insurance and freight from Japan to site which shall be arranged by Buyer.
- 2) Taxes and/or duties to be incurred outside of Japan shall be borne and paid by Buyer, if applicable.
- 3) Seller's prices mentioned above are quoted under the condition that all of the items and quantity offered shall be ordered in one lot at the same time within the validity period. In case of partial order, prices shall be re-quoted.
- 4) The terms and conditions which are not specified in this quotation shall be discussed and mutually agreed before signing the contract.

9. Others :

- 1) The costs for TA dispatchment are not included in Seller's prices.
- 2) Because of COVID-19 pandemic, please kindly note that the delivery time may be longer than mentioned in this quotation. After we receive your PO, we will inform you fixed delivery time.
- 3) The name of products may be subject to change after receipt of your PO/procurement.
- 4) Flexible hoses, pull boxes, and angle materials for vibrometers are not included in this quotation because existing ones are planned to be re-used.

MITSUBISHI CORPORATION


A. NAKAMURA
General Manager
Infrastructure EPC Management Office

E. & O. E

No.	Description	MS#			Qty	PCA		Remarks
		Drawing No.	Revised No.	Unit Price		Total Price		
1	(Exhaust Cylinder Complete replacement)							
1	PISTON	09-5571-08	09-5571-08	2	PC\$ 340.400	680.800		
2	PISTON	09-5571-09	09-5571-09	2	PC\$ 340.400	680.800		
3	EXHAUST CYLINDER	01-05120-91	01-05120-91	1	ST \$170.000	\$170.000		
4	HEX SOC HEAD PLUG R18	01-05058-14	01-05058-14	1	PC\$ 12.20	12.20		
5	COVER	01-05122-78	01-05058-01	4	PC\$ 256.400	1025.600		
6	COVER	01-05122-79	01-05058-02	2	PC\$ 288.000	576.000		
7	PACING NO 8	01-05122-88	01-05058-06	4	PC\$ 38.400	153.600		
8	PACING NO 8	01-05122-81	01-05058-07	2	PC\$ 38.300	76.600		
9	BOLT M16x36	01-05122-82	01-05058-08	80	PC\$ 11.670	933.600		
10	TORQUE LOCK WASHER R18	01-05122-83	01-05058-03	80	PC\$ 11.10	888.000		
11	PIN	01-05122-04	09-54237-02	1	POE 118.000	118.000		
12	COVER	01-05122-05	09-54237-03	1	POE 123.300	123.300		
13	PACING NO 8	01-05122-06	09-54237-04	1	POE 11.10	11.10		
14	COVER	01-05122-22	09-54545-01	1	POE 3185.000	3185.000		
15	HEX BOLT M12x30	01-05122-24	01-05114-01	35	PC\$ 112.110	3923.850		
16	HEX BOLT M12x30	01-05122-25	01-05114-02	35	PC\$ 111.440	3900.400		
17	HEX SOC HEAD BOLT M12x10	01-05122-30	01-05114-04	6	PC\$ 85.220	511.320		
18	HEX SOC HEAD BOLT M12x10	01-05122-31	01-05114-05	14	PC\$ 121.670	1703.380		
19	HEX SOC HEAD BOLT M12x10	01-05122-32	01-05114-06	10	PC\$ 17.190	171.900		
20	HEX SOC HEAD BOLT M12x10	01-05122-33	01-05114-07	17	PC\$ 10.640	180.880		
21	HEX NUT M16	01-05122-35	01-05114-08	30	PC\$ 11.290	338.700		
22	HEX NUT M12	01-05122-36	01-05114-09	14	PC\$ 38.780	542.920		
23	CAWSET	01-05122-37	09-54545-02	1	POE 116.000	116.000		
24	HEX SOC HEAD NUT M20x40	01-05122-38	01-05114-10	6	PC\$ 112.000	672.000		
25	TAPER PIN 32	01-05122-40	01-05114-22	2	PC\$ 113.700	227.400		
26	DOOR HINGE NUT FRAMER BOLT M20x128x52	01-05122-42	01-05114-23	4	PC\$ 40.000	160.000		
27	HEX NUT M16	01-05122-44	01-05114-25	2	PC\$ 17.20	34.40		
28	HEX SOC HEAD NUT M20x17	01-05122-46	01-05114-26	8	PC\$ 116.220	929.760		
29	TAPER PIN WITH THREAD 3/32	01-05122-48	01-05114-27	2	PC\$ 118.270	236.540		
30	HEX NUT M8	01-05122-49	01-05114-28	2	PC\$ 11.90	23.80		
31	HEX SOC HEAD BOLT M12x10	01-05122-48	01-05114-18	9	PC\$ 45.110	405.990		
32	LOCK WASH R18	01-05122-49	01-05114-20	1	PC\$ 38.440	38.440		
33	SPECIAL HEX SOC HEAD BOLT WITH M12x120	01-05122-50	01-05114-31	4	PC\$ 148.170	592.680		
34	HEX SOC HEAD BOLT WITH M12x175	01-05122-52	01-05114-32	2	PC\$ 1131.220	2262.440		
35	HEX SOC HEAD BOLT WITH M12x175	01-05122-58	09-54237-05	4	PC\$ 16.170	64.680		
36	HEX SOC HEAD PLUG R1 1/2	01-05122-60	09-54545-03	1	PC\$ 14.400	14.400		
37	HEX SOC HEAD PLUG R1 1/4	01-05122-67	09-54545-07	1	PC\$ 13.980	13.980		
38	HEX SOC HEAD PLUG R1	01-05122-68	09-54545-08	1	PC\$ 12.300	12.300		
39	HEX SOC HEAD PLUG R1/2	01-05122-69	09-54545-09	1	PC\$ 10.70	10.70		
40	PACING	01-05122-71	09-54545-02	4	PC\$ 1158.010	4632.040		
41	PLUG MPT3M	01-05122-74	09-54545-14	1	PC\$ 31.220	31.220		
42	PIN	01-05122-77	01-05058-15	4	PC\$ 418.000	1672.000		
43	HEX DOWEL BOLT M8x70	01-05122-84	01-05114-43	4	PC\$ 422.780	1691.120		
44	HEX BOLT M8x70	01-05122-85	01-05114-44	4	PC\$ 324.720	1298.880		
45	HEX BOLT M8x90	01-05122-86	01-05114-45	16	PC\$ 316.040	5057.040		
46	HEX NUT M20	01-05122-87	01-05114-46	8	PC\$ 14.870	118.960		
47	HEX NUT M16	01-05122-88	01-05114-47	16	PC\$ 11.040	176.640		
48	SPLIT PIN 4x25	01-05122-89	01-05114-48	8	PC\$ 130	1040		
49	SPLIT PIN 4x25	01-05122-90	01-05114-49	16	PC\$ 130	2080		
50	RETAINER PLATE	01-05122-92	09-54491-01	9	PC\$ 1189.040	10701.360		
51	RETAINER PLATE	01-05122-93	09-54491-02	8	PC\$ 1102.920	8823.360		
52	GEAL PLATE	01-05122-94	09-54491-03	8	PC\$ 1076.800	8614.400		
53	WASHER	01-05122-95	09-54491-04	24	PC\$ 45.190	1084.560		
54	HEX BOLT M12x25	01-05122-27	01-05114-07	64	PC\$ 18.080	1157.120		
55	HEX BOLT M16x25	01-05122-28	01-05114-08	24	PC\$ 15.880	382.320		
56	BRACKET	01-05122-95	09-54491-05	2	PC\$ 112.230	224.460		
57	PIPE	01-05122-21	09-54358-18	2	PC\$ 141.180	282.360		
58	PIPE SUPPORT TYPE A 22x1	01-05122-53	09-54358-23	2	PC\$ 10.000	20.000		
59	BUNG PLUG 10x15	01-05122-54	09-54358-24	2	PC\$ 1300	2600		
60	BUNG OASIS 11 1/2x15	01-05122-55	09-54358-25	2	PC\$ 1110	2220		
61	HEX BOLT M12x45	01-05122-65	09-54358-26	8	PC\$ 1110	8880		
62	HEX BOLT M10x20	01-05122-57	09-54358-27	8	PC\$ 1110	8880		
63	HEX BOLT M16x20	01-05122-59	09-54358-29	2	PC\$ 1110	2220		
64	HEX NUT M12	01-05122-63	09-54358-33	8	PC\$ 1110	8880		
65	HEX NUT M8	01-05122-64	09-54358-34	2	PC\$ 1110	2220		
66	SPRING WASHER 8	01-05122-66	09-54358-35	2	PC\$ 1110	2220		
67	SEAL RING	01-05122-67	09-54358-36	1	ST 1022.230	1022.230		
68	Seal Ring Housing	01-05122-10	09-54358-39	1	ST 1113.500	1113.500		
69	Plug R2	01-05122-06	09-54358-05	1	PC\$ 100.780	100.780		
70	PACING	01-05122-11	09-54358-01	2	PC\$ 1012.700	2025.400		
71	SEAL PLATE	01-05122-13	09-54431-04	5	PC\$ 1229.080	6145.400		
72	LEAF SPRING	01-05122-17	09-54431-06	4	PC\$ 114.470	457.880		
73	KEY	01-05122-19	09-54431-08	2	PC\$ 117.220	234.440		
74	SLOT HEAD SCREW M6	01-05122-20	09-54431-09	4	PC\$ 119.280	477.120		
75	HEX BOLT M10x20	01-05122-58	01-05114-09	12	PC\$ 16.870	202.440		
76	HEX SOC HEAD BOLT M12x17	01-05122-34	01-05114-14	12	PC\$ 16.440	197.280		
77	HEX SOC HEAD BOLT M16x17	01-05122-60	09-54545-04	2	PC\$ 1110	2220		
78	SEAL RING	01-05122-68	09-54358-31	1	ST 1042.980	1042.980		
79	SEAL RING	01-05122-69	09-54358-32	1	ST 1026.670	1026.670		
80	SLOT HEAD SCREW M6	01-05122-64	09-54358-37	2	PC\$ 10.220	20.440		
81	T RECESS PAN HEAD SCREW M10x10	01-05122-62	09-54358-32	2	PC\$ 1110	2220		
82	DRIPLATE	09-54358-41		1	ST 1016.870	1016.870		
83	INSULATION BLANKET	09-54358-41		1	ST 1016.870	1016.870		
84	HEX BOLT M8x140	00-30173-01	09-54441-01	26	PC\$ 111.400	2896.400		
85	TAPER PIN Type A 20x70	01-05122-63	01-05114-05	2	PC\$ 110.440	220.880		
86	HEX NUT M16	01-05122-64	09-54358-34	2	PC\$ 1110	2220		
87	BASE	09-53704-02	09-53704-01	1	PC\$ 102.740	102.740		
88	SUPPORT PLATE	09-53704-03	09-53704-01	2	PC\$ 111.860	223.720		
89	ROD	09-53704-04	09-53704-01	1	PC\$ 140.000	140.000		
90	BRACKET	09-53704-05	09-53704-01	1	PC\$ 102.220	102.220		

No	Description	ABBY Drawing No	Quantity	Qty	PCS		Priority	
					Unit Price	Total Price		
81	PLATE	09-03704-06	09-03704-13	4	PCS	430,790	1723,130	
82	ADJUSTABLE PLATE	09-03704-07	09-03704-14	1	PCS	46,640	46,640	
83	STRAIGHT PIN 25x75	09-03704-08		4	PCS	46,730	178,880	
84	HEX BOLT HEAD BOLT 10x16	09-03704-09	09-03704-10	18	PCS	1680	30240	
85	GRASS (NIPPU) - P.VM	09-03704-12	09-03704-12	4	PCS	1230	4920	
88	HEX BOLT 10x15	09-03704-13		4	PCS	1230	4920	
87	TAPER PIN Type A 20x80	G1-00880-02		2	PCS	24,000	48,000	
86	HEX NUT 10x	G1-00800-03		2	PCS	410	820	
89	FRING BRACKET	G1-00921-02	09-02070	1	BT	4785,700	4785,700	
100	RING BRACKET	G1-00801-03		1	BT	-	-	Included in No 89
101	WASHER	G1-00801-04		4	PCS	-	-	Included in No 89
102	HEX BOLT 10x16	G1-00801-09		12	PCS	-	-	Included in No 89
103	HEX BOLT 10x12.5	G1-00801-10		4	PCS	-	-	Included in No 89
104	PLAIN WASHER 10	G1-00801-11		4	PCS	-	-	Included in No 89
105	HEX NUT 10x	G1-00801-12		4	PCS	-	-	Included in No 89
106	MANDREL	BL-00194-01	BL-00194	1	PCS	84,375,790	84,375,790	
107	STOPPER	BL-00194-02	BL-00194-01	1	PCS	-	-	Included in No 106
108	STOPPER	BL-00194-03	BL-00194-02	1	PCS	-	-	Included in No 106
109	POAT	BL-00194-04	BL-00194-03	2	PCS	-	-	Included in No 106
118	HEX BOLT 10x16	BL-00194-05		4	PCS	-	-	Included in No 106
111	HEX BOLT 10x16	BL-00194-06		4	PCS	-	-	Included in No 106
112	PIPE 1/2"	G3-07186	G3-07186	1	BT	4570,670	4570,670	
113	PIPE 1/2x3/4x10	G3-07186-06		1	PCS	15,670	15,670	
114	UNION 1/2"	G3-07186-10		1	PCS	173,330	173,330	
115	PIPE 1/2"	G3-07186		1	BT	1878,670	1878,670	
116	PIPE 1/2x3/4x10	G3-07186-08		3	PCS	45,670	137,010	
117	UNION 1/2"	G3-07186-10		1	PCS	173,330	173,330	
118	SPECIAL KEY BOLT 1 1/2x1/2x1-1/2	09-00005-07		2	PCS	1131,870	2263,740	
119	SPECIAL KEY BOLT 1/2x1-1/2	09-00430-18		2	BT	1181,870	2363,740	
120	WASHER	09-00430-20		2	PCS	102,220	204,440	
121	HEX NUT 10x			2	PCS	12,440	24,880	
TENDON NATION Complete replacement								
122	END BRACKET	09-20042-02	09-22011-01	1	BT	183,249,080	183,249,080	
123	HEX BOLT 10x16	09-20042-05	09-22011-03	21	PCS	112,020	2352,420	
124	HEX BOLT 10x12.5	09-20042-06	09-22011-04	68	PCS	180,810	12314,880	
125	HEX BOLT 10x16x70	09-20042-07	09-22011-50	30	PCS	42,220	1266,600	
126	HEX BOLT 10x12x30	09-20042-08	09-22011-51	20	PCS	11,620	232,400	
127	HEX NUT 10x	09-20042-09	09-22011-52	68	PCS	18,670	1268,560	
128	HEX NUT 10x	09-20042-10	09-22011-53	50	PCS	140,350	7017,500	
129	PLAIN WASHER 12	09-20042-11	09-22011-54	20	PCS	1320	26,400	
130	HEX BOLT 10x16	09-20042-12	09-22011-55	4	PCS	13,690	54,760	
131	HEX NUT 10x	09-20042-13	09-22011-56	21	PCS	14,840	311,640	
132	WASHER	09-20042-14	09-22011-57	1	PCS	14,440	14,440	
133	RETAINER PLATE	09-20042-15	09-22011-58	2	PCS	11,110	22,220	
134	TAPER PIN Type A 10x22	09-20042-16	09-22011-59	4	PCS	11,020	44,080	
135	HEX NUT 10x		09-22011-50	4	PCS	11,10	44,40	
136	PLAIN WASHER 12		09-22011-51	4	PCS	11,10	44,40	
137	PIPE	09-18136-08	09-22011-52	1	PCS	145,220	145,220	
138	PIPE	09-18136-10	09-22011-53	1	PCS	119,890	119,890	
139	PIPE	09-18136-11	09-22011-54	1	PCS	112,330	112,330	
140	PIPE	09-18136-12	09-22011-55	1	PCS	112,330	112,330	
141	PIPE	09-18136-13	09-22011-56	1	PCS	112,330	112,330	
142	U BOLT 1/2	09-18136-15		2	PCS	1290	2580	
143	BOLT 1/2x12	09-18136-16		2	PCS	11,10	22,20	
144	SPRING WASHER 6	09-18136-18		2	PCS	11,10	22,20	
145	PIPE	09-18136-02	09-22011-57	1	PCS	138,140	138,140	
146	PIPE	09-18136-03	09-22011-58	1	PCS	138,140	138,140	
147	PIPE	09-18136-04	09-22011-59	1	PCS	138,140	138,140	
148	PIPE	09-18136-05	09-22011-60	1	PCS	138,140	138,140	
149	PIPE	09-18136-06	09-22011-61	1	PCS	121,600	121,600	
150	PIPE	09-18136-08	09-22011-62	1	PCS	1274,790	1274,790	
151	U BOLT 1/2	09-18136-14		2	PCS	1220	2440	
152	BRACKET	09-18136-21	09-22011-63	1	PCS	123,110	123,110	
153	BRACKET	09-18136-22	09-22011-64	1	PCS	123,110	123,110	
154	BRACKET	09-18136-23	09-22011-65	1	PCS	113,300	113,300	
155	BOLT 1/2x14		G3-21800	2	PCS	1230	2460	
156	U NUT 10x		G3-31800	2	PCS	1440	2880	
157	PIPE 1/2-475	G3-07186	G3-07186-03	1	PCS	14,060	14,060	
158	PIPE 1/2-475	G3-07186	G3-07186-07	4	PCS	14,060	56,240	
159	PIPE 1/2-475	G3-07186	G3-07186-07	1	PCS	14,060	14,060	
160	SPE 20x80	G3-07186	G3-07186-07	1	PCS	14,060	14,060	
161	GPL 10x25	G3-07186	G3-07186-18	2	PCS	1660	3320	
162	PIPE 25x50x1900	G3-07186	G3-07186-19	4	BT	113,690	454,760	
163	Turn Bole	G3-00221-01		4	BT	1151,330	4605,320	
164	HEX BOLT 10x16			6	PCS	4190	25140	
165	HEX NUT 10x			6	PCS	4110	24660	
166	WASHER 20			16	PCS	4110	65760	
(Pong)								
167	HEX BOLT 10x16	G3-07186-A	G3-07186-04	12	PCS	1110	13320	
168	HEX NUT 10x	G3-07186-A	G3-07186-07	12	PCS	1190	14280	
169	RING BRACKET 10x-15	G3-07186-A	G3-07186-10	3	PCS	1180	3540	
170	HEX BOLT 10x16	G3-07186-B	G3-07186-13	12	PCS	11230	134760	
171	HEX NUT 10x	G3-07186-B	G3-07186-18	12	PCS	1230	14760	
172	SPIRAL WOUND GAS OFF C. 10K. 25	G3-07186-B	G3-07186-22	3	PCS	11,110	33,330	
173	STUD BOLT 10x110	G3-07186-A	G3-07186-01	18	PCS	1090	19620	
174	HEX NUT 10x	G3-07186-A	G3-07186-17	18	PCS	1290	23220	
175	SPIRAL WOUND GAS OFF C. 10K. 300	G3-07186-A	G3-07186-15	3	PCS	154,580	463,740	
176	STUD BOLT 10x110	G3-07186-C	G3-07186-07	36	PCS	1360	48960	
177	HEX NUT 10x	G3-07186-C	G3-07186-12	72	PCS	1290	92880	

No.	Description	UNIT	Drawing No.	Drawing No.	Qty	PCA		Remarks	
						Unit Price	Total Price		
179	SPRAL WOUND BASKET ID-10K-250		G3-07156-C	G3-07156-A	3	PCS	150 600	450 600	
179	HEX BOLT M16x50		G3-07152-A	G3-07152-B	4	PCS	32 760	131 040	
180	HEX NUT M16		G3-07152-A	G3-07152-B	4	PCS	11 48	45 92	
181	RING GASKET 10K-25		G3-07152-A	G3-07152-B	1	PCS	4220	4220	
182	HEX BOLT M12x55		G3-07152-C	G3-07152-D	4	PCS	108 560	434 240	
183	HEX NUT M12		G3-07152-C	G3-07152-D	4	PCS	11 48	45 92	
184	RING GASKET 10K-15		G3-07152-C	G3-07152-D	2	PCS	4220	8440	
185	HEX BOLT M16x30		G3-07161-A	G3-07232-A	4	PCS	32 760	131 040	
186	HEX NUT M16		G3-07161-A	G3-07232-A	4	PCS	11 10	44 40	
187	RING GASKET 10K-25		G3-07161-A	G3-07232-A	1	PCS	4220	4220	
188	HEX BOLT M16x50		G3-07161-B	G3-07232-B	4	PCS	4200	16800	
189	HEX NUT M16		G3-07161-B	G3-07232-B	4	PCS	11 10	44 40	
190	RING GASKET 10K-15		G3-07161-D	G3-07232-B	2	PCS	4220	8440	
191	HEX BOLT M16x40		G3-07166-H	G3-07233-30	10	PCS	41 10	411 00	
192	HEX NUT M16		G3-07166-H	G3-07233-30	10	PCS	11 10	111 00	
193	RING GASKET 10K-100		G3-07166-H	G3-07233-30	2	PCS	4220	8440	
194	HEX BOLT M16x55		G3-07166-M	G3-07233-33	4	PCS	4220	16880	
195	HEX NUT M16		G3-07166-M	G3-07233-33	4	PCS	11 10	44 40	
196	RING GASKET 10K-50		G3-07166-P	G3-07233-30	1	PCS	4220	4220	
197	HEX BOLT M16x50		G3-07166-P	G3-07233-30	12	PCS	4220	50640	
198	HEX NUT M16		G3-07166-P	G3-07233-30	12	PCS	11 10	133 20	
199	RING GASKET 10K-32		G3-07166-Q	G3-07233-30	3	PCS	4220	12660	
200	HEX BOLT M16x50		G3-07166-Q	G3-07233-30	4	PCS	41 10	164 40	
201	HEX NUT M16		G3-07166-Q	G3-07233-30	4	PCS	11 10	44 40	
202	RING GASKET 10K-32		G3-07166-R	G3-07233-36	2	PCS	4220	8440	
203	HEX BOLT M16x50		G3-07166-R	G3-07233-36	40	PCS	420	16800	
204	HEX NUT M16		G3-07166-R	G3-07233-36	40	PCS	11 10	444 00	
205	GASKET 10K-25		G3-07166-S	G3-07233-30	10	PCS	100	1000	
206	HEX BOLT M16x55		G3-07166-S	G3-07233-33	4	PCS	4220	16880	
207	HEX NUT M16		G3-07166-S	G3-07233-33	4	PCS	11 10	44 40	
208	RING GASKET 10K-25		G3-07166-S	G3-07233-33	2	PCS	4220	8440	
209	HEX BOLT M16x55		G3-07166-T	G3-07233-15	12	PCS	41 10	493 20	
210	HEX NUT M16		G3-07166-T	G3-07233-15	12	PCS	11 10	133 20	
211	RING GASKET 10K-50		G3-07166-U	G3-07233-20	3	PCS	11 10	33 30	
212	HEX BOLT M16x50		G3-07166-U	G3-07233-15	8	PCS	41 10	328 80	
213	HEX NUT M16		G3-07166-U	G3-07233-15	8	PCS	11 10	88 80	
214	RING GASKET 10K-40		G3-07166-V	G3-07233-20	2	PCS	11 10	22 20	
215	O-RING FOR UNION		G3-15138-04	09-72732-30	1	PCS	112 670	112 670	
216	O-RING FOR UNION		G3-15138-05	09-72742-30	1	PCS	112 670	112 670	
217	PIPE 1/2-12		G3-07205	G3-07205	1	ST	45 8 500	45 8 500	
218	PIPE 25x25-40x100			G3-07205-10	1	ST	15 670	15 670	
219	PIPE 25x25-40x			G3-07205-13	2	PCS	4200	8400	
220	SPL 10K-25			G3-07205-18	2	PCS	4200	8400	
221	PIPE 1/2-18			G3-07205	1	ST	1688 220	1688 220	
222	PIPE 25x25-40x2000			G3-07205-06	1	ST	15 670	15 670	
223	PIPE 25x25-40x			G3-07205-14	4	PCS	4270	17080	
224	SPL 10K-25			G3-07205-17	2	PCS	4200	8400	
225	PIPE 1/2-15			G3-07205	1	ST	1620 220	1620 220	
226	PIPE 40x25-40x100			G3-07205-04	1	ST	40 000	40 000	
227	SPL 10K-40			G3-07205-43	4	PCS	4270	17080	
228	PIPE 1/2-17			G3-07205	1	ST	1620 220	1620 220	
229	PIPE 40x25-40x100			G3-07205-05	1	ST	40 000	40 000	
230	SPL 10K-40			G3-07205-17	1	PCS	4270	4270	
231	PIPE 1/2-14			G3-07205	1	ST	155 800	155 800	
232	PIPE 100x50-100x100			G3-07261-01	1	ST	101 330	101 330	
233	PIPE 50x25-50x100			G3-07261-10	1	PCS	117 330	117 330	
234	BT 100x40			G3-07261-12	1	PCS	437 780	437 780	
235	SPL 10K-100			G3-07261-13	1	PCS	43 220	43 220	
236	SPL 10K-100			G3-07261-16	2	PCS	41 980	83 960	
237	SPL 10K-50			G3-07261-18	1	PCS	440	440	
238	BOSS FT 34			G3-07261-21	1	PCS	428 780	428 780	
239	SITE GRASS 100A		G3-07261-22	09-78816-05	1	ST	404 000	404 000	
240	PIPE 32x25-40x100			G3-07261-24	1	PCS	45 990	45 990	
241	SOCKET 30A			G3-07261-25	1	PCS	40 330	40 330	
242	SPL 10K-32			G3-07261-28	1	PCS	4070	4070	
243	BOREL 60x30			G3-07261-29	1	PCS	4000	4000	
244	BOREL 100x50x50			G3-07261-29	1	PCS	4070	4070	
245	PIPE 1/2-18		G3-07266	G3-07266	1	ST	1434 190	1434 190	
246	PIPE 32x25-40x1300			G3-07266-08	1	ST	40 300	40 300	
247	PIPE 25x25			G3-07266-10	2	PCS	4401	8802	
248	SPL 10K-32			G3-07266-17	2	PCS	1780	3560	
Other Products									
249	LINER 100		G3-08352-24	09-88823-15	4	PCS	278 780	1115 120	
250	LINER 100		G3-08352-26	09-88823-16	2	PCS	110 440	220 880	
251	LINER 100		G3-08352-28	09-88823-17	2	PCS	45 890	91 780	
252	LINER 101		G3-08352-37	09-88823-18	2	PCS	16 670	33 340	
253	LINER 110		G3-08352-39	09-88823-19	4	PCS	318 440	1273 760	
254	LINER 100		G3-08352-40	09-88823-21	4	PCS	40 000	160 000	
255	LINER 100		G3-08352-41	09-88823-22	4	PCS	17 220	68 880	
256	LINER 101		G3-08352-42	09-88823-23	4	PCS	16 180	64 720	
257	PLAIN WASHER 100		G3-19834	09-88823-24	90	PCS	11 580	1042 200	
258	GASKET 10		G3-19834	09-88823-25	2	PCS	168 830 220	337 660 440	
259	BOLT B.M.FI : M16x70		G3-19834	09-88823-27	20	ST	1330	26600	
260	TEMPORARILY TORQUE PIN			01-00306-02	3	ST	490 640	1471 920	
(GASKET FOR EACH PREPARATION)									
261	HYDRAULIC TORQUE WRENCH		1MKT		2	PCS	17 400 220	34 800 440	
262	HYDRAULIC TORQUE WRENCH		50mm		2	PCS	17 220	34 440	
263	HYDRAULIC TORQUE WRENCH		HYDRIC AIR		1	PCS	10 050 000	10 050 000	
264	LAPOR PIN PEABER		TR120		2	PCS	1994 670	3989 340	

No.	Description	ASST Drawing No.	Drawing No.	Qty	PCA		Remarks	
					Unit Price	Total Price		
265	HYDRAULIC JACK	PCS-502		2	PCS	\$113,500	\$227,000	
266	HYDRAULIC JACK	7-90 x 17 1/2		2	PCS	\$132,000	\$264,000	
267	JURNAL JACK	11-25 1/2		3	PCS	\$204,880	\$614,640	
268	AIR CHISEL	FRD4674.7		1	PCS	\$145,870	\$145,870	
269	Chisel	12 Dams		3	PCS	\$30,000	\$90,000	
270	Chisel	12 Coars(MIT#1)		2	PCS	\$31,330	\$62,660	
271	Chisel	20 Coars(MIT#2)		2	PCS	\$58,220	\$116,440	
272	Chisel	22 Coars(MIT#3)		2	PCS	\$71,580	\$143,160	
273	Corner Drill (Air Drilling Machine)	FD-23R-41		1	PCS	\$1,084,580	\$1,084,580	
274	Drill Stand	10S-12T		1	PCS	\$5,860	\$5,860	
275	Pump out	PCD-3074408		2	PCS	\$9,900	\$19,700	
	[Mandatory Tool for Each Replacement]							
276	Setting Drill Nut		00-30757-34	10	PCS	\$336	\$3,360	
277	Holder		00-30757-33	20	PCS	\$72,000	\$1,440,000	
278	Box Nut		00-30757-34	20	PCS	\$17,880	\$357,600	
279	H-Bush			1	PCS	\$98,398	\$98,398	
280	Steel Plate			1	PCS	\$18,240,880	\$18,240,880	
PCA Total							\$20,362,148	



Technical Information		Doc. No.	ME-220509	Rev.	0
		Date : 1 July, 2022			
Customer		Department/Section			
NORTH EASTERN ELECTRIC POWER CORPORATION Ltd.		Global GTCC Service Project Group Takasago Service Engineering Department GTCC Business Division			
Project		Prepared	H. Takaya		
ASSAM GAS BASED POWER PROJECT M251B3 GAS TURBINE		Checked	A. Dhiman S. Otsuki		
Subject		Approved	K. Furukawa		
Contents of the Estimate for Exhaust Cylinder					

ABSTRACT

This document is prepared to explain the contents of the estimate for the exhaust cylinder.

SPM

Relevant Section

REFERENCE

ME-160747 Proposal for Renovation & Modernization

() URGENT	
CATEGORY:	
() Recommendation	() Technical Report
() MHI Question	(✓) Information
() Reply to Technical Inquiry	
Reply	
() Required	(✓) Not Required

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

Order	PA Code	Management Code	QC Code	ECT	SL	NOTICE										Copy	Total			
-	-	-	-	-	2	The business operations and employees of Mitsubishi Power, Ltd. involved in design, manufacture, sale, installation and engineering have been transferred to Mitsubishi Heavy Industries, Ltd. (MHI) as of October 1, 2021. Therefore, please note that the word "Mitsubishi Power" (and/or Mitsubishi Electric Power Systems ("MPS")) should be read as "Mitsubishi Heavy Industries (MHI)" in this drawing (or document), unless otherwise notified.										-	0			
WBS Document Code																				
Distribution	Customer	販売課	営業課	技術課	品質課	生産課	設備課	検査課	材料課	倉庫課	総務課	経理課	人事課	労務課	安全課	環境課	その他			
	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



Revisions		ECT	-	SL	2	Doc No.	ME-220509		
Rev.	Description				Revised	Checked	Approved	Date	
0	First issue				-	-	-	-	

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	----------	-----------

1. Preface

Requests for quotation were received from the customer on Jan. 20, 2022. Estimation specifications are summarized in this document.

< RFQ >

- 1) Exhaust Cylinder for Unit #1GT
- 2) Exhaust Cylinder for Unit #4GT

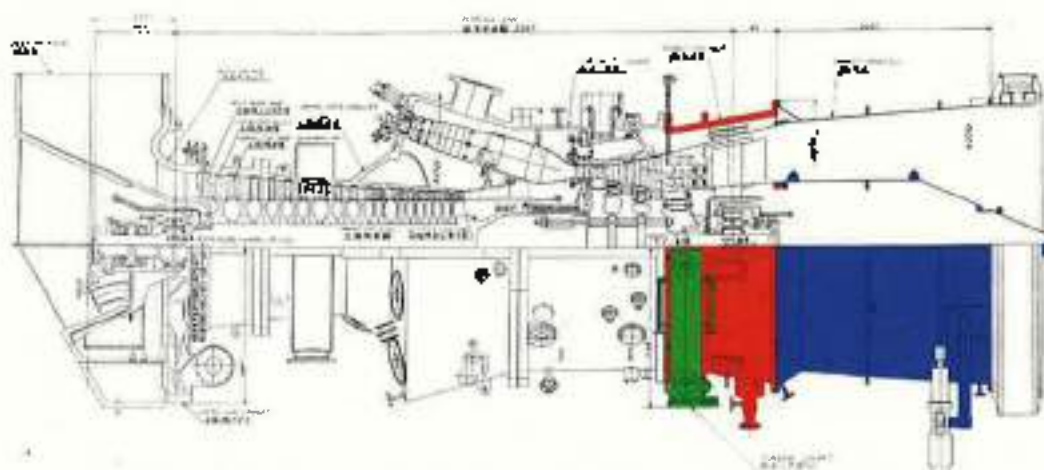
2. Scope of Supply

Parts and Installation jigs (tools)

3. Contents of Estimate

The contents of the estimate are summarized below.

No.	Contents of Estimate	
1	Exhaust cylinder	Replace
2	Base & Support for Exhaust cylinder	Replace
3	Exhaust manifold(*1)	Replace
4	Piping(*2) , others	Replace



Exhaust Cylinder (Red Part), Base/Support (Green Part), Exhaust Manifold (Blue Part)

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	----------	-----------

(Remarks)

***1:** In addition to replacing the exhaust cylinder, the replacement of the exhaust manifold for the following reasons.

1) From the past regular inspection records, many cracks were confirmed in the exhaust manifold, and welding repair was repeated. The major inspection of the GT#2 conducted in April 2022 confirmed the heavy damage of the exhaust manifold and recommended replacement of the exhaust manifold in the inspection report.

2) It will be difficult to install the exhaust manifold due to the strain caused by the aging of the existing manifold and the welding repair for many years.

Please refer to ATTACHMENT for the condition of the exhaust manifold.

***2:** Piping which are connected to Exhaust cylinder & support and exhaust manifold and the existing piping. New piping needs to be adjusted and assembled in site.

4. Specification of Exhaust cylinder

The exhaust cylinder is estimated with the following improvements.

1) To increase the number of horizontal flange fixing bolts as a countermeasure against opening due to deformation of outer diffuser horizontal flange.

2) In consideration of maintainability, manholes are provided in a horizontal portion on the outside of exhaust cylinder.

3) To reduce the risk of cracking, the silt of the horizontal flange of the outer diffuser was eliminated.

4) Socket-and-spigot structure (positioning) is provided at the joint between the exhaust cylinder and the turbine casing. Since the turbine casing is not new (existing part), the clearance of the socket-and-spigot section of the turbine casing is widened to accommodate the effect of deformation into consideration.

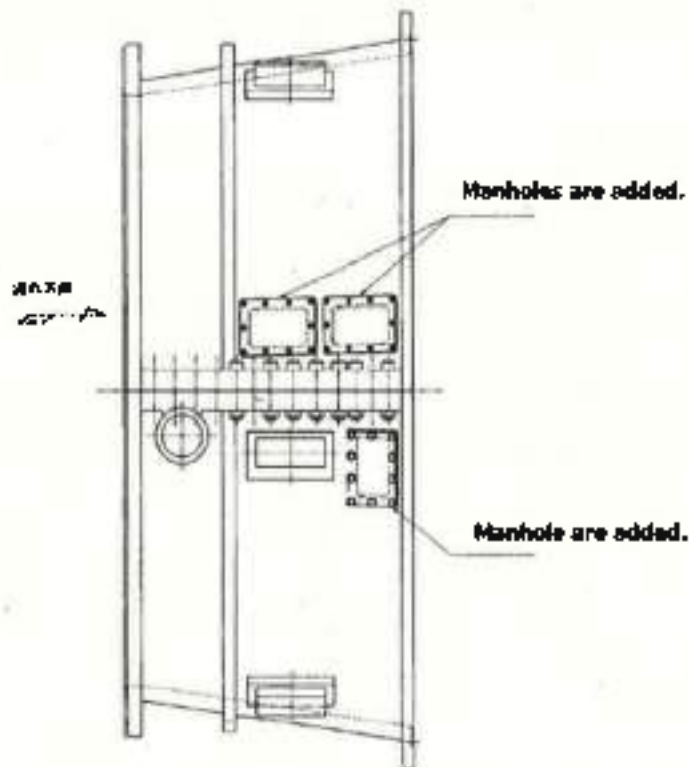
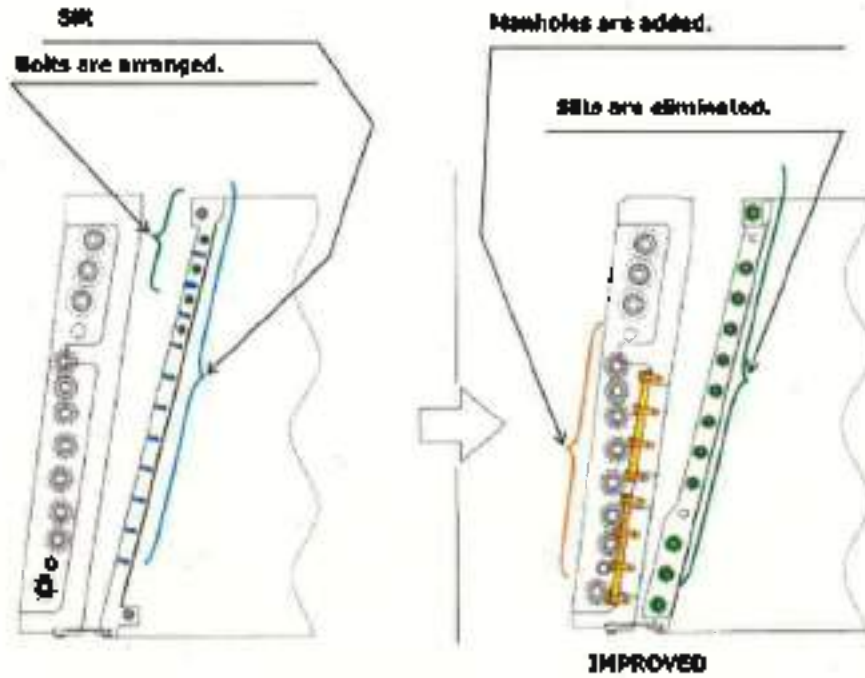
In order to widen the clearance between the exhaust cylinder and the turbine casing, exhaust cylinder cannot be positioned, so a taper pin is added and positioned.

For additional installation of the taper pin, co-drilling of the turbine casing and exhaust cylinder is required. Therefore, the exhaust cylinder is temporarily assembled, and the positioning taper pin drilling is performed before installation of the exhaust cylinder.

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

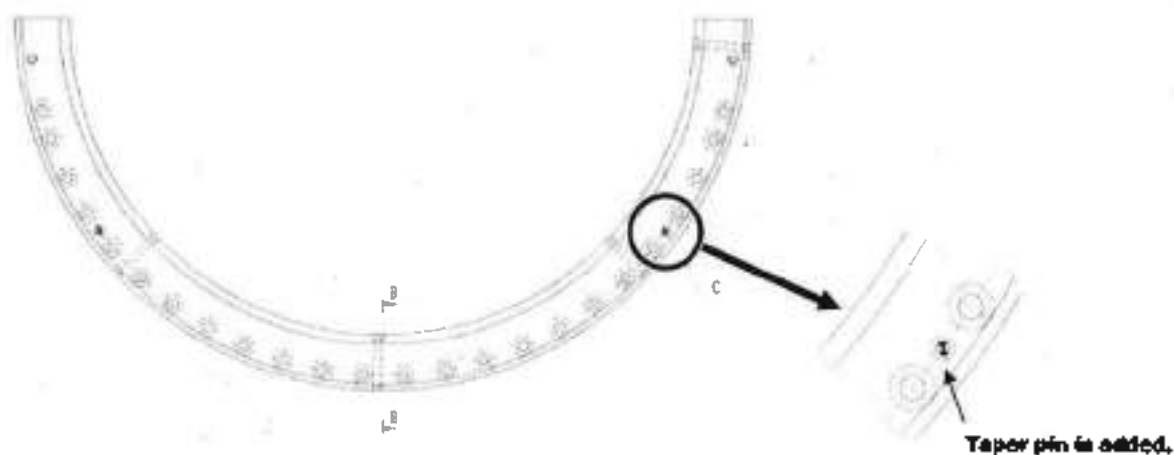
ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	----------	-----------



CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	-------------	-----------



[End OF DOCUMENT]

CONFIDENTIAL

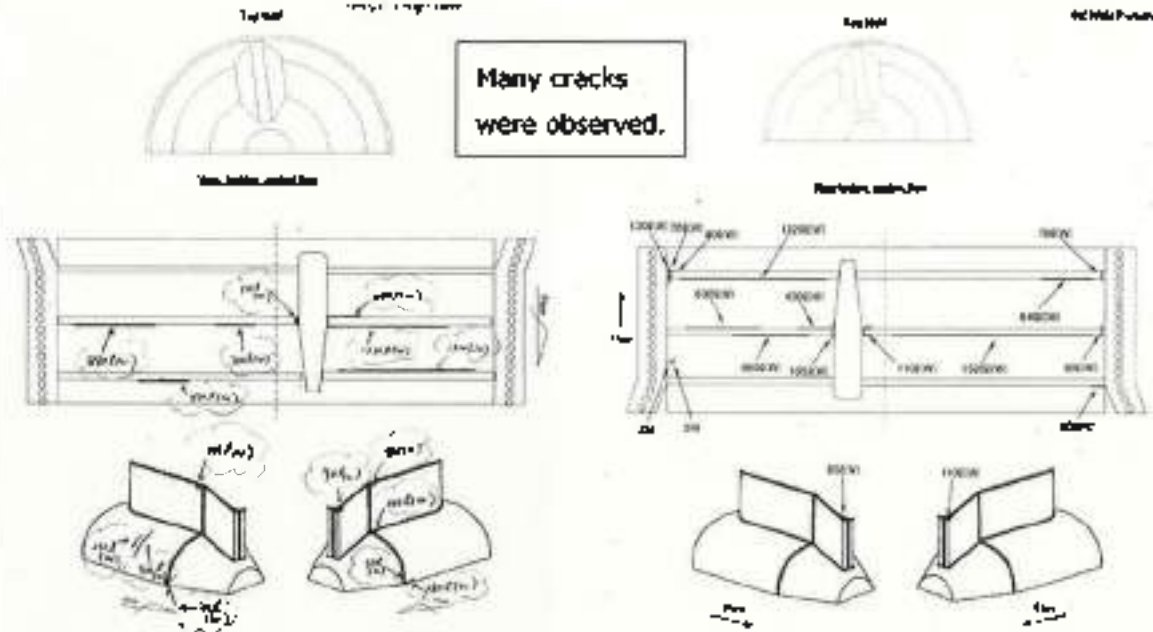
THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION

ECT	-	SL	2	Doc. No.	ME-220509
-----	---	----	---	----------	-----------

ATTACHMENT : The condition of the Exhaust manifold

GT#1 (2017 TI) /Refer MRGF17-0031

GT#2 (2016 TI) /Refer MRGF16-0090



GT#2 (2022 MI) /Refer MRGF22-0015

Many cracks were observed.

1	Apr-22	GT2	Exhaust Cylinder (replacement)	Exhaust cylinder has heavy damage, and it was difficult to repair it.	It is recommended to replace other things.
6	Apr-22	GT2	Exhaust manifold (replacement)	Exhaust manifold has heavy damage, and it was difficult to repair it.	It is recommended to replace other things.

CONFIDENTIAL

THIS DOCUMENT IS THE PROPERTY OF MITSUBISHI HEAVY INDUSTRIES, LTD. AND CONFIDENTIAL. IT MUST NEITHER BE COPIED NOR USED FOR ANY PURPOSE OR MANNER OTHER THAN EXPRESSLY PERMITTED BY MITSUBISHI HEAVY INDUSTRIES, LTD. OR WITH A PRIOR WRITTEN CONSENT OF MITSUBISHI HEAVY INDUSTRIES, LTD. NEITHER IS IT TO BE HANDED OVER NOR COMMUNICATED TO A THIRD PARTY IN ANY WAY. BREACH OR INFRINGEMENT OF ANY KIND WILL LEAD TO LEGAL ACTION.

1 Disassembling and Reassembling Tools

General Tool for Exh. Replacement					
No.	Tool/Equipment	No.	Size/mm/Spec.	Quantity	Remarks
1-1	Hydraulic screw wrench (Socket and Power Unit)  HY-MULTI-HYTORC AIR	(1)	30 mm	2	For loosening and tightening of bolts on various flange between turbine cylinder and exhaust casing
1-2	TAPER PIN REAMER 	(1)	TPR20	2	For drilling taper reamer hole
1-3	Hydraulic Jack with Pump 	(1)	30ton	2	For correction of deformation of turbine cylinder
1-4	Journal Jack 	(1)	26ton	5	For supporting shaft casing, secondary wheel vane or EPH casing and BPH vane/casing. The jack should be equipped with a scale including eye-rod indicator
1-5	Air Drill 	(1)	12.0mm	2	Straight shank For drilling external bolts
1-6	Cormor Drill 4Ar Drilling Machine F-22PCN-1S 	(1)	1.2 Dia/MT1	2	Taper shank
		(2)	1.6 Dia/MT1	2	Taper shank
		(3)	2.0 Dia/MT1	2	Taper shank
		(4)	MT12 - MT1	1	End shank
					For drilling secured bolts and pilot hole of reamer hole
1-7	Prism Tool 	(1)	See See, V-shape tool	2	For measuring the right angle of V-shape support

1. Disassembly and Reassembly Tools

Mandatory Tool for Exh. Replacement

Item	Tool/Equipment	No.	Substitutes/Spec.	Quantity	Remarks
2-1	Slipping bolt for Exh. Expansion Joint	(1)	Setting Bolt Nut	10	
		(2)	Washer	20	
		(3)	Roll Nut	20	
					For security of Exh. Expansion Joint
2-2	Lubrication connecting tool	(1)	Lubrication connecting tool	1 set	An appropriate lubrication is used.



GSTIN : 36AAACB5126H1ZZ

DOCUMENT/15

BHEL-GE Gas Turbine Services Private
Limited
A1, A2 & A3, Quadrant 1, 7th Floor, Cyber
Towers, Madhapur, RR District, Telangana
Hyderabad - 500081
TS
IND

Telephone : +91-40-40640111
Fax :

Quotation

Quotation No. : Q20-0101-Rev02

Date: 27-06-2022

North Eastern Electric Power Corporation Ltd.-Katalguri

ASSAM GAS BASED POWER PLANT,P.O.: BOKULONI

BOKULANI - 786191

AS

IND

Assam(18)

GSTIN : 18AAACN9991J3ZP

Subject: Offer for Supply of Un Bucketed Rotor of Frame-6B and SVK, IGV along with container.

Customer Ref. No. : E-mail

Customer Ref. Date : 9th Aug-2021.

Terms & Conditions

SCOPE OF WORK

BHEL-GE Gas Turbine Services Pvt. Ltd., a joint venture between GE and BHEL, are pleased to submit quotation for the supply of parts as described in appendix 'A' attached, against parts identified in your email enquiry. HSN code for Gas Turbine Spare parts shall be 84119900, however actual HSN code for the offered item shall be provided at the time of dispatch and GST will be charged extra at actuals as per Govt. rules.

Special Notes: Please note that Scope is limited to supply of Items as per Annexure. Any type of erection & commissioning works, civil works is not part of the offered scope of work.

Commercial Terms and Condition

PRICE:

The total price for the supply of parts of GT listed in Appendix 'A' of this proposal. The price excludes all taxes and Duties, Freight and Insurance and which shall extra to Buyer account.

SHIPMENT, FRIEGHT & INSURANCE:

BGGTS have quoted Ex Works/ Ex Suppliers works prices, which do not include the Taxes and duties, sales tax, insurance and freight.

TAXES:

All taxes and Duties are Extra at Actuals as per GST guide lines. BGGTS has not included in its price the Any taxes and duties, which are extra payable by Buyer, as applicable on the date of dispatch as per GST rules.

Taxes & Duties

Our Price does not include the IGST or any other taxes including the Octroi, if applicable. These shall be borne directly by purchaser.

"Any increase or decrease in Indirect Taxes applicable on the Contract Price or any element therein due to change in law shall be to the account of the Customer. It is hereby clarified that in case of introduction of a Goods and Services Tax by any name or nomenclature, in addition to the above-mentioned adjustment in this clause / contract price on the output side, any increase or decrease of Indirect Taxes on the Suppliers / Service Providers procurement will also be considered for this clause and shall be to the account of the Customer." "Indirect Taxes" means CGST, SGST, Works Contract Tax, Goods and Service Tax (GST), Octroi, Entry Tax any other tax other than taxes applicable to the contract." "Change in Law" means enactment or introduction of any new law or levy (including but not limited to Goods and Service Tax (GST)) that is applicable to the country and / or State where the Project is to be developed or where to or from the Supply of the Equipment to be made, repairs or services are to be rendered."

ORDER CANCELLATION:

Once the purchaser places the order, it cannot be cancelled unless seller accepts the cancellation in writing.

OTHER TERMS & CONDITIONS:

All other terms & conditions shall be as per BGGTS Standard Terms and conditions only.

Limitation of Liability:

BGGTS does not accept any liability for any loss, damage to building / plant / equipment personnel due to any third part / personnel or due to any cause whatsoever and all claims against BGGTS or our personnel are excluded. We recommend that a suitable insurance cover be taken by Buyer to shield the same. Notwithstanding any other provisions of this contract.

(Signature and Stamp)



GSTIN : 36AAACB5126H1ZZ

1109
BHEL-GE Gas Turbine Services Private Limited
A1, A2 & A3, Quadrant 1, 7th Floor, Cyber Towers, Madhapur, RR District, Telangana Hyderabad - 500081
TS
IND

Telephone : +91-40-40640111
Fax :

Quotation

BGGTS shall not be liable for loss of profit or revenues, loss of use of equipment or systems, interruption of business, cost of replacement Power, cost of capital, downtime costs, increased operating costs, any special, consequential, incidental, indirect, or punitive damages or claims of Buyer's customers for any of the foregoing types of damages. whether caused by our breach of contract, tort or otherwise howsoever arising. Our overall liability is limited to this contract value.

All BGGTS liability shall end upon expiration of the applicable warranty period, provided that Buyer may continue to enforce a claim for which it has given notice prior to that date by commencing an action or arbitration, as applicable under this Contract, before expiration of any statute of limitations or other legal time limitation but in no event, later than one year after expiration Of such warranty period. BGGTS shall not be liable for advice or assistance that is not required for the work scope under this Contract.

Validity: Offer is valid for 30 days from the date of our offer.

Terms of Payment

100% of payment with applicable taxes & duties shall be paid by Buyer against exchange of Dispatch Documents through Bank.

Partial shipments and partial payments shall be allowed (If applicable)

DELIVERY

Our Standard Delivery time for Parts mentioned in the Price Schedule is 12 months and shall be counted from the date of receipt of technically and commercially clear order and amendments, if any, subject to finalization of order before expiry of validity period.

WARRANTY CLAUSE

Parts quoted by us are warranted for a period of 18 months from the date of dispatch or 12 months from the date of installation whichever expires earlier. It is strongly recommended that, after supply of goods, subject to an order, purchaser to conduct material inspectiosn at site within 15 days from the date of receipt of material to avail the warranty benefit, when parts are not used immediately in the equipment.

NON-ACCEPTANCE OF LIQUIDATED DAMAGES / PRICE REDUCTION SCHEDULE CLAUSE:

As a Company Policy, BGGTS shall not accept any liquidated damages clause for delays in delivery. However, BGGTS shall endeavor to meet delivery mentioned in quotation and even improves it wherever possible.

NON-ACCEPTANCE OF PBG AND SD CLAUSE:

As a Company Policy, BGGTS shall not accept any Performance Bank Guarantee (PBG) and Security Deposit (SD) Clause. However, BGGTS shall endeavor to meet delivery mentioned in quotation and even improves it wherever possible.

"Both Seller and Buyer acknowledge that the COVID-19 epidemic and government actions in response to it have affected and will continue to affect Seller's ability to deliver goods and services around the world (the "COVID-19 Impact"). In the event that the COVID-19 Impact affects Seller's ability to deliver on time or at the bid price, , Seller shall be entitled to an equitable adjustment in schedule and price as appropriate, subject to Seller's obligation to work in good faith with Buyer to mitigate the impact on schedule and/or cost."



GSTIN : 36AAACB5126H1ZZ

1110
BHEL-GE Gas Turbine Services Private
Limited
A1, A2 & A3, Quadrant 1, 7th Floor, Cyber
Towers, Madhapur, RR District, Telangana
Hyderabad - 500081
TS
IND

Telephone : +91-40-40640111
Fax :

Quotation

Annexure

Customer Ref. No.: E-mail

Customer Ref. Date: 9th Aug 2021

Quotation No.: Q20-0101-Rev02

Quotation Date: 27-06-2022

S.No	Item	Part	Qty	UOM	Unit price (INR)	Ext price (INR)
	<u>New Rotor+SVK+IGV+SC</u>					
1	BUCKETED ROTOR ASS.FOR GT FR-6B(Including Below)	13530161001-90	1	EA	296497000	296497000
	Stage#1 Bucket Kit	35306090	1	SET		
	Stage#2 Bucket Kit	35306100	1	SET		
	Stage#3 Bucket Kit	35306110	1	SET		
2	Compressor Stator vane kit	23512961020-09	1	SET	25979814	25979814
3	IGV kit with H/W (without control r	43510661006-01	1	SET	14054985	14054985
4	Storage container	GT9751910013	1	EA	2824800	2824800
					Total(INR)-on Ex-works	339356599

Special Notes:

1. The above offered prices are valid for order placement within 31st Dec 2022 only.

Thanking You

Your Sincerely

For BHEL-GE Gas Turbine Services Private Limited


Ravindra. Chinta
Dy. Manager (Commercial)

NOTICE: Sale or Services is expressly conditioned on Buyer's assent to these Terms and Conditions. Any additional or different terms proposed by Buyer are expressly objected to and will not be binding upon Seller unless agreed to in writing by Seller; provided however, that no pre-printed facility entry form shall modify these Terms and Conditions even if signed by Seller's representative. Any oral or written representation, warranty, course of dealing or trade usage not contained in these Terms and Conditions or the Contract shall not be binding on either party. Any order to perform work and Seller's performance of work shall constitute Buyer's assent to these Terms and Conditions. Unless otherwise specified in the quotation or Contract, any quotation by Seller shall expire 30 days from its date and may be modified or withdrawn by Seller before receipt of Buyer's acceptance.

1. Definitions. Unless Seller otherwise agrees:

"Buyer" means the entity to which Seller is providing Products or Services including repairs under the Contract.

"Contract" means the documents that comprise the agreement between Buyer and Seller for the sale or Services, including these Terms and Conditions and any other documents incorporated therein by reference, such as, the final quotation, the agreed scope(s) of work, and Seller's order acknowledgement.

"Products" means all equipment, parts, materials, supplies, software, and other goods Seller has agreed to supply to Buyer under the Contract.

"Seller" means the entity providing Products or performing Services under the Contract.

"Services" means all services Seller has agreed to perform for Buyer under the Contract.

"Repair" means all repair / refurbishment work that Seller has agreed to perform on used Parts for Buyer at Seller's premises under the Contract.

"Site" means the premises where Products are delivered or Services are performed, not including Seller's premises from which it performs remote Services.

"Terms and Conditions" means these Terms and Conditions for Sale and Services.

2. Payment. Except as otherwise agreed to by Seller in writing, and upon approved credit, the following payment terms apply:

2.1 Buyer shall pay Seller all invoiced amounts, without right of set-off, within 15 days from date of invoice. Seller shall be entitled to payment of all charges associated with Seller's performance of Services as the Services are performed. Buyer shall pay a monthly late payment charge computed at the rate of 1.5% (to be checked with standard invoices), or the maximum interest rate permitted by applicable law, whichever is less, on any past-due amount for each calendar month (or fraction thereof) that the payment is overdue and all costs of Seller's collection efforts including reasonable attorney's fees.

2.2 If at any time Seller reasonably determines that due to prevailing market conditions, do not justify the continuation of Seller's performance, Seller may require full or partial payment in advance or payment through irrevocable Letter of Credit or shall be entitled to suspend or terminate the Contract.

3. Taxes and Duties. Unless otherwise specified in the Contract, Seller shall be responsible for and pay directly, all corporate and individual taxes measured by net income or profit imposed by any governmental authority on Seller, its employees or subcontractors due to the execution of any agreement or the performance of or payment for work hereunder ("Seller Taxes"). Buyer shall be responsible for and pay directly when due and payable all taxes, duties, fees, or other charges of any nature (including, but not limited to, ad valorem, consumption, excise, franchise, gross receipts, import, license, property, sales, stamp, storage, transfer, turnover, use, or value-added taxes, and any and all items of withholding, deficiency, penalty, addition to tax, interest, or assessment related thereto), other than Seller Taxes, imposed by any governmental authority on Seller or its

employees or subcontractors due to the execution of any agreement or the performance of or payment for work hereunder ("Buyer Taxes"). All payments due and payable by Buyer to Seller hereunder shall be made in the full amount of the Contract price, free and clear of all deductions and withholding for Buyer Taxes and Government Levies, if any. If Buyer deducts or withholds Buyer Taxes, Buyer shall pay additional amounts to Seller to cause the amounts Seller actually receives, net of deducted or withheld Buyer Taxes, to equal the full Contract price. Buyer shall provide to Seller within one month accurate official receipts from the appropriate governmental authority for deducted or withheld taxes.

4. Delivery; Title Transfer; Risk of Loss; Storage. 4.1 For shipments within INDIA, Seller shall deliver Products to Buyer EXW Seller's / Sub-Supplier's facility, place of manufacture or warehouse. For all shipments from OUTSIDE INDIA, Seller shall deliver Products to Buyer FCA Port of Export (Incoterms 2000). Except for those obligations that are consistent with Incoterms 2000, Seller shall not be liable in any claim asserted by Buyer with respect to delivery. Partial deliveries and partial payment will be permitted. If Products delivered do not correspond in quantity, type or price to those itemized in the invoice for the shipment, Buyer will so notify Seller within 60 days after receipt. Seller may deliver any or all Products in advance of the delivery schedule.

4.2 Title to Products shipped from outside country of installation shall pass to Buyer immediately after each item departs from the territorial land, seas and overlying airspace of Port of export. Title to Products shipped from within the country where Products will be installed shall pass to Buyer when Products are made available for shipment from the manufacturer's factory or the storage facility utilized by Seller. Title to Services shall pass to Buyer as performed.

4.3 Notwithstanding Section 4.1 above, in all events risk of loss shall transfer to Buyer upon title passage.

4.4 If any Products cannot be shipped to or received by Buyer when ready due to any cause not attributable to Seller, Seller will notify Buyer and then may ship Products to a storage facility, including a facility within the place of manufacture, or to an agreed freight forwarder. If Seller places Products in storage or if Products are detained at any port, the following conditions shall apply: (i) title and all risk of loss or damage shall immediately pass to Buyer if they had not already passed; (ii) any amounts otherwise payable to Seller upon delivery or shipment shall be payable upon presentation of Seller's invoices; (iii) all expenses and charges incurred by Seller, such as for preparation for and placement into storage, handling, inspection, preservation, insurance, storage, demurrage, removal and any taxes shall be payable by Buyer upon submission of Seller's invoices; and (iv) when conditions permit and upon payment of all amounts due hereunder, Seller shall resume delivery of Products to the originally agreed point of delivery.

4.5 Buyer shall bear the sole risk of loss for Buyer's equipment during the term of the Contract. If repair Services are to be performed on Buyer's equipment at Seller's facility, Buyer shall be

responsible for transporting the equipment to and from Seller's facility.

5. Excusable Delays. Seller shall not be liable nor in breach or default of its obligations under the Contract to the extent performance of such obligations is delayed or prevented, directly or indirectly, due to causes beyond its reasonable control, including, but not limited to, acts of God, fire, terrorism, war (declared or undeclared), epidemics, material shortages, insurrection, acts (or omissions) of Buyer or Buyer's suppliers or agents, any act (or omission) by any governmental authority, strikes, labor disputes, transportation shortages, or vendor non-performance. The delivery or performance date shall be extended for a period equal to the time lost by reason of delay, plus such additional time as may be reasonably necessary to overcome the effect of the delay. If Seller is delayed by any acts (or omissions) of Buyer, or by the prerequisite work of Buyer's other contractors or suppliers, Seller shall be entitled to an equitable price and performance adjustment.

6. Compliance with Laws, Codes and Standards. 6.1 Seller represents that the Products will be produced in compliance with applicable fair labor standards laws, occupational safety and health laws.

6.2 The Contract price, delivery and performance dates and any performance guarantees will be equitably adjusted to reflect additional costs or obligations incurred by Seller resulting from a change in industry specifications, codes, standards, applicable laws or regulations.

6.3 Seller's obligations are conditioned upon Buyer's compliance with all applicable trade control laws and regulations. Buyer shall not transship, re-export, divert or direct Products other than in and to the ultimate country of destination specified on Buyer's order or declared as the country of ultimate destination on Seller's invoice, except as permitted by applicable laws and regulations.

6.4 Notwithstanding any other provisions, Buyer shall timely obtain any required authorization, such as an export license, import license, foreign exchange permit, work permit or any other governmental authorization. Even if Seller applies for the authorization, Buyer shall be solely responsible for obtaining, maintaining and/or effectuating any governmental authorizations or notifications, required for the lawful performance of the Services at the Site.

7. Warranty. 7.1 Seller warrants to Buyer that (i) the Products shall be shipped free from defects in material, workmanship and title and (ii) the Services shall be performed in a competent, diligent manner in accordance with any mutually agreed specifications. Unless Seller expressly agrees otherwise in writing, any items not manufactured by Seller (including incidental materials and consumables used in the Services) shall carry only the warranty that the original manufacturers provide, and Seller gives no warranty on behalf of the manufacturers of such items.

7.2 Unless otherwise stated in the Contract, the warranty period for Products and Repairs shall be one year from first use or 18 months from delivery, whichever occurs first, except that software are warranted for 90 days from delivery. Unless otherwise stated in the Contract, the warranty period for Services shall be 6 months from completion, software related Services, which shall have a warranty period of 90 days from completion.

7.3 If Products or Services do not meet the above warranties, Buyer shall promptly notify Seller in writing within the warranty period. Seller shall thereupon (i) at Seller's option, repair or replace the defective Products in reasonable time or (ii) re-perform the defective Services. If in Seller's reasonable judgment the Product cannot be repaired or replaced or the Services cannot be re-performed, Seller shall refund or credit monies paid by Buyer for that portion of Products or Services that do not meet the above warranties. Any repair, replacement or re-performance by Seller hereunder shall not extend the applicable warranty period. The parties shall mutually agree on the specifications of any test to determine the presence of a defect.

7.4 Buyer shall bear the costs of access (including removal and replacement of systems, structures or other parts of Buyer's facility), de-installation, decontamination, re-installation and transportation of Products to Seller and back to Buyer.

7.5 These warranties and remedies are conditioned upon (a) the proper storage, installation, operation, and maintenance of the Products and conformance with the proper operation instruction manuals provided by OEM / Seller, (b) Buyer keeping proper records of operation and maintenance during the warranty period and providing Seller access to those records, and (c) modification or repair of the Products or Services only as authorized by Seller. Seller does not warrant the Products or any repaired or replacement parts against normal wear and tear or damage caused by misuse, accident, or use against the advice of Seller. Any modification or repair of any of the Products or Services not authorized by Seller shall render the warranty null and void.

7.6 This Article provides the exclusive remedies for all claims based on failure of or defect in Products or Services, whether the failure or defect arises before or during the applicable warranty period and whether a claim, however described, is based on contract, warranty, indemnity, tort / extra contractual liability (including negligence), strict liability or otherwise. The warranties provided in this Article are exclusive and are in lieu of all other warranties and guarantees whether written, oral, implied or statutory. NO IMPLIED STATUTORY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE APPLIES.

8. Limitation of Liability. 8.1 The total liability of Seller for all claims arising out of or relating to the performance or breach of the Contract or use of any Products or Services or any order shall not exceed (a) the Contract price or (b) if this Contract is in the form of a frame or master agreement under which Buyer places an order with Seller for the Products and Services to be purchased, (i) the final price of the particular order under which the specific Products or Services giving rise to the claim are supplied or performed or (ii) RS. 5,00,000 if the claim is not part of any particular order. Seller's liability shall terminate upon the expiration of the applicable warranty period, provided that Buyer may enforce a claim that accrued prior to that date by commencing an action or filing an arbitration, as applicable under the dispute resolution clause, before the expiration of the applicable statute of limitations or repose, but not later than one year after the expiration of such warranty period.

8.2 Seller shall not be liable for loss of profit or revenues, loss of product, loss of use of Products or Services or any associated equipment, interruption of business, cost of capital, cost of cover, downtime costs, increased operating costs, claims of Buyer's customers for such damages, or for any special, consequential, incidental, indirect, punitive or exemplary damages.

9. Dispute Resolution, Governing Law. Any dispute arising out of or in connection with the Contract, including any question regarding its existence, validity or termination, shall be resolved in accordance with this paragraph and will be settled, if possible, by negotiation of the parties. If a dispute is not resolved by negotiations, either party may, by giving written notice, refer the dispute to a meeting of appropriate higher management of each party, to be held within twenty (20) business days after giving notice. If the dispute is not resolved within thirty (30) business days after the date of the meeting of higher management, or any later date to which the parties may agree, either party may submit to arbitration or court. The governing law shall be Indian Law and jurisdiction shall be the court of Hyderabad.

10. Confidentiality. 10.1 In connection with the Contract, Seller and Buyer (as to information disclosed, the "Disclosing Party") may each provide the other party (as to information received, the "Receiving Party") with "Confidential Information." "Confidential Information" means (a) all pricing for Products and Services, (b) all terms of the Contract, (c) all information that is designated in writing as "confidential" or "proprietary" by the Disclosing Party at the time of written disclosure, and (d) all information that is orally designated as "confidential" or "proprietary" by the Disclosing Party at the time of oral disclosure and is confirmed to be "confidential" or "proprietary" in writing within 10 days after oral disclosure.

10.2 The Receiving Party agrees: (i) to use the Confidential Information only in connection with the Contract and permitted use(s) and maintenance of Products and Services, (ii) to take reasonable measures to prevent disclosure of the Confidential Information, except to its employees, agents or financing parties who have a need to know for Buyer to perform its obligations under the Contract or to use and maintain Products or Services, and (iii) not to disclose the Confidential Information to a competitor of the Disclosing Party. The Receiving Party agrees to obtain a commitment from any recipient of Confidential Information to comply with the terms of this Article. Confidential Information shall not be reproduced without the Disclosing Party's written consent, and the Receiving Party shall return all copies of Confidential Information to the Disclosing Party upon request except to the extent that the Contract entitles the Receiving Party to retain the Confidential Information. Seller may also retain one copy of Buyer's Confidential Information until all its potential liability under the Contract terminates.

As to any individual item of Confidential Information, the restrictions of this Article shall expire the earlier of five (5) years after the date of disclosure or three (3) years after termination or expiration of the Contract.

11. Health and Safety Matters. 11.1 Buyer shall take all necessary precautions, at all times, for the health and safety of Seller personnel at the Site. These include, but are not limited to: providing to Seller for review, and instructing Seller's personnel regarding, Buyer's safety practices; proper and safe handling of, and protection of Seller's personnel from exposure to, Hazardous Materials; energization and de-energization of all power systems (electrical, mechanical and hydraulic) using safe and effective lock-out/tag-out procedures; and conducting periodic safety meetings.

11.2 Operation of Buyer's equipment is the responsibility of Buyer. If Buyer requires or permits Seller's personnel to operate Buyer's equipment at the Site, Buyer shall indemnify and save Seller, its employees and agents, harmless from expense and

liability (including reasonable attorneys' fees) incurred by or imposed upon Seller, its employees and agents, based upon exposure to Hazardous Materials, injury to persons (including death) or damage to property resulting from operation of equipment at the Site by Seller personnel. Buyer shall not require Seller personnel to work on other projects or equipment during the term of the Contract.

12. Site Access and Conditions; Hazardous Materials. Buyer shall provide Seller access to the Site and any other facilities free of charge, including the operating and development environment and information, as necessary for Seller's performance of the Contract. Prior to Seller starting any work at the Site, Buyer will (i) provide documentation that identifies any existing Hazardous Materials on or about the Site, and (ii) allow Seller, at its option, access to the Site to perform or have performed a Site evaluation, including without limitation, a review of applicable documents and visual examination of the Site. Whether or not Seller conducts any evaluation, Seller will have no responsibility or liability for existing Site conditions.

13. Termination and Suspension. 13.1 Buyer may terminate the Contract (or any portion thereof) for cause if Seller: (i) substantially breaches a material obligation which does not otherwise have a specified contractual remedy, provided that: (a) Buyer shall first provide Seller with detailed written notice of the breach and of Buyer's intention to terminate the Contract, and (b) Seller shall have failed, within 30 days after receipt of the notice (or such extended period as is considered reasonable by the parties), to either (1) commence and diligently pursue cure of the breach, or (2) provide reasonable evidence that the breach has not occurred; or (ii) becomes insolvent, makes an assignment for the benefit of its creditors, has a receiver or trustee appointed for the benefit of its creditors, or files for protection from creditors under any bankruptcy or insolvency laws. If Buyer terminates the Contract as provided in this Section: (a) Buyer shall pay to Seller all portions of the Contract price allocable to work performed (for example, the price for Products completed or partially completed before the termination), and all Services performed at the Seller's then-current standard time and material rates; and (b) Seller shall pay Buyer the difference between that portion of the Contract Price allocable to the terminated scope and the actual amounts reasonably paid by Buyer to another supplier for that scope.

13.2 Seller shall have the right to suspend or terminate the Contract (or any portion thereof) immediately for cause if: (i) Buyer becomes insolvent, makes an assignment for the benefit of its creditors, has a receiver or trustee appointed for the benefit of its creditors, or files for protection from creditors under any bankruptcy or insolvency laws; (ii) there is an excusable delay (as per Section 5 above) lasting longer than 120 days; (iii) any representation or warranty made by Buyer herein or in any document or certificate furnished by Buyer in connection herewith proves to be incorrect in any material respect; or (iv) Buyer materially fails to comply with any terms of the Contract, including but not limited to, failure to make any payment when due or to fulfil any payment conditions.

13.3 If the Contract (or any portion thereof) is terminated for any reason other than those set forth in Section 13.1 above, Buyer shall pay Seller for all Products completed or partially completed, and Services performed before the effective date of termination, plus a cancellation charge equal to 15% of the Contract price allocable to the uncompleted Products, and unperformed Services.

13.4 Buyer shall pay any reasonable expenses incurred by Seller in connection with a suspension or termination, including expenses for repossession, fee collection, demobilization/remobilization or costs of storage during suspension upon submission of Seller's invoice(s). Performance of Seller's obligations shall be extended for a period of time reasonably necessary to overcome the effects of any suspension.

14. Intellectual Property Indemnification. 14.1 Subject to the terms of the Contract, Seller shall indemnify Buyer against any damages, costs and expenses arising out of any suit, claim, or proceeding (a "Claim") alleging that Products or Services infringe a patent in effect in the U.S., an EU member state or country of delivery (provided there is a corresponding patent issued by the U.S. or an EU member state), or U.S. copyright or copyright registered in the country of delivery; provided that: (a) Buyer promptly notifies Seller in writing of any such Claim; (b) Buyer makes no admission of liability and gives Seller sole authority, at Seller's expense, to direct and control all defense, settlement, and compromise negotiations; and (c) Buyer provides Seller with full disclosure and assistance that may be reasonably required to defend any such Claim.

14.2 Seller shall have no obligation or liability with respect to any Claim based upon: (a) any Products or Services that have been altered, modified, or revised; (b) the combination, operation, or use of any Products or Services with other products when such combination is part of any allegedly infringing process; (c) failure of Buyer to implement any update provided by Seller that would have prevented the Claim; (d) unauthorized use of Products or Services, including, without limitation, a breach of the provisions of the Contract; or (e) Products or Services made or performed to Buyer's specifications.

14.3 Should any Product or Service, or any portion thereof, become the subject of a Claim, Seller may at its option (a) procure for Buyer the right to continue using the Product or Service, or portion thereof, (b) modify or replace it in whole or in part to make it non-infringing, or (c) failing (a) or (b), take back Products or Services and refund any fees received by Seller attributable to the infringing Product or Service.

14.4 This states Seller's entire liability for indemnification for patent, trademark, copyright, and trade secret infringement for Products and Services.

14.5 Notwithstanding the foregoing, with respect to any Products or Services, or portions thereof, which are not manufactured/developed by Seller, only the indemnity of the manufacturer/developer, if any, shall apply.

15. Changes. 15.1 Each party may at any time propose changes in the schedule or scope of Products or Services in the form of a draft change order. Some changes requested by Buyer may require analytical or investigative work to evaluate the change, and this evaluation work may be charged to Buyer at prevailing rates. The parties may mutually agree on the length of time within which a decision shall be made regarding the change. If mutually agreed, the changes will be documented in a written document signed by authorized representatives of each party, along with any equitable adjustments in the Contract price or schedule. Seller is not obligated to proceed with the changed schedule or scope until both parties agree in writing. Changes in applicable laws, rules and regulations shall be treated as a change within the meaning, and subject to the requirements, of this Article. Unless otherwise agreed by the parties, pricing for

additional work arising from changes in laws, rules and regulations shall be at time and material rates.

15.2 All Products delivered shall conform to Seller's part or version number specified or (at Seller's option) its equivalent or the superseding number subsequently assigned by Seller. If the number ordered is no longer available, Seller is authorized to ship a valid interchangeable Product without notice to Buyer.

16. Inspection and Factory Tests. The quality control exercised by Seller / Sub-supplier in its manufacture of Products shall be in accordance with Seller's / Sub-supplier's normal quality control policies, procedures and practices. Seller shall attempt to accommodate Buyer's requests to witness Seller's factory tests of Products manufactured to order basis in line with Buyer's specifications, if such witnessing can be arranged without delaying the work. Such access shall be limited to areas directly concerned with Products ordered by Buyer and shall not include restricted areas where development work or work of a proprietary nature is being conducted.

17. General Clauses. 17.1 Products and Services sold by Seller are not intended for use in connection with any nuclear facility or activity without the written consent of Seller. Buyer warrants that it shall not use or permit others to use Products or Services for such purposes, unless Seller agrees to the use in writing. If, in breach of this, any such use occurs, Seller (and its parent, affiliates, suppliers and subcontractors) disclaims all liability for any nuclear or other damages, injury or contamination, and in addition to any other legal or equitable rights of Seller, Buyer shall indemnify and hold Seller (and its parent, affiliates, suppliers and subcontractors) harmless against any such liability. If Seller agrees in writing to any such use, the parties shall agree upon special terms and conditions that provide Seller protections against nuclear liability and which are acceptable to Seller under the then current laws that apply.

17.2 Seller may assign its rights and obligations under the Contract, in part or in whole, to any of its affiliates without Buyer's consent, and may subcontract portions of the work, so long as Seller remains responsible for it. Buyer agrees to execute any documents that may be necessary to effect Seller's assignment. The delegation or assignment by Buyer of any or all of its duties or rights under the Contract without Seller's prior written consent shall be void.

17.3 If any provision of the Contract is found to be void or unenforceable, the remainder of the Contract shall not be affected. The parties will replace any such void or unenforceable provision with a new provision that achieves substantially the same practical or economic effect and is valid and enforceable.

17.4 The Contract represents the entire agreement between the parties. No modification, amendment, rescission or waiver shall be binding on either party unless agreed in writing by the parties' authorized representatives.

17.5 This Contract may be executed in multiple counterparts that together shall constitute one agreement.

17.6 Except as provided in the Article entitled "Limitation of Liability," and in 17.1 above regarding nuclear use, this Contract is for the benefit of the parties and not for any third party.

(Signature and initials)



नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बुकुलुनि, जिला- डिब्रुगढ़, आसाम, पिन - 786 161

(A Govt. of India Enterprise)

www.neepco.gov.in**ASSAM GAS BASED POWER PLANT**

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 161

Ph: 0374-2625210, 2625211, 2625429, 2625213, 0374-2625349, 2625217

E-mail: agbpps@sancharnet.in, hopagbp@sancharnet.in

No.NEEPCO/AGBP/ST&Aux/W-33(A)-09/2020-21/ 240

Dated 03.08.2020

To,

M/S Cooldeck Industries Private Limited,
121 Andheri Industrial Premises,
Off Veera Desai Road, Andheri (West)
Mumbai, PIN 400053
Phone : +91-22-61333888, 022-44199 14825
Fax : +91-22-61333820
E-mail : rajiv@cooldeckin.com, romulus@cooldeckin.com

SUB: Work Order for Supply and replacement of fill packs of cooling tower and taking out of old removed fill packs out of the plant for further disposal / recycling from suppliers end at their own arrangement.

REF: 1. Our NIB no. : NEEPCO/AGBP/ST & Aux/2019-20/13 Dated 03.03.2020
E-Tender Id -2020_NEEPC_44893_1

Dear Sir (S),

With reference to the aforesaid NIT and subsequent corrigendum published hereafter, the Corporation is pleased to place the order for Supply and replacement of fill packs of cooling tower of Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dibrugarh (Assam) and taking out of old removed fill packs out of the plant for further disposal / recycling from suppliers end at their own arrangement, as per scope, price, other terms and conditions stated below.

TERMS AND CONDITIONS:

1. Contract Price: Overall amount for the complete work as defined in the Scope of work shall be *Rs. 1,02,88,599.00 (Rupees one crore two lakhs eighty eight thousand five hundred ninety nine) only* inclusive of all. The price as mentioned, will remain FIRM till the currency of the contract and will not be subjected to escalation irrespective to any increases whatsoever in material or labour cost etc.

Basic Price break up:

(A) Schedule of Price for materials :

Sl. No.	Description of Items	Quantity	Rate (Rs.)	Amount (Rs.)
1	Supply of Fill Sheets	83,280 Nos.	84.10	70,03,848.00
2	Supply of PVC Solvent Cement, 20-40 SE	5,200 Kg	145.00	7,54,000.00

(B) Schedule of Price for work :

Sl. No.	Description of Items	Quantity	Rate (Rs.)	Amount (Rs.)
1	Removal of old Fill Packs and Replacement with new one	For all Cells	1,20,163.00	9,61,304.00

Total basic amount: (A + B) = : Rs. 87,19,152.00
(Rupees eighty seven lac nineteen thousand one hundred fifty two) only

- Taxes & Duties: GST as applicable shall be extra on above basic price. The GSTIN for our plant i.e. AGBP is 18AAACN999J32P.
- Scope of work and technical specification: The detail specification and scope of work is defined in attached Annexure with all the relevant information as required to be executed by the party.

Regd. Office : Brookland Compound, Lower New Colony, Shillong - 793 003

Ph. : (0364) 2224487 / 2226453 FAX : 2226417


4. **Contract period:** The entire scope of supply / work shall have to be completed within six (Six) months from the date of issuance of this order, i.e. on or before 24.01.2021.
5. **Payment Terms:**
 - a) **Payment against supplied material:** 80% of the contractual value against supply of material including GST shall be released to the party against supply of material in full and good condition as mentioned in in Schedule of Price for material, Clause 1(A), subject to submission of security cum performance bank guarantee equivalent to 10% of total basic contract value. Otherwise, 10% of total basic contract value shall be retained by NEEPCO as security cum performance guarantee from the invoiced amount of the contractor.
 - b) **Payment against work:** 100% payment against installation/erection work as mentioned in Schedule of Price for Work, clause 1 (B) and balance 20% amount as retained against supplied material shall be released to the contractor along with all taxes and duties after successful completion of erection and commissioning as per contract subject to fulfilment of condition as mentioned under clause No.6 under the head of Security Cum Performance Guarantee.
6. **Security Cum Performance Guarantee:**
 - Within 30(thirty) days from the date of issue of purchase / work order, the successful bidder herein called the contractor shall furnish a security cum performance guarantee for an amount equivalent to 10 (ten) percent of the total contract basic value at per enclosed format (Annexure-II) from any nationalized bank in favor of NEEPCO Ltd valid for entire period of contract i.e till expiry of guarantee/warranty period and additional 90 (ninety) days covering claim period.
 - The security cum Performance Guarantee furnished by the contractor shall be irrevocable and unconditional and NEEPCO shall have the right to invoke it notwithstanding any dispute or difference between NEEPCO and contractor pending before the Court, Tribunal, Arbitrator or any other authority as per provision of the contract.
 - On expiry of the contract, the bank guarantee will be released to the contractor without any interest on presentation of an absolute no demand certificate issued from work executing authority of this corporation. However, the corporation shall be entitle to retain, set off, deduct or adjust any claim against the contractor from the PBG as submitted or payable by the corporation.
 - It is expressed understood and agreed that the amount of contract performance guarantee shall not be construed as limiting factor/amount of various liabilities under this contract.
7. **Time of Completion:** The entire scope of supply / work shall have to be completed within six (Six) months from the date of issuance of this order, i.e. on or before 03.01.2021. Only 1(one) CT cell shall be offered for removal and replacement of fill packs at a time. On successful completion of fill replacement, the same shall be taken into service and another one shall be offered for execution of work. The time gap between line up and withdrawal shall be considered as normal and shall not be considered as idle period.
8. **Transit Insurance:** Transit Insurance is in the scope of Contractor.
9. **Liquidated damage:** The Contractor shall ensure timely completion of work under this contract to the satisfaction of the Engineer-in-Charge of NEEPCO. The Contractor shall ensure engagement of adequate skill manpower and shall engage his manpower round the clock, if required for timely completion of entire work. If the contractor fails to complete the work satisfactorily in time i.e. as agreed upon, an amount @ 1/2% (half percent) of basic contract value for each calendar week or part of delay from the schedule date of completion or extension thereof subject to a maximum of 17.5 % of the total basic contract value shall be deducted from the Contractor's bill. However, LD clause shall not be imposed under Force Majeure Condition/conditions.
10. **FORCE MEASURE:** The terms and conditions mutually agree upon with respect to this contract shall be subject to force majeure condition. Neither the contractor nor the corporation shall be considered default in the performing of its obligation herein under if such performance is prevented or delayed without limitation because of wars, insurrection, civil disobediences, strikes, riots, epidemics, earthquakes, storms, floods, explosions or fire not caused by contractor's negligence, lightning, acts of God or any law and order proclamation, regulation or ordinance of the Government which is of such a nature that is beyond control.
11. **Reporting at site:** The execution team shall have to report at site within 30 days from the date of issuance of site clearance in respect of readiness of cooling tower cells for replacement of fill packs.
12. **Death, insolvency and Breach of contract:** The contractor shall have to insure his workman as deployed for this contract against all type of accident i.e. fatal, major, minor and in such cases NEEPCO shall not be hold responsible anyhow. In case of infringement of any terms and conditions, major or minor, of this covenant /agreement/ condition by the contractor, the corporation shall have full power to rescind, cancel or terminate the contract after observing all legal formalities. The decision of Corporation in this regard shall be final and binding.
13. **Guarantee / Warranty:** Standard clauses of Guarantee / Warranty shall be applicable for the supply of materials and work performed by the Contractor. The supplied material shall have to guaranteed / warranted for a period of 12 months from the date of operation or 18 months from the date of supply, whichever is earlier. However Guarantee / Warranty against workmanship shall be counted for a period of 12 months from the date of operation only.

14. General Terms and Conditions :

- a. The Contractor is deemed to have full knowledge about the nature and character of the plant & equipment as the case may be for the work to be executed at the site condition, the relevant matters, details and extent of work. The Contractor shall ensure proper safety to the men, materials and plant & equipment of the Corporation while working at Site. The Contractor shall provide suitable safety equipment of prescribed standard to his workmen and follow safety work procedure. No personal protective equipment shall be issued by the corporation.
- b. The Contractor is required to comply with all relevant acts, rules and regulations applicable in respect of safety of the personnel engaged for the works.
- c. NEEPCO will not accept any liability for accidents to Contractor's workmen and compensation required to be paid to the Contractor's workmen in the event of any accident. NEEPCO bears no responsibility whatsoever towards the Contractor's workmen for any loss / damage caused by any accident during the works. For any such eventuality the responsibility lies solely on the Contractor.
- d. The Contractor at his own interest and cost shall arrange for adequate insurance cover for his workers to protect them against all claims applicable under Workmen's Compensation Act, 1923.
- e. The Contractor's workmen will not be entitled to free medical treatment from NEEPCO. The Contractor shall ensure the receipt of medical benefit to his workmen under Employees State Insurance Act 1948.
- f. The Contractor shall ensure full compliance of various Indian Laws and Statutory Regulations, to the extent applicable, as stated below, but not limited to, in force from time to time:
 - Workman's Compensation Act, 1923.
 - Payment of Wages Act, 1936.
 - Minimum wages Act, 1948.
 - Contract Labour (Regulation & Abolition) Act, 1970.
 - Provident Funds and Miscellaneous Provisions Act, 1952.
 - Income Tax Act 1961.
 - Any other Act or Statute having bearing over engagement of workers directly or indirectly for execution of the Contract.
- g. The Income Tax and other taxes as may be payable under the provision of relevant Acts will be deducted at source.
- h. The Contractor's personnel shall maintain strict discipline and harmony at the work site. The Engineer-in-Charge of NEEPCO shall be at discretion to object to the presence of any worker / representative of the Contractor at site, if in his opinion, such worker / representative has misconducted himself or found incompetent or negligent or otherwise undesirable and the Contractor shall remove such person(s) immediately.
- i. The persons engaged by the Contractor must not be found under the influence of alcohol and drugs within the Plant area during the duty hours and also maintain decorum in the Plant area at all the time. The Contractor shall not engage minor labour below 18 (eighteen) year of age under any circumstances.
- j. Temporary Entry Pass for entry into the work site will be issued by NEEPCO in favor of the Contractor and each of his workers till expiry of the contract period. No personnel shall be allowed to enter inside the NEEPCO's Plant/Colony area without valid Entry Pass. The Contractor shall apply for the temporary Entry pass for his employees giving full details of them.
- k. The Contractor's workers shall act and carry out all works as per instruction / direction of the Engineer-in-charge of NEEPCO for the said works or his authorized representative.
- l. **Settlement of dispute:** A process of mutual settlements shall decide all the differences or disputes arising out of the Contract between the parties. However, if the process of mutual settlements fails, then the dispute under this contract will be settled through arbitration as per Indian Arbitration and Conciliation Act, 1996. All disputes shall be under the jurisdiction of Dibrugah Court only.

- m. Termination of contract: NEEPCO reserves the right to terminate this contract in the event of Contractor's continued default in providing requisite services after proper and due notice having being served upon. NEEPCO also reserves the right to terminate this contract if any condition under FORCE MAJEURE warrants stoppage of the work. In case of termination on account of this reason, before completion of the Contract period the Contractor shall be paid all eligible charges as per this contract on pro rata basis for the work done up to the date of termination. On expiry of the Contract period, this contract will automatically stand terminated.
15. Agreement: The successful bidder herein called the contractor shall have to enter in to an agreement with the NEEPCO on stamp paper of appropriate value of not less than Rs. 100.00 (hundred) in the prescribed form within one month from the date of receipt of this order or before commencement of work execution by the contractor. Issued work order, order acceptance letter, signed copies of bid document, corrigendum published time to time and any other correspondence in this connection shall form the complete contract agreement which shall be binding of this contract.
16. Breach of Contract: In case of infringement of any terms and conditions major or minor, of this covenant / agreement by the contractor, the Corporation shall have full power to rescind, cancel or terminate the contract after observing all legal formalities. The decision of Corporation in this regard shall be final and binding.
17. SUSPENSION OF WORK:
- The Corporation reserves the right to suspend and restore execution of the whole or any part of the awarded Contract. Orders for suspension or restoring the works will be issued by the Engineer-in-Charge to the Contractor in writing.
 - Any necessary and demonstrable costs incurred by the Contractor as a result of such suspension of the works will be paid by the Corporation, provided such costs are substantiated to the satisfaction of the Engineer-in-Charge. The Corporation shall not be responsible for any liabilities if suspension is due to some default on the part of the Contractor.
18. Disposal of old fill packs: The contractor shall have to do the arrangement to take out the removed old PVC fill packs out of the plant for further disposal / recycling at par applicable norms at their own cost and arrangement. However, NEEPCO shall provide designated area to store old fill packs, water line and electrical connection free of cost for crushing the fill packs into pieces.
19. Engineer-in-Charge: You are requested to contact Mr. Anupam Boruah, D.G.M. (E/M), ST&Aux, for execution of tendered work.
20. Consignee: The D.G.M. (E/M), Material Management Wing, Assam Gas Based Plant, NEEPCO Ltd., Bokuloni (Near Dulisjan town), P.O. : BokuloniChariali - 786 191, Dist. : Dibrugarh (Assam) . Phone no. : (0374) 282 5411
21. Paying authority: The D.G.M. (Fin), F&A, Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, P.O. : BokuloniChariali - 786 191, Dist. : Dibrugarh (Assam) .
22. Order Acceptance: Please confirm acceptance of this PO by fax or E-mail at the following address
- Enclosure: Annexure- I & Annexure-II.

Thanking you.



(Anupam S. Boruah),
D.G.M. (E/M),
Steam Turbine and Aux Complex,
Assam Gas Based Power Plant,
NEEPCO Ltd., Bokuloni,
Dibrugarh, Assam- 786191
Phone : - 0374 2825505
Fax : - 0374 2825349/ 5217.
E-mail: sinauxagbpneepco@gmail.com

TECHNICAL CONDITION AND SPECIFICATION.

Objective: The overall objective is to replace old dog PVC fill packs of induced draught counter flow cooling tower of Assam Gas based Power Plant, NEEPCO Bokulani for improvement of performance of cooling tower.

Broad Scope of Work: The broad scope of work is to 1) supply PVC fill sheets with required Adhesive for making fill packs at site and replacement of old dogged fill packs of cooling tower of AGBP NEEPCO, Bokulani, Assam. 2) Taking out of old removed fill packs out of the plant for further disposal/recycling as per norms. The detail of scope under this contract shall be elaborated and the contractor shall have to adhere the same without any deviation.

Design detail of cooling tower:

Make of the cooling Tower: Paharpur Cooling Tower.

Type	: Induced draught counter flow.
CT Model	: Paharpur : 85442-3.0-8
Capacity	: 19500 M ³ /hr.
Number of cells	: 08 numbers.
Cell dimension	: 17000 mm x 13000 mm
Height	: From GL to bottom of fill packs : 4500 mm.
Floor level of cooling tower	: 10.00 Mtr.

Fill sheet specification

Type of PVC fill sheet	: MC-67 (Paharpur), non clog type.
Fill sheet dimension	: Length of the fill sheet: 1205 mm; height of the fill sheet: 920 mm
Fill sheet thickness	: 0.3 mm minimum.
Material property	: Material must meet all CTI STD-136 material properties after production and the manufacturer must submit test results to the owner prior to shipment of actual material
<u>Fill flute depth of each sheet</u>	: <u>17 mm. (for detail refer photograph and drawing followed by).</u>

Fill pack size	: Pack of 12 sheets in each pack.
Numbers of sheet per cell (existing)	: 10410 nos.
Total numbers of fill sheet in all 8 (eight) cells as per design	: 83,280 numbers.

Adhesive specification

Adhesive : PVC Solvent Cement, 20-40 SE.

Detail Scope of Work:

- The contractor shall have to supply PVC fill sheets as per specification along with required adhesive (required for replacement of complete fill packs in all 8 (eight) cells of the cooling tower).
- At a time, only one cell shall be offered to the contractor for replacement of PVC fill packs. After successful completion of fill packs replacement, the cell shall be taken into service and another cell shall be offered to

the contractor. Upon completion of fill replacement, the contractor shall offer the cell for inspection to the engineer/engineer in charge of NEEPCO and shall have to draw joint inspection certificate.

- c) The contractor shall have to make PVC fill packs at site only. Accordingly the contractor shall have to bring fill pack making machine to the site.
- d) Removal of old fill packs from the cell of cooling tower shall be under the scope of this contract.
- e) The contractor shall have to remove drift eliminator (Asbestos made) from the respective cell for removal of old fill packs if required and shall have to replace as is after completion of installation of new PVC fill packs.
- f) The contractor shall have to dismantle water distribution system of respective cell which includes nozzle diffusers, branch arm assembly, distribution header prior to removal of old fill packs and install back the same after completion of installation of new PVC fill packs. In case of dismantling requirement of water distribution system, the contractor shall take special care not to damage any part of it. In the event of any damage/broken of nozzle, diffusers etc. attributed as part of negligence of the contractor/his manpower, the contractor shall have to replace the same at their own cost.
- g) Prior to execution of removal of old fill packs and replacement with new fill packs, the contractor shall completely cover the respective cooling water basin of the cell with strengthen material to ensure not to fall broken pvc fill pieces/ scales at sump water.
- h) The contractor shall keep it in mind that there may not be possible to completely dry out cells of cooling tower by isolation as the plant is an old one. However, condition shall be still favorable for the work even after passing of water in few cells.
- i) After execution of the work, the contractor shall have to clean the surrounding area of cooling tower from removed fills and debris.
- j) The contractor shall take utmost care to follow safety measures as required as per norms.
- k) *The contractor shall have to do the arrangement to take out the removed old PVC fill packs out of the plant and shall make an arrangement for further disposal at per applicable norms.*

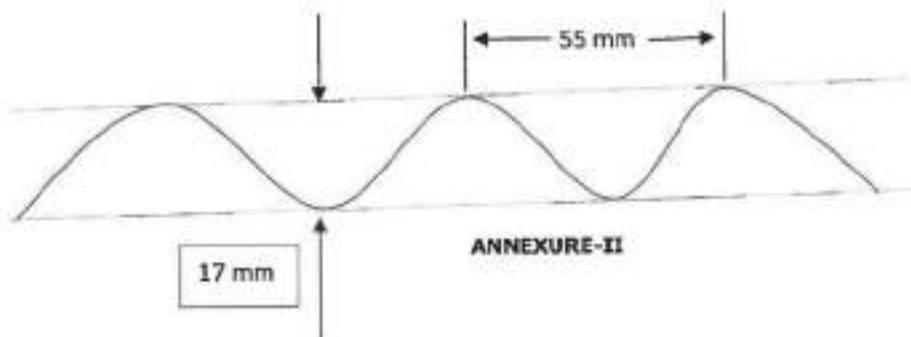
Scope of NEEPCO:

- 1) NEEPCO shall make adequate arrangement for illumination at work site and extend electric power to the place where PVC fill packs shall be made.
- 2) NEEPCO shall provide open space near to cooling tower for stacking of prepared new fill packs.
- 3) NEEPCO shall arrange temporary plant area gate pass to the personals engaged by the contractor under this contract.
- 4) NEEPCO shall arrange designated area for storage of old fill packs with water line and electrical power supply at free of cost to crush old fill packs into pieces.
- 5) NEEPCO shall provide vacant quarter, if available, for the execution team engaged by the contractor for the replacement work on chargeable basis near to plant.

Existing PVC Fill sheet:



Flute details.





ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

Dial 1219 for Complaints on Electric

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloni@gmail.com

Ref. No.

No. NEPCO/AGBP/ST&Aux/W-33(A)-23/2021-22/ 79

Dated 27.05.2021

Date.

To,

M/s THERMAX Ltd.,

Environment House, 90-92 BG Block,

MIDC Bhosari,

Pune - 411 026, India

Phone : (020) 67156123, +91 9836718039

E-mail Id. : Subhashis.Ghosh@thermaxglobal.com

Sub: Purchase Order for supply & delivery of Bulk Acid Storage Tank (THERMAX) with accessories.

- Ref. : 1. Our offer request vide our e-mail on 09.04.2021 (11:59 Hrs.)
: 2. Your offer No. WW55-SPARES/20-21/D-7/ RO Dated 14.04.2021.
: 3. Our e-mail on 28.04.2021 (12:09 Hrs.) for confirmation of some T&Cs of your offer.
: 4. Your clarification on above vide e-mail on 17.05.2021 (14:19 Hrs.)

Dear Sir,

With reference to above, we are pleased to place this order for supply and delivery of Bulk Acid Storage Tank with accessories as follows as per the price schedule, terms & conditions given below.

Sl. No.	Description of Items	Quantity	Rate (Rs.)	Rate after Discount @3% (Rs)	Amount (Rs.)
1.	Bulk Acid storage tank, Service: 33% HCL, MOC: MSRL (IS 2062) & Natural Rubber lined, Type: Horizontal, Dish End. Size: DIA. 2600 X 3000 LOS, THERMAX DRG NO. - 4.T.08289/A; THERMAX JOB NO. - 6979; Accessories: Tubular Level Gauge, Transparent with isolation lined diaphragm valve (04 numbers with each tank)	02 Sets	5,37,000.00	5,20,890.00	10,41,780.00
2	Fume Absorber for acid tank, MOC: HDPE: 1 set per tank with breather valve.	02 Sets	17,300.00	16,781.00	33,562.00

Total basic price : Rs. 10,75,342.00

Terms & Conditions:

- Prices:** The above prices are Ex-works, Bhosari, Pune basis and shall remain firm during the currency of the contract.
- Discount:** A discount @ 3% is incorporated in price details above.
- Packing & Forwarding:** Packing & Forwarding charges @ 3% shall be applicable on total basic price.
- Taxes & Duties:** GST as applicable shall be paid as extra which is 18% at present. GSTIN of AGBPP may please be noted as 18AAACN9991J3ZP.

5. **Payment Terms:** 100 % payment shall be made within 30 days after receipt of material at site in full and good condition against GRN. Payment will be made through E-Payment only. All the necessary **bank details** i.e. **bank name, address, Account no RTGS/IFSC code** etc. needs to be forwarded along with the submitted invoice.
6. **Delivery period:** Materials shall be delivered within 16 (sixteen) weeks i.e. on or before 16.09.2021 from the date of issuance of purchase order. However, it is requested to squeeze the delivery period to the extent possible considering urgent need of ordered material at site. Please note that the Date of dispatch of material as recorded in consignment note/delivery challan shall be considered as date of supply.
7. **Freight:** The material shall be transported through reputed transporter up to the destination i.e. AGBPP , NEEPCO Ltd., Bokuloni on **freight paid basis** .Cost of freight at actual shall be reimbursed as extra against documentary evidence which may be claimed along with the submitted invoice.
8. **Transit Insurance:** The materials will be covered under NEEPCO's open insurance policy. Therefore, you are requested to furnish detail of dispatch documents to the consignee in advance prior to dispatch the material from your works.
9. **Rejection of materials:** If the materials are found defective at the time of receipt or found unsuitable for uses for which these are intended, the same shall be rejected and the supplier shall replace the same at their own cost up to the destination.
10. **Guarantee/Warranty:** The material supplied shall be warranted for a period of 12 months from the date of installation or 18 months from the date of dispatch whichever is earlier against any manufacturing defect .
11. **Liquidated Damage:** In case the supplier fails to deliver the materials within contractual delivery period stipulated under Sl. No. 6 of this purchase order (or any extension thereof) due to reasons attributable to the supplier, then the Corporation reserves the right to recover from the supplier's sum towards Liquidated Damage @ ½% (half percent) value of the undelivered portion of the supply for each calendar week or part thereof the delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account of this shall not exceed 10% (ten percent) of the basic order value of this P.O. . However, the Liquidated Damage shall not be imposed if the supplier fails to deliver the materials within the scheduled delivery period due to **Force Majeure conditions**, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, floods, explosion or fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.
12. **Delivery Destination and Consignee:** The D.G.M. (E/M), Material Management Wing, Assam Gas Based Power Plant, No.3 Bokuloni Village, P.O. : Bokuloni Chariali – 786191 , Dist.: Dibrugarh, Assam, Phone No. : (0374) 2825411.
13. **Paying authority:** The D.G.M. (Fin), F&A Wing, AGBP. , NEEPCO Ltd. , Bokuloni , P.O. : Bokuloni Chariali , Dist. : Dibrugarh (Assam) , PIN – 786 191 . Phone No. : 0374 (2825421) .

Kindly acknowledge receipt of this Purchase Order and convey your acceptance thereof.

Thanking you,

Yours faithfully,



(Anupam S Baruah),
 DGM (E/M),
 Steam Turbine and Aux Complex;
 Assam Gas Based Power Plant,
 NEEPCO Ltd.; Bokuloni,
 Dibrugarh, Assam- 786191
 Phone :- 0374 2825505
 Fax :- 0374 2825349 / 5217.
 E-mail:stnauxagbpneepco@gmail.com



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

Dist 1219 for Complaints on Electric

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Gov. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloni@gmail.com

1123
DOCUMENT/18

Ref. No. No. NEEPCO/AGBP/ST & AUX/W-33(A)-09/2021-22/ 101

Date Dated 29.05.2021

To,

M/S. Paharpur Cooling Towers Ltd.,
Paharpur house,
8/1/B Diamond Harbour Road,
Kolkata- 700 027,
Phone : (033) 4013 3000
Fax : (033) 4013 3499
E-mail : sales@paharpur.com ; bk.das@paharpur.com

Sub. : Purchase order for supply of spares of cooling tower, Model: 85442-3.0-8, Serial No. 93-2- 931.

Ref. : 1. Our Offer Request vide e mail on 16.02.2021 (12:34 Hrs.)
2. Your Offer proposal (revised) No. 21E1P0227/1/ BKD Dated 29.04.2021
3. Our E-mail on 28.04.2021 (12:31 Hrs.) regarding confirmation of some T&Cs of your offer .
4. Your confirmation message vide e mail on 29.04.2021 (13:08 Hrs.).

Dear Sir,

With reference to above, we are pleased to place this order for supply and delivery of following items as per the price schedule, terms & conditions given below.

Sl. No.	Item description.	Quantity	Rate (Rs.)	Amount (Rs.)
1	GRDR 36 RT - 14.84:1 76-4399-1 (Series-36 spiral- bevel cum helical two- stage gear reducer assembly with reduction ratio 14.84:1), CT model: CT model: 85442-3.0-8	02 nos.	9,30,861.00	18,61,762.00

Total basic price : Rs. 18,61,762.00
(Rupees eighteen lakhs sixty one thousand seven hundred sixty two) only :

Terms and conditions:

1. **Prices:** Prices indicated are Ex-works Kolkata and shall remain firm till currency of this contract.
2. **Taxes and duties:** GST as applicable shall be paid as extra. GST invoice with all information details as per GST rule may please be submitted. GSTIN of AGBP may please be noted as 18AAACN9991J3ZP.
3. **Delivery:** Materials shall have to be delivered within 16 weeks (i.e. on or before 18.09.2021) from the date of issuance of this purchase order. However, you are requested to squeeze the delivery period to the extent possible considering urgent maintenance requirement. Please note that the date of dispatch from your works as recorded in delivery challan/consignment note shall be considered as date of delivery.
4. **Transit Insurance:** The materials shall be covered under NEEPCO's open insurance policy; therefore, you are requires to furnish complete dispatch details and invoices in advance to the consignee for necessary action prior to dispatch of materials.
5. **Freight charges:** The material shall have to be transported through reputed transporter on freight paid basis up to the destination and freight charge shall be reimbursed against actual which may be claimed along with the invoices against documentary evidence.
6. **Payments terms:** 100 % payment shall be released after receipt of the material in full and good condition at AGBP store, against GRN . Payment will be made through E-payment only, therefore necessary bank details i. e. bank name, address, account no. RGTS/IFSC code etc. needs to be furnished with the submitted invoice.

7. **Rejection of materials:** If the materials are found defective at the time of receipt or found unsuitable for use or will not fit / operate in the existing machineries for which these are intended, the same shall be rejected and the supplier shall replace the same at their cost up to the destination.
8. **Guarantee/Warranty:** The material supplied, shall be warranted for a period of 18 months from the date of supply or 12 months from the date of installation, whichever is earlier, against any manufacturing defect.
9. **Liquidated Damage:** In case the supplier fails to deliver the materials within contractual delivery period stipulated under Sl. No. 6 of this purchase order (or any extension thereof) due to reasons attributable to the supplier, then the Corporation reserves the right to recover from the supplier's sum towards Liquidated Damage @ ½% (half percent) value of the undelivered portion of the supply for each calendar week or part thereof the delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account of this shall not exceed 10% (ten percent) of the basic order value of this P.O. . However, the Liquidated Damage shall not be imposed if the supplier fails to deliver the materials within the scheduled delivery period due to **Force Majeure conditions**, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, floods, explosion or fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.
10. **Consignee & Destination :** The DGM (E/M), Material Management Wing, Assam Gas Based Plant, NEEPCO Ltd. Bokulani , P.O. : Bokuloni Chariali – 786 191 , Dist. : Dibrugarh , Assam , Phone : (0374) 2825411 .
11. **Paying authority:** The DGM (Fin) ,F&A wing, AGBP, NEEPCO Ltd. , P.O. : Bokulani Chariali – 786191 , Dist. : Dibrugarh (Assam) , Phone : (0374) 2825421

Kindly acknowledge receipt of this Purchase Order and convey your acceptance thereof .

Thanking you.

Regards.



(Anupam S Baruah)
 DGM (E/M), ST & Aux
 Steam Turbine and Aux. Complex,
 Assam Gas Based Power Plant,
 NEEPCO Ltd.; Bokuloni,
 Dibrugarh, Assam- 786191
 Phone :- (0374) 2825505.
 Fax :- (0374) 2825349/ 5217.
 E-mail :- stn@ixagbpneepco@gmail.com



Printed & Published by Computerized on Demand

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 101
E-mail : agbp.bokuloni@gmail.com

DOCUMENT/19



No. NEEPCO/AGBPS/HOP/W-15/2022-23/ 57

dated 09.05.2022

To,

M/s Bharat Heavy Electricals Ltd,
Spares & Service Business Group – Eastern Region,
M/S. Bharat Heavy Electricals Ltd.,
DJ-9/1, 3rd Floor, Karunamayee, Sector – II,
Salt Lake City, Kolkata - 700091
Phone : (033) 23211686, 23212391, 23211574
Fax : (033) 23216289, 23211960; E-mail : satya@bhel.in, am@bhel.in

Sub. Assam Gas Based Power Station: Purchase order for supply of complete CW Pump without Motor.

Ref.

1. Our offer request vide e mail dated 17.08.2021
2. Your Offer ref. No. PS/SSBG-KOL/HYU/SB21K0330/GKD/0103 dated 20.10.2021
3. Your e mail dated 17.02.2022 regarding the confirmation of extending discount and validity extension of your offer.
4. Negotiation meeting held on 11.04.2022 over team meet pertaining to extending further discount and absorbing the freight charges as well as extension of validity of your offer.

Dear Sir(s),

With reference to the above, the Corporation is pleased to place this order for supply of complete CW pump without Motor for one to one replacement in existing C. W. system without any alternation of existing system as per Items & Price and terms & conditions indicated in this order.

Items and Prices:

Sl. No	Item Description	Qty	Unit Price (In Rs.)	Discounted Price (In Rs)	Amount (Rs.)
1.	Pump specification: Make BHEL: Type: CW-10 Flow: 6600M ³ /Hr. Head: 22.5 MWC. Speed: 590 RPM. Pump eff: 87%. Pump input power: 489.4 KW Motor rating: 6.6KV, 550 KW. No of stage: 1.	01 (one) No.	4,16,01,250.00	3,82,73,150.00	3,82,73,150.00
2	Total amount: Rupees three crore eighty two lacs seventy three thousand one hundred and fifty) only.				3,82,73,150.00



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

Call 2209 for Complaints or Enquiry

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Govt of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 101

E-mail : agbo.bokuloni@gmail.com

1126



आमारे
समस्त महोदय

Terms & Conditions:

- Prices:** The prices indicated in this order shall remain firm during the currency of the contract. The freight charges from BHEL, Hyderabad to AGBPS, NEEPCO site shall be borne by BHEL.
- Discount:** Discount @ 8% has been considered as per MoM dated 25.03.2022 held between NEEPCO and BHEL.
- Taxes & Duties:** GST as applicable shall be paid as extra. Present IGST rate is 12%. GST invoice with all relevant information details as per GST rule shall be submitted by BHEL. GSTIN of AGBP is 18AAACN9991J3ZP.
- Delivery period:** Materials shall be delivered within 12 (twelve) months reckoned from the date of receipt of technically and commercially clear purchase order or receipt of advance, whichever is later. However, the date of dispatch of the material from BHEL's works as recorded in the delivery challan shall be considered as date of delivery.
- Freight charges:** The material shall be transported up to the destination on freight paid basis and freight charges shall be on BHEL account.
- Payments terms :**
 - 10% interest free advance shall be released against submission of performa invoice.
 - Balance 90% along with applicable GST shall be paid after receipt of the material at site in full and good condition.
- Guarantee/Warranty:** The material supplied shall be warranted for a period of 18 months from the date of supply or 12 months from the date of commissioning whichever is earlier. Any replacement / repairs required to be made under the provisions of the above guarantee will be carried out by M/s BHEL either at BHEL's works or at site depending on the facilities available at site, without any extra cost to the Corporation.
- Interchangeability:** The ordered item shall be supplied as per Original Design only for one to one replacement of existing pumps without any alteration.
- Transit Insurance:** The material will be covered under NEEPCO's Open Marine Insurance Policy. BHEL shall furnish the dispatch details to the consignee in advance for necessary action prior to dispatch of the material.
- Rejection of materials:** If the ordered item is found defective at the time of receipt or found unsuitable for use for which this is intended, the same shall be rejected and BHEL shall replace the same at their cost.



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

Def 1216 for Compliance on Electric

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbpsbokuloni@gmail.com

1127



Assam
गवर्नरी
असम प्रदेस

11. **Standard Quality Plan:** BHEL Standard quality procedure shall be applicable. All the necessary quality check, testing shall have to be carried out as per BHEL standard prior to dispatch the item.
12. **Delivery Destination and Consignee:** The D.G.M. (E/M), Material Management Wing, Assam Gas Based Power Station, No.3 Bokuloni Village, P.O. : Bokuloni Chariali – 786191 , Dist.: Dibrugarh, Assam, Phone No. : 9435395167
13. **Paying authority:** The G.M. (Fin), F&A Wing, AGBP. , NEEPCO Ltd. , Bokuloni , P.O. : Bokuloni Chariali , Dist. : Dibrugarh (Assam) , PIN – 786 191 . Phone No. : 0374 (2825421) .

Kindly acknowledge receipt of this Purchase Order and convey your acceptance.
Thanking you,

Yours faithfully,

(B. Goswami)

Chief General manager/HOP

AGBPS : NEEPCO

NIO

Memo No. NEEPCO/AGBPS/HOP/W-15/2022-23/ 58-63

dated 09.05.2022

Copy for favor of information to:

1. The Executive Directors (O&M), NEEPCO, Guwahati for kind information.
2. The G.M. (Fin), F&A , AGBPS, NEEPCO with a copy of approval.
3. The DGM (E/M), ST&Aux, AGBPS, NEEPCO, Bokuloni.
4. The DGM (E/M), MMW, AGBPS, NEEPCO, Bokuloni for information and necessary action.
5. The DGM (E/M), O&AWC, AGBPS, NEEPCO, Bokuloni for information.
6. The Sr. manager (C), Vigilance Wing, AGBPS, NEEPCO, Bokuloni .

(B. Goswami)

Chief General manager/HOP

AGBPS : NEEPCO



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

027 1279 for Computer on Grids

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 785 101
E-mail : agbp.bokuloni@gmail.com

1128



No. NEEPCO/AGBPS/HOP/W-15/2022-23/ 64

dt. 09/05/2022

To,

The Bharat Heavy Electricals Ltd,
Spares & Service Business Group – Eastern Region,
M/S. Bharat Heavy Electricals Ltd.,
DJ-9/1, 3rd Floor, Karunamayee, Sector – II,
Salt Lake City, Kolkata - 700091
Phone : (033) 23211686, 23212391, 23211574
Fax : (033) 23216289, 23211960; E-mail: satya@bhel.in, am@bhel.in

Sub: Assam Gas Based Power Station: Purchase order for supply of 550 KW, 6.6 KV, HT motor for CW pump.

Ref:

1. Our request vide e mail dated 17.08.2021
2. Your Offer ref. No. PS/SSBG-KOL/ISM/GKD/0101 dated 23.09.2021.
3. Your e mail dated 17.02.2022 regarding the confirmation of extending discount and validity extension of your offer.
4. Negotiation meeting held on 25.03.2022 and 18.04.2022 over VC between NEEPCO & BHEL.

Dear Sir(s),

With reference to above, the Corporation is pleased to place this order for supply of 550 KW, 6.6 KV HT motor for CW pump suitable for one to one replacement in existing system without any alteration of existing system as per Item & Price and terms & conditions indicated in this order.

Items & Prices:

Sl. No	Item Description	Quantity	Unit Price (in Rs.)	Discounted Unit Price (in Rs)	Total Price (in Rs.)
1.	Motor specification: Make: BHEL. Voltage: 6.6 KV CW motor Power: 550 KW, 10 pole, vertical mounted squirrel Cage Induction Motor, Frame size: 1LA7714 Earlier supplied motor Sl. No. 42110P404-21-03	01 (One) No.	71,30,000.00	65,59,600.00	65,59,600.00
2	Total				65,59,600.00

(Rupees Sixty five lacs fifty nine thousand and six hundred) only



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

ISO 14001 for Greenfields in Shillong

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULOKI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloki@gmail.com

1129



भारतीय
वैद्युत महानिगम

Terms & Conditions:

- Prices:** The prices indicated in this order shall remain firm during the currency of the contract. The freight charges from BHEL Bhopal to AGBPS, NEEPCO site shall be borne by BHEL.
- Discount:** Discount @ 8% has been considered as per MoM dated 25.03.2022 held between NEEPCO and BHEL.
- Taxes & Duties:** GST as applicable shall be paid as extra. Present IGST rate is 18%. GST Invoice with all relevant information details as per GST rule shall be submitted by BHEL. GSTIN of AGBP is 18AAACN9991J3ZP.
- Delivery period:** Materials shall be delivered within 12 (twelve) months reckoned from the date of receipt of technically and commercially clear purchase order or receipt of advance, whichever is later. However, the date of dispatch of the material from BHEL's works as recorded in the delivery challan shall be considered as date of delivery.
- Freight charges:** The material shall be transported up to the destination on freight paid basis and freight charges shall be on BHEL account.
- Payments terms :**
 - 10% interest free advance shall be released against submission of performa invoice.
 - Balance 90% along with applicable GST shall be paid after receipt of the material at site in full and good condition.
- Guarantee/Warranty:** The material supplied shall be warranted for a period of 18 months from the date of supply or 12 months from the date of commissioning whichever is earlier. Any replacement / repairs required to be made under the provisions of the above guarantee will be carried out by M/s BHEL either at BHEL's works or at site depending on the facilities available at site, without any extra cost to the Corporation.
- Interchangeability:** The ordered item shall be supplied as per Original Design only for one to one replacement of existing motors without any alteration.
- Transit Insurance:** The material will be covered under NEEPCO's Open Marine Insurance Policy. BHEL shall furnish the dispatch details to the consignee in advance for necessary action prior to dispatch of the material.
- Rejection of materials:** If the ordered item is found defective at the time of receipt or found unsuitable for use for which this is intended, the same shall be rejected and BHEL shall replace the same at their cost.



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

One of 270 Best Companies in Electric

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloni@gmail.com

1130



11. **Standard Quality Plan:** BHEL Standard quality procedure shall be applicable. All the necessary quality check, testing shall have to be carried out as per BHEL standard prior to dispatch the item.
12. **Delivery Destination and Consignee:** The D.G.M. (E/M), Material Management Wing, Assam Gas Based Power Station, No.3 Bokuloni Village, P.O. : Bokuloni Chariali – 786191 , Dist.: Dibrugarh, Assam, Phone No. : 9435395167
13. **Paying authority:** The G.M. (Fin), F&A Wing, AGBP. , NEEPCO Ltd. , Bokuloni , P.O. : Bokuloni Chariali , Dist. : Dibrugarh (Assam) , PIN – 786 191 . Phone No. : 0374 (2825421) .

Kindly acknowledge receipt of this Purchase Order and convey your acceptance.

Thanking you,

Yours faithfully,

(B. Goswami)

Chief General manager/HOP

AGBPS: :NEEPCO

NIO

Memo No. NEEPCO/AGBPS/HOP/W-15/2022-23/ 65-70

dt. 09/09/2022

Copy for favor of information to:

1. The Executive Directors (O&M), NEEPCO, Guwahati for kind information.
2. The G.M. (Fin), F&A , AGBPS, NEEPCO with a copy of approval.
3. The DGM (E/M), ST&Aux, AGBPS, NEEPCO, Bokuloni.
4. The DGM (E/M), MMW, AGBPS, NEEPCO, Bokuloni for information and necessary action.
5. The DGM (E/M), O&AWC, AGBPS, NEEPCO, Bokuloni for information.
6. The Sr. manager (C), Vigilance Wing, AGBPS, NEEPCO, Bokuloni .

(B. Goswami)

Chief General manager/HOP

AGBPS: :NEEPCO



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

Shel 1719 for Complaints on Ethics

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloni@gmail.com



No. NEEPCO/AGBPS/HOP/W-15/2022-23/ 50

dated 09.05.2022

To,

M/s Bharat Heavy Electrical Ltd,
Spares & Service Business Group - Eastern Region
DJ-9/1, 3rd Floor, Karunamayee, Sector-II
Salt Lake City, Kolkata - 700 091
Phone : (033) 23211686, 23212391, . 2321-1574,
Fax : (033) 2321-6289, 2321-1960; E Mail: satya@bhel.in

Kind attention Mr. Satya Narayan Das.

Sub. : Assam gas Based Power Station: Work order for inspection, repair and refurbishment of used Steam Turbine Rotor of Unit # 3 (model: HNK-71/2.8/32-4, 30 MW, Sl. No.T-402) at BHEL's works, Hyderabad.

Ref.:

1. Our e mail dated 20.10.2021 (12:45 Hrs.) requesting to submit offer for refurbishment along with the inspection report.
2. Your e mail dated 02.02.2022 (09:26 Hrs.) along with rotor inspection report.
3. Your offer ref. **PS/SSBG-KOL/HYU/SB21K0582/GKD/0104 Dated 04/02/2022** .
4. Our e mail dated 11.02.2022 (10:32 Hrs.) regarding discount, payment term and extension of offer validity.
5. Your reply vide e mail dated 11.02.2022 (13:13 Hrs.) .
6. Our e mail dated 18.02.2022 (10:58 Hrs.) regarding confirmation on the Terms and conditions.
7. Your reply on above vide e mail dated 19.02.2022 (10:00 Hrs.) .
8. Our e mail dated 24.02.2022 (10:56 Hrs.) regarding revision of your payment terms and freight charge.
9. Our e mail dated 25.02.2022 (17:44 Hrs.) regarding payment terms.
10. Your reply on above vide e mail dated 25.02.2022 (18:22 Hrs.) regarding payment terms.
11. Negotiation meeting dated on 11.04.2022 between NEEPCO and BHEL held through MS Team.

Dear Sir,

With reference to above, the corporation is pleased to place this detail work order for repair of used Rotor of Steam Turbine Unit # 3 (model: HNK-71/2.8/32-4, 30 MW, Sl. No.T-402) at your works as per Scope, Prices and Terms & Conditions mentioned in this order .

(Handwritten Signature)



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

Best EPC for Complete and Electric

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

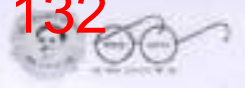
(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : eghp.bokuloni@gmail.com



75
असम
गैस आधारित
बलुकोनी

1. **Prices:** The prices for entire scope of the works shall be as stated here under:

Sl. No.	Item Description	Quantity	Rate (in Rs)	Rate after considering 4% discount (in Rs)	Amount (in Rs)
1	Cost of the material	01 Lot	1,72,57,800.00	1,65,67,488.00	1,65,67,488.00
2	Service / Repair charge	01 Job	2,49,61,650.00	2,39,63,184.00	2,39,63,184.00
3	Total basic price: (Rupees four crore five lac thirty thousand six hundred and seventy two) only				4,05,30,672.00

2. **Scope of Works:** The scope of works under this contract shall be as follows. The repairing shall be carried out as per OEM's standard repair procedure at the BHEL's workshop, Hyderabad.

- i. Receipt, un-loading and un-packing of Rotor.
- ii. Cleaning.
- iii. Inspection and Indications.
- iv. Manufacture and Replacement of all blades of row nos. 16 to 23 and 25 to 29 (i.e. 13 rows).
- v. New blades' Shroud machining as per drawings.
- vi. Removal of all rotor sealing fins.
- vii. Manufacture and Replacement of Sealing fins and machining as per drawing.
- viii. Polishing of Thrust Collar and Front and Rear Journal Areas.
- ix. Skim cut on oil gland areas and differential expansion probe area.
- x. Manufacture and assembly of new over speed Governor Parts.
- xi. De-magnetization of rotor.
- xii. Manufacture and replacement of balancing weights, as applicable.
- xiii. Dynamic Balancing of rotor*
- xiv. Pre-dispatch inspection.
- xv. Preservation and packing & Forwarding

3. **Terms and Conditions:**

a) **Prices:** Prices indicated in this order shall remain FIRM during the currency of the contract.

b) **Payment :**

- a) 10 % (ten percent) of the basic price shall be paid as interest free advance against submission of proforma invoice.
- b) Balance 90% (ninety percent) payment along with GST shall be released after receipt of the refurbished rotor at AGBPS site.

c) **Taxes and Duties:** The prices indicated in this order is exclusive of all applicable taxes & duties. GST for material as well as for service charge, as applicable, shall be paid extra. GST invoice with all information/details as per GST rule shall be submitted. GSTIN of AGBPS may please be noted as 18AAACN9991J3ZP



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

NEEPCO is a Government of Assam Enterprise

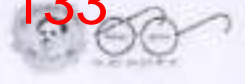
नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloni@gmail.com



অসম চৰকাৰ
গেছ শক্তি

- d) **Packing & Forwarding:** The prices indicated in this order are inclusive of Packing & Forwarding charges.
- e) **Transportation:** M/s BHEL shall be dispatched the refurbished rotor by road transport on door delivery basis up to the AGBPS. Freight Charges from BHEL's works to Assam Gas Based Power Station shall be borne by BHEL. No transshipment will be allowed at any circumstances and repaired rotor shall be transported in a manner which meets all safety requirements.
- f) **Transit Insurance:** Transit Insurance shall be arranged by NEEPCO. BHEL shall furnish all dispatch documents to the consignee in advance for necessary arrangement of transit insurance coverage prior to dispatch.
- g) **Delivery Period:** The refurbished rotor shall be delivered within 9 (nine) months from the date of receipt of this work order or receipt of 10% advance payment whichever is later. However, BHEL shall make full effort to squeeze the delivery period to the extent possible considering upcoming Major Inspection of steam turbine Unit # 1.
- h) **Guarantee/Warranty:** All the repaired items shall be guaranteed against any manufacturing defect or faulty workmanship for a period of 6 (six) months from the date of installation or 12 (twelve) months from the date of dispatch, whichever is earlier.
- i) **Inspection and Testing:** BHEL's standard procedure for inspection and testing of the refurbished rotor shall be applicable. NEEPCO reserves the right to waive or depute its authorized representative to witness the tests. However, all test reports/certificates shall be submitted to NEEPCO.
- j) **Consignee and Destination :** The D.G.M. (E/M), MMW , Assam Gas Based Power Station, NEEPCO, Ltd, P.O. Bokulani Chariali - 786191 (Near Duliajan), Dist. : Dibrugarh (Assam) , Phone : +91 9435395167
- k) **Paying Authority:** The G.M. (Fin.) , F&A wing, Assam Gas Based Power Plant, NEEPCO Ltd., P.O. Bokuloni Chariali - 786191, Dist. : Dibrugarh (Assam) , Phone : (0374) 2825421 .

Kindly acknowledge receipt of this Work Order and convey your acceptance.

Thanking You,

Yours faithfully,

(B. Goswami)

Chief General manager/HOP

AGBPS : NEEPCO

Contract | अनुबंध



Contract No | अनुबंध क्रमांक: GEMC-511687723180318

Generated Date | अनुबंध तिथि: 10-Mar-2023

Bid/RA/PBP No. | बोली/आरए/पीबीपी संख्या: [GEM/2022/B/2691330](#)

Organisation Details | संगठन विवरण	Buyer Details | खरीदार विवरण
Type | प्ररूप: Central PSU	Designation | पद: DEPUTY GENERAL MANAGER EM
Ministry | मंत्रालय: Ministry of Power	Contact No. | संपर्क नंबर: 0374-2825505-
Department | विभाग: NORTH EASTERN ELECTRIC POWER Corporation Limited	Email ID | ईमेल आईडी: anupamb.neepco@nic.in
Organisation Name | संगठन का नाम: NORTH EASTERN ELECTRIC POWER Corporation Limited	GSTIN | जीएसटीआईएन: -
Office Zone | कार्यालय क्षेत्र: Assam Gas Based Power Plant Bokuloni Dibrugarh	Address | पता: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786191, India

Financial Approval Detail | वित्तीय स्वीकृति विवरण	Paying Authority Details | भुगतान प्राधिकरण विवरण
IFD Concurrence | आईएफडी सहमति: No	Role: PAO
Designation of Administrative Approval | प्रशासनिक अनुमोदन का पदनाम: HOP, AGBPS NEEPCO Ltd.	Payment Mode | भुगतान का तरीका: Offline
Designation of Financial Approval | वित्तीय अनुमोदन का पदनाम: DM (F&A), AGBPS	Designation | पद: IN CHARGE FINANCE
	Email ID | ईमेल आईडी: rahulg.neepco@nic.in
	GSTIN | जीएसटीआईएन: 18AAACN9991J3ZP
	Address | पता: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, Dibrugarh, ASSAM-786191, India

Seller Details | विक्रेता विवरण	
GeM Seller ID | जेम विक्रेता आईडी: 9168200001125278	Company Name | कंपनी का नाम: PAHARPUR COOLING TOWERS LTD
Contact No. | संपर्क नंबर: 03340133000	Email ID | ईमेल आईडी: sales@paharpur.com
Address | पता: 8/1/B,,Paharpur House,,Diamond Harbour Road,,Alipore, Kolkata, WEST BENGAL-700027, -	MSME verified | एमएसएमई सत्यापित: No
MSME Registration number | एमएसएमई पंजीकरण संख्या: -	GSTIN | जीएसटीआईएन: 19AABCP8017C1ZM

*GST / Tax invoice to be raised in the name of | जिसके नाम के पक्ष में GST/TAX इनवॉइस पेश किया जाएगा - Consignee

Product Details | उत्पाद विवरण						
#	Item Description | आइटम विवरण	Ordered Quantity | आइटम विवरण	Unit | इकाई	Unit Price (INR) | इकाई मूल्य (INR)	Tax Bifurcation (INR) | कर विभाजन (INR)	Price (Inclusive of all Duties and Taxes in INR) | मूल्य (INR में सभी शुल्क और कर सहित)
1	Product Name | उत्पाद का नाम: GRDR 36 RT- 14.84: 1 76- 4399- 1 Brand | ब्रांड: Paharpur Brand Type | ब्रांड प्रकार: Registered Brand Catalogue Status | कैटलॉग की स्थिति: Catalogue not verified by OEM Selling As | कैसे बेचा जा रहा है: Reseller not verified by OEM Category Name & Quadrant | श्रेणी का नाम और चतुर्थांश: GRDR 36 RT- 14.84: 1 76- 4399- 1 (Q3) Model | मॉडल: GRDR 36 RT-14.84:1 76-4399-1 HSN Code | एचएसएन कोड: 84199090	2	pieces	880,000	NA	1,760,000
2	Product Name | उत्पाद का नाम: ICT charges for CT GEAR BOX SERIES 36 Brand | ब्रांड: NA Brand Type | ब्रांड प्रकार: Unbranded Catalogue Status | कैटलॉग की स्थिति: Catalogue not verified by OEM Selling As | कैसे बेचा जा रहा है: Reseller not verified by OEM Category Name & Quadrant | श्रेणी का नाम और चतुर्थांश: Addon Services for bid (Q3) Model | मॉडल: ICT HSN Code | एचएसएन कोड: HSN not specified by seller	2	pieces	265,000	NA	530,000
Total Order Value | कुल ऑर्डर मूल्य (in INR)						2,290,000

Consignee Detail | परेषिती विवरण						
S.No | क्र.सं.	Consignee | परेषिती	Item | वस्तु	Lot No. | लॉट नंबर	Quantity | मात्रा	Delivery Start After | दिनांक के बाद डिलीवरी शुरू	Delivery To Be Completed By | वितरण पूरा कब

					करना है	तक करना है
1	Designation | पद : - Email ID | ईमेल आईडी : rubudas.neepco@nic.in Contact | संपर्क : 0374-2825204- GSTIN | जीएसटीआईएन : - Address | पता : AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786191, India	GRDR 36 RT- 14.84: 1 76- 4399- 1	-	2	10-Mar-2023	08-Jul-2023

Product Specification for GRDR 36 RT- 14.84: 1 76- 4399- 1

Specification | विनिर्देश	Sub-Spec | उप-विनिर्देश	Value | मूल्य
Custom Specification	Custom Specification	Yes

Installation Commissioning and Testing (ICT) details for the above item | उपरोक्त मद के लिए स्थापना कमीशनिंग और परीक्षण (आईसीटी) विवरणः

% of Product Cost Payable on Product Delivery	70 %
Min Cost Allocation for ICT as a % of product cost	30 %
Number of days allowed for ICT after site readiness communication to seller	60 Days

Seller Specification Document | विक्रेता विशिष्टता दस्तावेज़:

1. SpecificationDocument1	mkp.gem.gov.in/catalog_data/catalog_support_document/15/68/084/CatalogAttrs/SpecificationDocument/2022/11/10/2022_11_10_16_33_54_series-36_2022-11-10-16-33-58_40bc61b78f62f9e983ff521afb311bb.pdf
---	--

Buyer Specification Document | खरीदार विशिष्टता दस्तावेज़:

1. SpecificationDocument	mkp.gem.gov.in/catalog_data/catalog_support_document/buyer_documents/888418/54/78/703/CatalogAttrs/SpecificationDocument/2022/10/27/technical-specification-ct-gear-box_2022-10-27-15-45-24_e16978f4baec9059d805c1e971b9a1e9.pdf
--	--

Corrigendum | शुद्धिपत्र

1. **Extended Upto** | तक बढ़ाया गया : 2022-12-05 09:00:00
2. **Extended Upto** | तक बढ़ाया गया : 2022-12-13 09:00:00
3. **Extended Upto** | तक बढ़ाया गया : 2022-12-21 09:00:00
4. **Extended Upto** | तक बढ़ाया गया : 2022-12-31 09:00:00

ePBG Detail | ईपीबीजी विवरण

Advisory Bank | सलाहकार बैंक :	NA
ePBG Percentage(%) | ईपीबीजी प्रतिशत (%) :	NA

Terms and Conditions | नियम और शर्तें

1. General Terms and Conditions-

- 1.1 This contract is governed by the [General Terms and Conditions](#), conditions stipulated to this Product/Service as provided in the Marketplace.
- 1.2 This Contract between the Seller and the Buyer, is for the supply of the Goods and/ or Services, detailed in the schedule above, in accordance with the General Terms and Conditions (GTC) unless otherwise superseded by Goods / Services specific Special Terms and Conditions (STC) and/ or BID/Reverse Auction Additional Terms and Conditions (ATC), as applicable

2. Buyer Added Bid Specific Terms and Conditions-

2.1 Generic

OPTION CLAUSE: The Purchaser reserves the right to increase or decrease the quantity to be ordered up to 25 percent of bid quantity at the time of placement of contract. The purchaser also reserves the right to increase the ordered quantity by up to 25% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly.

2.2 Generic

Bidder financial standing: The bidder should not be under liquidation, court receivership or similar proceedings, should not be bankrupt. Bidder to upload undertaking to this effect with bid.

2.3 Generic

Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

2.4 Generic

Bidder shall submit the following documents along with their bid for Vendor Code Creation:

- a. Copy of PAN Card.
- b. Copy of GSTIN.

c. Copy of Cancelled Cheque.

d. Copy of EFT Mandate duly certified by Bank.

2.5 Generic

Data Sheet of the product(s) offered in the bid, are to be uploaded along with the bid documents. Buyers can match and verify the Data Sheet with the product specifications offered. In case of any unexplained mismatch of technical parameters, the bid is liable for rejection.

2.6 Generic

Experience Criteria: The Bidder or its OEM (themselves or through reseller(s)) should have regularly, manufactured and supplied same or similar Category Products to any Central / State Govt Organization / PSU / Public Listed Company for 3 years before the bid opening date. Copies of relevant contracts to be submitted along with bid in support of having supplied some quantity during each of the year. In case of bunch bids, the primary product having highest value should meet this criterion.

2.7 Generic

Installation, Commissioning, Testing, Configuration, Training (if any - which ever is applicable as per scope of supply) is to be carried out by OEM / OEM Certified resource or OEM authorised Reseller.

2.8 Generic

OPTIONAL SITE VISIT:

1. The Bidder is advised to visit and examine the installation site and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid. The costs of visiting the site shall be borne by the Bidder.

On the part of bidders.

2. The Bidder representative shall be allowed entry upon consignee premises for such visits, only upon the express conditions that the Bidder will release and indemnify the Buyer and Consignee against all liabilities arising out of such visit including death or injury, loss or damage to property, and any other loss, damage, costs, and expenses incurred as a result of such visit.

3. The Bidder shall not be entitled to hold any claim against Buyer for noncompliance due to lack of any kind of pre-requisite information as it is the sole responsibility of the Bidder to obtain all the necessary information with regard to site, surrounding, working conditions, weather etc. on its own before submission of the bid.

2.9 Generic

Upload Manufacturer authorization: Wherever Authorised Distributors are submitting the bid, Manufacturers Authorisation Form (MAF)/Certificate with OEM details such as name, designation, address, e-mail Id and Phone No. required to be furnished along with the bid.

2.10 Generic

While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

2.11 Inspection

Materials shall be guaranteed for 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier.

2.12 Scope of Supply:

Scope of supply (Bid price to include all cost components) : Supply Installation Testing and Commissioning of Goods

2.13 Buyer Added Bid Specific ATC:

Buyer Added text based ATC clauses

1. Brief description of scope of work: Supply of heavy-duty gear reducer with reduction gear ratio: 14.84:1 for cooling tower

Technical specification of existing gear boxes:

Manufacturer of existing gear box: Paharpur:

Model: Series: 36 (Spiral Bevel cum helical two stage gear reducer:

Reduction Gear ratio: 14.84:1

Input power:

Input motor power: 75 KW.

Direction of rotation: Clockwise when looking at shaft end.

Power transmission: Through hollow shaft.

2. Qualifying criteria: The bidder must be a manufacture of the offered gear box or an authorized dealer of the manufacture r having past credential of supplying similar type of Heavy Duty Gear Reducers to any Govt, PSU or any reputed private party organizations. As a proof of credential, the bidder shall have to upload copy of executed purchase order/s supported with satisfactory performance certificate.

3. Techno dimensional conformity: The supplied gear boxes must be technically as well as dimensionally match with the existing gear boxes as the proposed gear boxes are intended to purchase to keep in ready stock for one to one replacement in the existing system to minimize the down time of the unit. Any alteration of gear box foundation, motor foundation, fan hub, existing drive shaft etc. is not envisages.

4. Site visit: the interested bidders are requested to visit the site for techno dimensional assessment of the existing gear boxes prior to participation in the bidding process. Any dimensional details as submitted from the buyers end shall not be considered final and in case on non-conformity if any shall be the responsibility of the bidders/ suppliers.

5. Rejection: In case of any deviation of supplied items from technical as well dimensional point of view which may call for a ny alternation or modification of associated system whether minor or major shall be liable for rejection and the supplier s

shall replace the same with the proper one at their own cost and risk.

6. **Site installation and demonstration:** The successful bidder shall have to install at least one gear box in the existing system and shall operate the same for demonstration of satisfactory performance as well as compatibility for one to one replacement in the existing system without any alteration.
7. **Delivery period:** Shall have to be dispatched within 6 months counted from the date of awarding the purchase order. The date as recorded in the delivery challan shall be considered as date of dispatch.
8. **EMD:** Instead of EMD, the interested bidder shall have to upload duly signed bid security declaration form on their letter head as per given format.
9. **PBG/SD:** Security cum performance guarantee shall be 10% (ten percent) of the basic contract value. The security cum performance guarantee shall have to be deposited by the successful bidder within 15 days from the date of issuance of supply order in the prescribed format as mentioned hereunder. PBG/ security deposit shall be valid till entire guarantee/warranty period with additional 90 days validity for the initiation of claim if any.
10. **Payment:** Upon completion of demonstration of performance in the existing system, 100% payment against supplied material shall be released to the party subject to submission of security cum performance bank guarantee equivalent to 10% of basic contract value. Otherwise 10% of total basic contract value shall be retained by NEEPCO as security cum performance guarantee from the invoiced amount of the supplier.
11. **Drawing and documentation:** The supplier shall have to submit the Operation and maintenance manual in hard copies as well as in soft copies covering all the drawing and list of spares along with part numbers which shall be required for maintenance and satisfactory performance of the supplied equipment.
12. **Guarantee/Warranty:** The supplied items shall have to be guaranteed/ warranted for a period 12 months counted from the date of operation or 18 months counted from the date of supply whichever is earlier.
13. **Liquidated damage:** In case the supplier fails to deliver the material within contractual delivery period due to reason attributed to the supplier, then the Corporation reserve the right to recover from the supplier's sum (Invoiced amount) toward Liquidated Damage @ ½% (half Percent) of basic value of material for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account of this shall, however, not exceed 10% (ten percent) of the contract basic value.
14. **Force majeure:** The terms and condition mutually agreed upon with respect to this contract shall be subject to force majeure. Neither the contractor nor the corporation shall be considered default in the performing of its obligation herein under if such performance is prevented or delayed because of war, hostilities, revolution, civil commotion, epidemic, accidents, fire, wind, flood or because of any law and order proclamation, regulation or ordinance of the Government or any act of God which is beyond control to either parties.

Format: of bid security declaration form:

I / We, the authorized signatory of M/s, participating in the subject tender No .

..... for the item / job of, do hereby declare:

- (i) That I / we have availed the benefit of waiver of EMD while submitting our offer against the subject Tender and no EMD being deposited for the said tender.
- (ii) That in the event we withdraw / modify our bid during the period of validity Or I/we fail to execute formal contract agreement within the given timeline OR I/we fail to submit a Performance Security within the given timeline Or I/we commit any breach of Tender Conditions / Contract which attracts penal action of forfeiture of EMD and I/we will be suspended from being eligible for bidding / award of all future contract(s) of NORTH EASTERN ELECTRIC POWER CORPORATION for a period of one year from the date of committing such breach.

Signature and Seal of Authorised Signatory of bidder

Name of Authorized Signatory

Company Name

Continuous

PBG format:

MODEL FORM OF BANK GUARANTEE
(In lieu of Security Deposit)

Guarantee No.....

Place.....

Date.....

To

In consideration of North Eastern Electric Power Corporation Ltd. (Herein-after called 'the Corporation') having agreed to exempt.....

(Name and address of the Contractor)

(herein-after called the said Contractor) from the demand, under the terms and conditions of purchase order no.....dtd issued by the North Eastern Electric Power Corporation Ltd., for the supply of ----- at AGBP NEEPCO Ltd. (herein-after called the said purchase order) of security deposit for the due fulfillment by the said Contractor of the terms and conditions contained in the said purchase order, on production of a Bank Guarantee for Rs..... (Rupees.....) only against any loss or damage caused to or suffered by the Corporation by reason of any breach by the said contractor of any of the terms or conditions contained in the said purchase order.

Wedo hereby undertake to pay the amounts due and

(Name & address of bank)

payable under the Guarantee without any demur, reservation, contest, recourse or protest and without any reference to the Contractor and without waiting for outcome/award of any dispute, litigation whatsoever in this regard pending before any court, Tribunal, Arbitrator etc. merely on a demand from the Corporation stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Corporation by reason of breach by the said contractor of any of the terms or conditions contained in the said purchase order or by reason of the Contractor's failure to perform the said agreement. Any such demand made on the Bank shall be conclusive as regards the due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs(Rupees) only.

We undertaken to pay the Corporation any

(Name & address of the bank)

dispute or disputes raised by the Contractor in any suit or proceeding pending before any court of Tribunal relating there to our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment there under and the contractor shall have no claim against us making such payment.

We..... (Name & address of the Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said purchase order and that it shall continue to be enforceable till all the dues of the North Eastern Electric Power Corporation Ltd., under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till the terms and conditions of the said agreement have been fully and properly carried out by the said contractor and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the(date) we shall be discharged from all liability under this guarantee thereafter.

We..... (Name & address of the Bank) further agree that the North Eastern Electric Power Corporation Limited shall have the fullest liberty without our consent and without affecting in any manner obligation hereunder to vary any of the terms and conditions of the said purchase Order/ Agreement or to extend time of performance by the said

contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Corporation against the said contractor and to forebear or enforce any of the terms and conditions relating to the said purchase Order and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor or for any forbearance, act or omission on the part of the Corporation or any indulging shown by the North Eastern Electric Power Corporation Ltd. to the said contractor or by any such matter or thing whatsoever which relieving us.

This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.

This guarantee shall come into force immediately and continue in force and remain valid till six months after the completion of supply under the said purchase Order which according to the said agreement should be six months from the probable date of completion i.e.....(date of completion) as per the contract or any extension of time granted subsequently.

This guarantee shall be extended from time to time as may be desired by the North Eastern Electric Power Corporation Ltd., who is the beneficiary under this guarantee and in the event if the contractor fails to comply such extension within the validity period, this shall be treated as a claim by the Corporation on the Bank.

We,(Names and address of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the North Eastern Electric Power Corporation Ltd. in writing.

Dated..... of

WITNESS

.....
Signature

.....
Signature

.....
Name

.....
Name

.....
Authority as per Power of Attorney
No. Dt.

.....
Official Address

.....
Bank's Rubber Stamp

* In case of Bank Guarantee issued by a Foreign Bank, the same shall be confirmed by any of the Nationalized Bank in India.

Note: This is system generated file. No signature is required. Print out of this document is not valid for payment/ transaction purpose.

नोट: यह सिस्टम जनरेटेड फाइल है। कोई हस्ताक्षर की आवश्यकता नहीं है। इस दस्तावेज़ का प्रिंट आउट भुगतान/लेनदेन उद्देश्य के लिए मान्य नहीं है।

Sl. No 5

KIRLOSKAR BROTHERS LIMITED

A Kirloskar Group Company

KBL REF: KBL/ESD/NEEPCO-AGBP/ACW/21-12-1A

Enriching Lives

Date: 20/12/2021

To

The DGM (E/M)

Steam Turbine & Aux. Dhm

Assam Gas Based Power Plant

NEEPCO LTD, Bokuloni

Dibrugarh, Assam -786191

Kind attn: Mr. Anupam S Baruah

Sub: - Techno-Commercial Offer for supply of Two nos. ACW Pump

Your RFQ No. : Enquiry over email dated 17th November 2021

Dear Sir,

We acknowledge with thanks the receipt of your above mentioned enquiry. We are pleased to submit herewith 'Our Proposal' in original as required by you as under: -

KBL's capability to meet the Power Sector's, total fluid handling requirements is reflected in the fact that it offers a wide range of pumps and valves including specialty pumps for a variety of applications. As a result of its pronounced competitive edge in terms of skilled engineering manpower, technological strengths and infrastructure, KBL has earned an enviable position of being an internationally acclaimed pump manufacturer.

KBL also has one of the finest testing facilities at the Hydraulic Research Centre at Kirloskarvadi Works. The testing facilities have been further upgraded and modernized with the technical assistance from BHRA, U.K. With this, KBL is now proud to have one of the best Test Laboratories in Asia.

We are pleased to submit herewith "Our techno-commercial" offer.

We trust you will find the above in line with your requirement & favor us with your valued order at the earliest. Should you need any further information / clarification, please feel free to contact us.

Thanking you and assuring of our best services always, we remain,

Yours faithfully,

For KIRLOSKAR BROTHERS LIMITED



Deep Ganguly

Manager Engineering Services

Email ID: deep.ganguly@kbl.co.in

Mobile no: +91 9875377397



Regional Office: C/o WAFIS Working Spaces, Godrej Wateride,
Office No. 1207 Tower No 2 12th Floor, Block-DF, Sector -4, Salt Lake -Kolkata West Bengal - 700091.
Registered Office & Global Headquarters: "Yamuna", Survey No. 96(3 to 7), Plot No. 3,
Baner, Pune - 411 045, Maharashtra, India.
Email: marketing@kbl.co.in Website: www.kirloskarpumps.com
CIN No.: L29113PH1920PLC000670

**KIRLOSKAR BROTHERS LIMITED**

A Kirloskar Group Company

KBL REF: KBL/ESD/NEEPCO-AGBP/ACW/21-12-1A

Date: 20/12/2021

To
The DGM (E/M)
 Steam Turbine & Aux. Divn
 Assam Gas Based Power Plant
 NEEPCO LTD, Bokuloni
 Dibrugarh, Assam -786191

Kind attn: Mr. Anupam S Baruah

Sub: - Techno-Commercial Offer for supply of Two nos. ACW Pump

Package	: ACW PUMP
Client	: Assam Gas Based Power Plant, NEEPCO Ltd.; Bokuloni
Customer Enq. no	: Enquiry over email dated 17 th November 2021

TECHNICAL DATA SHEET

TECHNICAL DATASHEET		
SL. NO.	DESCRIPTION	
	PUMP TYPE	VERTICAL TURBINE
1	MAKE	KIRLOSKAR BROTHERS LTD.
2	MODEL & SIZE, stage	BHR 35-18 ^o ; 2 stage
3	TYPE	VERTICAL TURBINE, SELF WATER LUBRICATION
4	PUMP QUANTITY	2
5	FLUID / SP. GRAVITY	CLEAR WATER / 1.0
6	CAPACITY, M ³ / HR	400
7	BOWL HEAD (MTR)	40.472
8	PUMP SHUTOFF HEAD (MTR)	68.4 MWC (approx.)
9	PUMP SHUTOFF POWER (KW)	46 KW
10	EFFICIENCY AT RATED FLOW	85%
11	PUMP INPUT IN KW	51.86 KW
12	NO. OF STAGES	2
13	CASING MOUNTING	VERTICAL
14	TYPE OF SHAFT SEALING	Gland Packed
15	DEL. Flange Drilling Std	ANSI B16.5 CL 150



KIRLOSKAR BROTHERS LIMITED

A Kirloskar Group Company

Enriching Lives

16	MATERIAL OF CONSTRUCTION	
i	BOWL / SUCTION BELL	2.5% NI CI FG 260
ii	IMPELLER	ST ST ASTM A351/ 351M- CF8M
iii	LINE SHAFT	ST ST ASTM A276-410 ANLD
iv	IMPELLER SHAFT	ST ST ASTM A276-410 ANLD
v	SHAFT SLEEVE	ST ST ASTM A276-410 (250-280 BHN) ANLD.
vi	SHAFT COUPLING	ST ST ASTM A276-410 ANLD
vii	SOLE PLATE	MS IS 2062-Fe 410W A
viii	COLUMN PIPE	MS IS 3589-Fe 410W A
ix	DISCHARGE TEE	MS IS 2062-Fe 410W A
x	COUPLING BETWEEN PUMP & MOTOR	CI IS 210-FG 260
xi	Strainer	MS IS 1977 Fe-310 (Galv)
xii	Others	All other MOC as per our previous supplied pump (KBL OA No -C04615A511)
17	Existing MOTOR Rating	75KW/4pole / 1484 RPM/TEFC Vertical Flange Mounted
18	Scope of Supply	Complete VT Pump assembly with Gland Packing arrangement
19	ACCESSORIES:	
i)	Strainer	YES
ii)	Sole plate	AS PER EXISTING FOUNDATION
20	INSPECTION / TESTING DETAILS :	
i)	Inspection Scope	AS PER OUR QAP ENCLOSED
ii)	Inspection & Approval Agency	NEEPCO
iii)	Performance Testing STD.	As per HIS
iv)	Performance Testing with Lab /Job Motor	LAB MOTOR
v)	QAP approval involved (Yes / No)	YES
vi)	Client Witnessing performance testing (Yes /No)	YES, As per approved QAP

**KIRLOSKAR BROTHERS LIMITED**

A Kirloskar Group Company

KBL REF: KBL/ESD/NEEPCO-AGBP/ACW/21-12-1A

Date: 20/12/2021

To
The DGM (E/M)
 Steam Turbine & Aux. Divn
 Assam Gas Based Power Plant
 NEEPCO LTD, Bokuloni
 Dibrugarh, Assam -786191

Kind attn: Mr. Anupam S Baruah

Sub: Techno-Commercial Offer for supply of Two nos. ACW Pump

Package	: ACW PUMP
Client	: Assam Gas Based Power Plant, NEEPCO Ltd.; Bokuloni
Customer Enq. no	: Enquiry over email dated 17 th November 2021

Scope of Supply**1. Scope of Supply of Pumps and Motor**

2 nos. of ACW Vertical Pumps (Model : BHR 35- 18 ", 2 stg).

Following items are included:

- Vertical Turbine pumps (BHR 35- 18 ", 2 stg)
- Pump sole plate with anchoring bolts.

1) Terminal Points: Pump delivery flange.

2. Exclusion:

- 1) All type of Civil work
- 2) Storage
- 3) Loading / Unloading at Site.



KIRLOSKAR BROTHERS LIMITED
A Kirloskar Group Company

Enriching Lives

Price Bid (Supply) :

Sr. No.	Description	Quantity	Unit Price (INR), Ex-Works, Kirloskarvadi	Total Price (INR), Ex-Works, Kirloskarvadi
1	ACW (VT Pump) BHR 35-18 °, 2 sig	2 Nos	23,85,700/-	47,71,400/-
Total in Words			Rupees Forty Seven Lakhs Seventy One Thousand Four Hundred only	

KBL REF: KBL/ESD/NEEPCO-AGBP/ACW/21-12-1A

Date: 20/12/2021

Commercial terms & conditions

PRICE: The prices quoted are Ex- Works. Any kind of taxes, Freight & Insurance etc. will be charged extra as applicable at the time of dispatch of the pumps.

Packing & Forwarding: Extra @2% on basic Price.

G.S.T: Extra as applicable. Present Rate (GST) is @ 12%.

INSURANCE: 1% extra on basic value or to be borne by you.

TRANSPORTATION: Excluded from our quoted price. It will be charged extra at actual.

DELIVERY COMMITMENT: The delivery of the equipment's will be within 8 months from the date of receipt of approval of drawings and documents & manufacturing clearance whichever is later. Date of dispatch of material from KBL works shall be considered as date of delivery.

INSPECTION: The items manufactured are fully inspected with vigorous stage inspection by our independent, full-fledged inspection Department. However, if you desire the inspection to be carried out by your inspectors, it should be carried out at our works before dispatch which shall be finished within 4 days (maximum) from the date of intimation from our end.

FORCE MAJEURE: Force Majeure consists of pandemic, war, riots, commotion, disturbances, strikes, lockouts, shortage of labour, famine, pestilence or epidemic sickness, earthquakes, fires, storms, floods, explosions, breakdown of Plant and Machinery from whatsoever cause. Failure of electricity or short supply of electricity, failure in obtaining essential raw materials or imported components, if any, and any other cause of whatsoever nature and description beyond our control or power.



Regional Office: C6 WAFIS Working Spaces, Godrej Waterside,
Office No. 1207 Tower No 2, 12th Floor, Block C9 Sector V, Salt Lake - Kolkata, West Bengal - 700091
Registered Office & Global Headquarters: "Yamuna", Survey No. 98(3-107), Plot No. 8,
Banel, Pune - 411 045, Maharashtra, India.
Email: marketing@kbl.co.in Website: www.kirloskarpumps.com
CIN No.: L29113PN1920PLC000670



Enriching Lives

KIRLOSKAR BROTHERS LIMITED

A Kirloskar Group Company

TERMS OF PAYMENT: We propose the following payment terms.

SUPPLY: 100% payment of basic order value alongside 100% GST & freight shall be released within 30 days against receipt of material at site.

Warranty: 12 Months from the date of installation or 18 months from the date of dispatch of materials whichever is earlier against manufacturing defect only. Our liability in respect of any defect in/ or failure of goods supplied, or any loss attributed here to, is limited to making good by replacement/repair, defects which under proper use appear herein and arise solely from faulty.

VALIDITY: Our offer shall remain valid for your acceptance up-to 45 (from the date of our offer) days after which it will be subject to our written confirmation.

Note : In the event of placing order please place the same to our authorize sales & service channel partner M/S Debson Pumps Private Limited, RCC Building , 1st Floor , Dr. B. Baruah Road . Opp. Urban Health Centre , Ulubari, Guwahati – 781007, (GSTN -18AABCD5639A1ZY); Corporate office : Merlin Building , Ground Floor, 1, Abdul Hamid Street (formerly British Indian Street) , Kolkata - 700069, West Bengal, India ,CIN NO: U29130WB1995PTC074229; who shall supply said VT pumps on our behalf.

Thanking you, assuring you our best service always.

Yours sincerely,

For KIRLOSKAR BROTHERS LTD



Deep Ganguly

Manager Engineering Services

Kolkata

Mobile no. +91 9875377397

Email ID: deep.ganguly@kbl.co.in

Bharat Heavy Electricals Limited

[A Government of India Undertaking]

Spares & Service Business Group - Eastern Region

DJ-9/1, 3rd Floor, Karunamayee, Sector-II

Salt Lake City, Kolkata - 700 091

☎: (033) 23211686, 23212391, , 2321-1574, Fax: (033) 2321-6289, 2321-1960

E Mail:satya@bhel.in



REF: PS/SSBG-KOL/ SB22K0471/HYU/GKD/0110

DTD: 12/10/2022

Mr. Anupam S Baruah,
DGM (E/M), ST & AUX.
AGBPS NEEPCO, Bokulani,
Dibrugarh, Assam: 786 191

Dear Sir,

SUB: BUDGETARY OFFER FOR THE SUPPLY OF SUPPLY OF BOILER FEED PUMP AT NEEPCO BOKULANI

REF.NO.: Email from Mr. Anupam Baruah DTD: 02/09/2022

With reference to your above Enquiry, we are pleased to submit our BUDGETARY OFFER FOR THE SUPPLY OF SUPPLY OF BOILER FEED PUMP AT NEEPCO BOKULANI as per details in attached **Annexure** and subject to the following terms and conditions:-

PRICES:

Our quoted prices are firm, the prices are Ex-works BHEL, HYDERABAD (GST NO: 36AAACB4146P1ZG, State: Telangana.) inclusive of packing & forwarding charges, but exclusive of GST, Freight, Insurance and all other taxes which will be applicable at the time of dispatch and shall be to customer accounts.

PRICE VALIDITY:

Our offer is kept valid for placement of order up to **10/11/2022** unless previously withdrawn. The rates quoted are in consideration of the Items/Quantities called for at the enquiry and hence wherever the order item quantities / order value are lower than the offer, specific confirmation on the validity of the prices shall have to be taken from BHEL before the issuance of Letter of Intent / purchase order by CUSTOMER.

TERMS OF PAYMENT:

- 10% interest free advance along with P.O.
- Balance 90% with applicable GST against despatch document through Bank with provision for part payment against part dispatches

DESPATCH: The materials shall be dispatched by Road on FREIGHT PREPAID DOOR DELIVERY BASIS through BHEL-approved transporter. NEEPCO/AGBPP shall have to pay the same @ 2% on the material value on pro-rata basis against claim in the invoice without insisting for any documentary proof.

TRANSIT INSURANCE:

Transit Insurance of the material shall be arranged by purchaser. We shall however furnish the brief despatch particulars immediately after the despatch to your underwriter/consignee

REPLACEMENT OF GOODS BROKEN OR DAMAGED IN TRANSIT:

In the event of goods broken or damaged in transit then CUSTOMER will have to recover such losses from the insurance company since the transit insurance is in CUSTOMER's Scope. The payment of damaged or broken goods should not be withheld till the replacement/rectification is made. It should be released as per our payment terms only.

Claims if any on account of BHEL must be made within 15 days from the date of receipt of the consignment, else the responsibility on the part of BHEL ceases.

Damaged or broken goods shall be replaced/rectified by BHEL at an extra cost and against a separate Purchase Order only from CUSTOMER.

Return of Goods mutually agreed between BHEL and CUSTOMER for Replacement/Rectification by BHEL shall have to be booked to the Consignor on Freight Prepaid and Door Delivery basis together with the Original Transporter Copy of Excise Invoice of the earlier supplies for availing the Modvat Benefits or reversal of the taxes/Duties paid, else the payment of Taxes/Duties shall have to be made twice by the CUSTOMER. The Return of goods shall be done with the consent of BHEL and within 45 days from the date of receipt of the consignment. BHEL shall not own the responsibility in the event of any delay in this regard.

DELIVERY: The delivery period of **12 Months (Ex-works our HYDERABAD Factory / sub-suppliers works)** as indicated above is in good faith & shall be reckoned from the date of receipt of Technically and Commercially clear order or receipt of advance, whichever is later and is subject to 'FORCE MAJEURE' condition. Delivery will be made in one or more consignments following our normal commercial practice, and each dispatch would constitute a sale.

LEVY OF PENALTY / LIQUIDATED DAMAGES:

BHEL do not agree/accept for levy of Penalty & Liquidated Damages on account of delay in delivery or premature failure, wear and tear of components. This clause is not applicable/ acceptable in case of supply of O&M Spares.

Goods and Service Tax (GST): Will be extra as applicable at the time of supply. Present rate ISGT is 18%. HSN Code. 84139120.

OTHER TAXES & DUTIES: The price quoted is exclusive of all Taxes and Duties and shall be applicable and extra if leviable by Central & State Government and other local authorities from time to time.

MATERIAL RECEIPT, ACCOUNTING & STORAGE:

BHEL expects that the CUSTOMER to raise the documents towards Material Receipt, Inspection & Accounting within a period of 15 days from the date of receipt of each consignment. BHEL shall not own the responsibility on the delayed (Beyond 15 days after the receipt of Goods) accounting of the consignments. The consignments booked under Transporters Go-down Delivery basis shall have to be collected within 3 days from the date of receiving the information from the Transporter about the arrival of the consignment. No claim on account of shortages, damages & loss of material shall be made on BHEL, since the Transporter had booked the goods in good condition at the time of booking.

All materials supplied shall have to be received, inspected, accounted and stored in covered shed only. BHEL shall not own any responsibility in event of open storage and subsequent damages if any on the supplied goods.

STANDARD QUALITY PROCEDURES:

The BHEL shall follow their own standard Quality procedures and Technical Delivery Conditions wherever available during the Manufacturing, Inspection and Testing of the products.

INSPECTION:

BHEL shall follow their own standard quality procedures and technical delivery conditions wherever available during manufacturing, inspection and testing of the products. The material shall be dispatched based on BHEL inspection. However, for critical items, Purchaser may witness the final inspection before dispatch.

SUPPLY FROM BHEL APPROVED VENDORS ONLY

Kindly note that the offered items shall be procured/supplied from BHEL approved vendors only and no PURCHASER approved vendors have been envisaged.

SUBMISSION OF DOCUMENTS:

BHEL being a PSU, we do not submit EMD, SD, PBG for supply of O&M spares.

WARRANTY / GENERAL LIABILITY :

- A) The warranty period of all the goods shall be 18 months from the date of supply or 12 months from the date of commissioning or standard warranty of the product offered by the Supplier if higher.
- B) Any replacement / repairs required to be made under the provisions of the above guarantee will be carried out at our option either at our works or at site depending on the facilities available at site.
- C) In case of goods not of our manufacture, you are entitled only to such benefits as we may receive under any guarantee given to us in respect thereto.

FORCE MAJEURE: We shall not be liable for loss or damage resulting from any delay or failure to make shipment within time specified for all or any part of the equipment due to Acts of God, war declared, or undeclared, acts of public Enemy, riots civil commotion, invasion, insurrection, sabotage, acts of restraint of Governments federal, state or municipal action or regulation, delay in release of foreign exchange and for import license by Government embargoes, strikes or other labour trouble, fire, flood, hurricanes, accidents, epidemics, quarantine restrictions, delays or destruction's or sinking of carriers, inability to obtain dock, lighterage or loading facilities, damage to or destruction in whole or in part of the equipment or manufacturing plant lock of, or inability to obtain raw materials, labour, fuel or supplies for any reason including defaults of suppliers or any failure on the part of the purchaser or his representatives to approve or comment on drawings or other technical document within the period of time specified by us or any other causes contingencies or circumstances not subject to our control whether of a similar or dissimilar nature which prevents the manufacture or delivery of the equipment. Any such causes or delay even though existing on the date of the contract or on the date of start of manufacture, shall extend the time of our performance by the length of delays occasioned thereby, including delay reasonably incident to the resumption of normal production even though such case may occur after performance of our obligation has been delayed for the other cause.

CANCELLATION OF P.O.: Cancellation of P.O. is not acceptable.

CONSIGNEE / PAYING AUTHORITY DETAIL : Full address of Consignee & Paying authority with phone & fax no. is to be mentioned for correct delivery of documents.

TIN No. : TIN no. must be given by purchaser in P.O.

GENERAL TERMS & CONDITIONS :In addition to the terms and conditions mentioned above our offer is also subject to General Terms & Conditions, incorporated in the enclosed form SSE-ID.

CONCLUSION : Wherever the order item quantities/order value are significantly lower than the offer, specific confirmation on the validity of the prices may please be taken from us before the placement of the purchase order. We might have taken some deviations from the enquiry terms and conditions. Customer is requested to take a note of these while placing the purchase order. Customer is requested to clearly indicate in the purchase order, the statutory & regulatory requirements that govern the items quoted against their enquiry. We would be pleased furnish clarifications, if any, on this offer.

Thanking you and assuring our best services always,

Yours faithfully,
for and on behalf of BHEL.



(Satya Narayan Das)
SSBG/KOLKATA

ANNEXURE

PRICE SCHEDULE

REF: PS/SSBG-KOL/HYU/GKD/0110

DTD: 11/10/2022

Offer Sl.no	Enq. Sl.No	Item description	Unit	Qty	Unit rate	Total Price	Remarks
		NEEPCO Bokuloni					
1	1	Supply of Boiler Feed pump without motor, pump model FRH-27, 7 (seven) stage impellers + one dummy with designed balance drum and balance piston for thrust compensation	NO	2	25735280	51470560	Scope is limited only supply. Supervision and installation are not in current offer scope.
					Total(Rs)	5,14,70,560/-	

(Rupees Five Crore Fourteen Lac Seventy Thousand Five Hundred Sixty Only)


(Satya Narayan Das)
SSBG/KOLKATA

GENERAL TERMS AND CONDITIONS OF SALE
OF SPARES AND EQUIPMENT**1. ACCEPTANCE**

The acceptance of this tender/ offer must be accompanied by sufficient information to enable us to proceed with order forthwith, otherwise, we are to be at liberty to amend the tender/ offer prices to cover any increase in cost which has taken place after acceptance. Any samples submitted must be returned to us, within one month from the date of receipt, with carriage paid for.

2. LIMITS CONTRACTS

This tender/ offer includes only such goods accessories and work as are specified herein.

3. DRAWING ETC.

Normally we are not submitting any drawing for spares supply. It at all given all descriptive and shipping specification, drawing and particulars of weight and dimensions that may have been furnished are approximate only, and the description and illustrations contained in our catalogues, price lists, and other advertisement matter are intended merely to present a general idea of the goods described therein and none of these shall form part of the contract. No manufacturing drawing will be submitted.

4. TESTS

The goods are carefully inspected and where applicable, submitted to standard test at the manufacture's works before dispatch. If special test or tests (mutually agreed at the time of offer / order) in the presence of your representative are required, these must be made at the manufacturer's works and will be charged for extra and will be cleared there itself by Customer's Inspector, and in the event of any delay on Customer's part in attending such tests after seven days notice that we are ready, the tests will proceed in his absence, and shall be deemed to have been made in their presence and will be dispatched .

5. EXTRA COST

In the event of the suspension of the work by your instruction or lack of instruction, the contract price shall be increased to cover any extra expense thereby incurred by us.

6. STATUTORY OBLIGATION

If the cost of the performance of the contract to BHEL shall be increased or reduced by reason of the making in India or elsewhere of any law or any order / regulation, having the force of the law after the date of our tender, the amount of such an increase or reduction shall be added to or deducted from the price as the case may be.

7. ADJUSTMENT OF PURCHASER'S DUES FROM BHEL BILLS

We do not accept the dues of purchaser to be adjusted from the bills relating to this offer.

8. ARBITRATION

In the event of any question or dispute arising under these conditions or any special conditions of contract or in connection with this contract, the same shall be referred to the award of a committee consisting of an arbitrator to be nominated by the Purchaser and an arbitrator to be nominated by BHEL, and in case of the said arbitrators not agreeing, then to the award of an Umpire to be appointed by the said arbitrators in writing before proceeding on the reference, and the decision of the arbitrators or in the event of their not agreeing, of the provisions of the Indian Arbitration Act 1996 and of the Rule thereunder and any statutory modification thereof shall be deemed to apply to and be incorporated in this contract.

Upon ever and any such reference, the assessment of the cost of, and incidental to, the reference and award respectively shall be at the discretion of the committee of arbitrators, or in the event of their not agreeing, of the Umpire appointed by them.

Work under the contract shall, if reasonably possible, continue during the arbitration proceedings, and payment due or payable by the purchaser shall not be with-held on account of such proceedings.

9. LEGAL

The contract shall in all respect be construed and operated as an Indian Contract in conformity with Indian Law.



Bharat Heavy Electricals Limited

[A Government of India Undertaking]

Spares & Service Business Group - Eastern Region

DJ-9/1, 3rd Floor, Karunamayee, Sector-II

Salt Lake City, Kolkata - 700 091

☎: (033) 23211686, 23212391, , 2321-1574, Fax: (033) 2321-6289, 2321-1960

E Mail:satya@bhel.in



REF: PS/SSBG-KOL/HYU/SB22K0383/GKD/0109

DTD: 10/10/2022

Mr. Anupam S Baruah,
DGM (E/M), ST & AUX.
AGBPS NEEPCO, Bokulani,
Dibrugarh, Assam: 786 191

Dear Sir,

SUB: OFFER FOR THE SUPPLY OF HEAT EXCHANGER SPARES AT NEEPCO KATHALGURI

REF.NO.: Email from Mr. Anupam Baruah DTD: 29.08.2022

With reference to your above Enquiry, we are pleased to submit our BUDGETARY OFFER FOR THE SUPPLY OF HEAT EXCHANGER SPARES AT NEEPCO KATHALGURI as per details in attached **Annexure** and subject to the following terms and conditions:-

PRICES:

Our quoted prices are firm, the prices are Ex-works BHEL, HYDERABAD (GST NO: 36AAACB4146P1ZG, State: Telangana.) inclusive of packing & forwarding charges, but exclusive of GST, Freight, Insurance and all other taxes which will be applicable at the time of dispatch and shall be to customer accounts.

PRICE VALIDITY:

Our offer is kept valid for placement of order up to **09/11/2022** unless previously withdrawn. The rates quoted are in consideration of the Items/Quantities called for at the enquiry and hence wherever the order item quantities / order value are lower than the offer, specific confirmation on the validity of the prices shall have to be taken from BHEL before the issuance of Letter of Intent / purchase order by CUSTOMER.

TERMS OF PAYMENT:

- 10% interest free advance along with P.O.
- Balance 90% with applicable GST against despatch document through Bank with provision for part payment against part dispatches

DESPATCH: The materials shall be dispatched by Road on FREIGHT PREPAID DOOR DELIVERY BASIS through BHEL-approved transporter. NEEPCO/AGBPP shall have to pay the same @ 2% on the material value on pro-rata basis against claim in the invoice without insisting for any documentary proof.

TRANSIT INSURANCE:

Transit Insurance of the material shall be arranged by purchaser. We shall however furnish the brief despatch particulars immediately after the despatch to your underwriter/consignee

REPLACEMENT OF GOODS BROKEN OR DAMAGED IN TRANSIT:

In the event of goods broken or damaged in transit then CUSTOMER will have to recover such losses from the insurance company since the transit insurance is in CUSTOMER's Scope. The payment of damaged or broken goods should not be withheld till the replacement/rectification is made. It should be released as per our payment terms only.

Claims if any on account of BHEL must be made within 15 days from the date of receipt of the consignment, else the responsibility on the part of BHEL ceases.

Damaged or broken goods shall be replaced/rectified by BHEL at an extra cost and against a separate Purchase Order only from CUSTOMER.

Return of Goods mutually agreed between BHEL and CUSTOMER for Replacement/Rectification by BHEL shall have to be booked to the Consignor on Freight Prepaid and Door Delivery basis together with the Original Transporter Copy of Excise Invoice of the earlier supplies for availing the Modvat Benefits or reversal of the taxes/Duties paid, else the payment of Taxes/Duties shall have to be made twice by the CUSTOMER. The Return of goods shall be done with the consent of BHEL and within 45 days from the date of receipt of the consignment. BHEL shall not own the responsibility in the event of any delay in this regard.

DELIVERY: The delivery period of **12 Months (Ex-works our HYDERABAD Factory / sub-suppliers works)** as indicated above is in good faith & shall be reckoned from the date of receipt of Technically and Commercially clear order or receipt of advance, whichever is later and is subject to 'FORCE MAJEURE' condition. Delivery will be made in one or more consignments following our normal commercial practice, and each dispatch would constitute a sale.

LEVY OF PENALTY / LIQUIDATED DAMAGES:

BHEL do not agree/accept for levy of Penalty & Liquidated Damages on account of delay in delivery or premature failure, wear and tear of components. This clause is not applicable/ acceptable in case of supply of O&M Spares.

Goods and Service Tax (GST): Will be extra as applicable at the time of supply. Present rate ISGT is 18%. HSN Code. 84199090.

OTHER TAXES & DUTIES: The price quoted is exclusive of all Taxes and Duties and shall be applicable and extra if leviable by Central & State Government and other local authorities from time to time.

MATERIAL RECEIPT, ACCOUNTING & STORAGE:

BHEL expects that the CUSTOMER to raise the documents towards Material Receipt, Inspection & Accounting within a period of 15 days from the date of receipt of each consignment. BHEL shall not own the responsibility on the delayed (Beyond 15 days after the receipt of Goods) accounting of the consignments. The consignments booked under Transporters Go-down Delivery basis shall have to be collected within 3 days from the date of receiving the information from the Transporter about the arrival of the consignment. No claim on account of shortages, damages & loss of material shall be made on BHEL, since the Transporter had booked the goods in good condition at the time of booking.

All materials supplied shall have to be received, inspected, accounted and stored in covered shed only. BHEL shall not own any responsibility in event of open storage and subsequent damages if any on the supplied goods.

STANDARD QUALITY PROCEDURES:

The BHEL shall follow their own standard Quality procedures and Technical Delivery Conditions wherever available during the Manufacturing, Inspection and Testing of the products.

INSPECTION:

BHEL shall follow their own standard quality procedures and technical delivery conditions wherever available during manufacturing, inspection and testing of the products. The material shall be dispatched based on BHEL inspection. However, for critical items, Purchaser may witness the final inspection before dispatch.

SUPPLY FROM BHEL APPROVED VENDORS ONLY

Kindly note that the offered items shall be procured/supplied from BHEL approved vendors only and no PURCHASER approved vendors have been envisaged.

SUBMISSION OF DOCUMENTS:

BHEL being a PSU, we do not submit EMD, SD, PBG for supply of O&M spares.

WARRANTY / GENERAL LIABILITY :

- A) The warranty period of all the goods shall be 18 months from the date of supply or 12 months from the date of commissioning or standard warranty of the product offered by the Supplier if higher.
- B) Any replacement / repairs required to be made under the provisions of the above guarantee will be carried out at our option either at our works or at site depending on the facilities available at site.
- C) In case of goods not of our manufacture, you are entitled only to such benefits as we may receive under any guarantee given to us in respect thereto.

FORCE MAJEURE: We shall not be liable for loss or damage resulting from any delay or failure to make shipment within time specified for all or any part of the equipment due to Acts of God, war declared, or undeclared, acts of public Enemy, riots civil commotion, invasion, insurrection, sabotage, acts of restraint of Governments federal, state or municipal action or regulation, delay in release of foreign exchange and for import license by Government embargoes, strikes or other labour trouble, fire, flood, hurricanes, accidents, epidemics, quarantine restrictions, delays or destruction's or sinking of carriers, inability to obtain dock, lighterage or loading facilities, damage to or destruction in whole or in part of the equipment or manufacturing plant lock of, or inability to obtain raw materials, labour, fuel or supplies for any reason including defaults of suppliers or any failure on the part of the purchaser or his representatives to approve or comment on drawings or other technical document within the period of time specified by us or any other causes contingencies or circumstances not subject to our control whether of a similar or dissimilar nature which prevents the manufacture or delivery of the equipment. Any such causes or delay even though existing on the date of the contract or on the date of start of manufacture, shall extend the time of our performance by the length of delays occasioned thereby, including delay reasonably incident to the resumption of normal production even though such case may occur after performance of our obligation has been delayed for the other cause.

CANCELLATION OF P.O.: Cancellation of P.O. is not acceptable.

CONSIGNEE / PAYING AUTHORITY DETAIL : Full address of Consignee & Paying authority with phone & fax no. is to be mentioned for correct delivery of documents.

TIN No. : TIN no. must be given by purchaser in P.O.

GENERAL TERMS & CONDITIONS :In addition to the terms and conditions mentioned above our offer is also subject to General Terms & Conditions, incorporated in the enclosed form SSE-ID.

CONCLUSION : Wherever the order item quantities/order value are significantly lower than the offer, specific confirmation on the validity of the prices may please be taken from us before the placement of the purchase order. We might have taken some deviations from the enquiry terms and conditions. Customer is requested to take a note of these while placing the purchase order. Customer is requested to clearly indicate in the purchase order, the statutory & regulatory requirements that govern the items quoted against their enquiry. We would be pleased furnish clarifications, if any, on this offer.

Thanking you and assuring our best services always,

Yours faithfully,
for and on behalf of BHEL.



(Satya Narayan Das)
SSBG/KOLKATA

ANNEXURE

PRICE SCHEDULE

REF: PS/SSBG-KOL/HYU/SB22K0383/GKD/0109

DTD: 10/10/2022

ENQ SN	OFR SN	Item Desc.	QTY	UoM	Unit Price	Total Price
1	1	SUPPLY OF ST OIL COOLER TUBE BUNDLE WITH DUMMY SHELL (1x100%)	6	SET	13061950	78371700
2	2	SUPPLY OF GENERATOR COOLER ELEMENTS (1set = 8 ELEMENTS)	1	SET	16274500	16274500
					Total(Rs)	9,46,46,200/-

(Rupees Nine Crore Forty Six Lac Forty Six Thousand Two Hundred Only)



(Satya Narayan Das)
SSBG/KOLKATA

GENERAL TERMS AND CONDITIONS OF SALE
OF SPARES AND EQUIPMENT**1. ACCEPTANCE**

The acceptance of this tender/ offer must be accompanied by sufficient information to enable us to proceed with order forthwith, otherwise, we are to be at liberty to amend the tender/ offer prices to cover any increase in cost which has taken place after acceptance. Any samples submitted must be returned to us, within one month from the date of receipt, with carriage paid for.

2. LIMITS CONTRACTS

This tender/ offer includes only such goods accessories and work as are specified herein.

3. DRAWING ETC.

Normally we are not submitting any drawing for spares supply. It at all given all descriptive and shipping specification, drawing and particulars of weight and dimensions that may have been furnished are approximate only, and the description and illustrations contained in our catalogues, price lists, and other advertisement matter are intended merely to present a general idea of the goods described therein and none of these shall form part of the contract. No manufacturing drawing will be submitted.

4. TESTS

The goods are carefully inspected and where applicable, submitted to standard test at the manufacture's works before dispatch. If special test or tests (mutually agreed at the time of offer / order) in the presence of your representative are required, these must be made at the manufacturer's works and will be charged for extra and will be cleared there itself by Customer's Inspector, and in the event of any delay on Customer's part in attending such tests after seven days notice that we are ready, the tests will proceed in his absence, and shall be deemed to have been made in their presence and will be dispatched .

5. EXTRA COST

In the event of the suspension of the work by your instruction or lack of instruction, the contract price shall be increased to cover any extra expense thereby incurred by us.

6. STATUTORY OBLIGATION

If the cost of the performance of the contract to BHEL shall be increased or reduced by reason of the making in India or elsewhere of any law or any order / regulation, having the force of the law after the date of our tender, the amount of such an increase or reduction shall be added to or deducted from the price as the case may be.

7. ADJUSTMENT OF PURCHASER'S DUES FROM BHEL BILLS

We do not accept the dues of purchaser to be adjusted from the bills relating to this offer.

8. ARBITRATION

In the event of any question or dispute arising under these conditions or any special conditions of contract or in connection with this contract, the same shall be referred to the award of a committee consisting of an arbitrator to be nominated by the Purchaser and an arbitrator to be nominated by BHEL, and in case of the said arbitrators not agreeing, then to the award of an Umpire to be appointed by the said arbitrators in writing before proceeding on the reference, and the decision of the arbitrators or in the event of their not agreeing, of the provisions of the Indian Arbitration Act 1996 and of the Rule thereunder and any statutory modification thereof shall be deemed to apply to and be incorporated in this contract.

Upon ever and any such reference, the assessment of the cost of, and incidental to, the reference and award respectively shall be at the discretion of the committee of arbitrators, or in the event of their not agreeing, of the Umpire appointed by them.

Work under the contract shall, if reasonably possible, continue during the arbitration proceedings, and payment due or payable by the purchaser shall not be with-held on account of such proceedings.

9. LEGAL

The contract shall in all respect be construed and operated as an Indian Contract in conformity with Indian Law.





नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

असम गैस आधारित शक्ति संयंत्र

बक्लान, जिला-डब्रुगढ़, असम - 786 001

Number

ASSAM GAS BASED POWER PLANT

Dated 24.01.2019

No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/635

To:

M/S Clarke Energy India Private Limited
Shivkiran, Plot No. 180, Lane No. 4, CTS No. 632
Dahanukar Colony, Kothrud, Pune, Maharashtra
India - 411 038

Kind Attn. Mr Punit Garg, Managing Director

Sub NEEPCO: Assam Gas Based Power Plant - Detail purchase order for Renovation & Modernization of Waikhesha make Gas Engine and its Auxiliaries (GBS Unit 4) at AGBP

- Ref:
1. Our enquiry ref NEEPCO/AGBP/SFC/GBS-25(R&M)/2018-19/422 Dated 07/09/2018
 2. Our enquiry ref NEEPCO/AGBP/SFC/GBS-25(R&M)/2018-19/359 Dated 14/09/2018
 3. Your Techno Commercial offer ref VVT/CEI-18/S-Quote-S-1105/R01/164 Dated 05/10/2018
 4. Our letter No. NEEPCO/AGBP/SFC/GBS-25(R&M)/2018-19/418 Dated 15/10/2018
 5. Your letter ref VVT/CEI-18/S-Quote-S-1165/R01/218 Dated 31/0/2018
 6. Our letter No. NEEPCO/AGBP/SFC/GBS-25(R&M)/2018-19/469 Dated 15/11/2018
 7. Your letter ref VVT/CEI-18/S-Quote-S-1185/R01/223 Dated 23/11/2018
 8. MOM held at AGBP, NEEPCO Dated 12/12/2018
 9. Your E-mail Dated 24/12/2018
 10. MOM held at HQ., NEEPCO, Shillong Dated 27/12/2018
 11. Our LOI ref. NEEPCO/AGBP/HOP/2018-19/W-10(A)/577 Dated 31/12/2018
 12. Your E-mail Dated 02/01/2019
 13. Our letter No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/560 Dated 04/01/2019
 14. Your acceptance of LOI vide Ref. SM/CEI-2019/224 dtd 4th January, 2019

Dear Sirs

With reference to above, the North Eastern Electric Power Corporation Ltd is pleased to place this detail supply order for design, manufacturing, testing, packing, dispatch and insurance, supply of plant, equipment, materials and other components for Renovation & Modernization of 4th unit of Gas Engine and its Auxiliaries at Gas Booster Station of Assam Gas Based Power Plant (291 MW), Assam, India as per Schedule of Requirement for supply at ANNEXURE-II and terms and conditions mentioned below.

1.0 Contract Price:

- 1.1 The contract Price for the entire scope of supply shall be Rs. 18,06,08,215.00 (Rupees Eighteen Crores Six Lakhs Eight Thousand Two Hundred Fifteen) only inclusive all applicable taxes & duties (GST) and insurance.
- 1.2 The schedule of Prices against the contract is enclosed at ANNEXURE-I
- 1.3 The contract price shall remain FIRM during the entire period of the Contract and no escalation shall be allowed on the same.

2.0 Completion Schedule / Delivery of materials:

Time is the essence of the contract. Design, manufacture, testing, packing, dispatch and insurance and supply of Plant/ equipment, materials and other components along with the erection, testing & commissioning under the contract shall be completed within 12 (twelve) months from the date of Techno-commercially clear purchase order. The supply shall be completed within such time as per the approved project schedule. The Contractor shall so organize his resources and perform his work as to complete it not later than the date agreed to. The time for completion of his works Contracted for shall be reckoned from the date of issue of the Techno-commercially clear order by the Purchaser.

Signature

3.0 Terms of Payment:

(a) For Supplies

- (i) 10% (ten percent) of the total contract supply price excluding GST for supply shall be paid as non-recoverable down payment on submission of Bank Guarantee of equivalent amount, along with interest at the rate of 1.5% (one and half percent) above BPLR of State Bank of India. (The Proforma of Bank Guarantee enclosed), with validity period up to 90 (ninety) days after the schedule date of successful completion which will be subject to fulfillment of following conditions:
- Unconditional acceptance of the LOI and detailed supply and Work order.
 - Submission of Contract Performance Guarantee and acceptance of thereof.
 - Submission of L1 network indicating therein various key phases of work such as, but not limited to Design/Drawing approval, manufacture, testing, transportation, receipt at final destination site.
 - Billing break up and its approval.
 - Signing of contract agreement.
 - Submission of Drawing submission schedule which shall form a part of the Contract Agreement.

The value of the Bank Guarantee against Down Payment shall be allowed to be reduced every 6(Six) months in proportion to the value of materials received at site. The Bank Guarantee shall automatically become null and void and discharged when the Bank Guarantee amount is reduced to zero. However, validity of Bank Guarantee shall be valid till such time the subsequent Bank Guarantee for reduced amount is received and accepted by the Purchaser.

- (ii) 65% (sixty five percent) of the contract supply price including GST shall be paid on pro rata basis on dispatch on production of the following to the consignee:
- Proof of dispatch (Lorry receipt/railway receipt)
 - Contractor's detailed Invoice.
 - Detailed packing list.
 - Test certificate and/or duly approved inspection certificate, or proof of waiver of inspection / tests.
 - Proof of dispatch clearance certificate.
 - Documentary evidence against payment of Taxes and Duties.

In case the Contractor does not avail the down payment as per Cl (i), the above amount will be 75% instead of 65%.

- (iii) 15% (Fifteen percent) of Contract supply price including GST amount shall be paid on receipt of materials at site in full and good conditions and duly certified by the Engineer-in Charge.
- (iv) Balance 10% (Ten Percent) of the total Contract Price including GST amount shall be paid "Final Acceptance" of the entire plant / equipment. However, on written request of the Contractor, this balance (ten percent) amount may be released against submission of Bank Guarantee for equivalent amount and the BG to be kept valid till "Final Acceptance" of the entire plant/equipment. However, such arrangement shall not relieve the contractor of any of his obligations towards completion of all works as per terms of the Contract.
- (v) All payments shall be released as above subject to finalization of Billing break up. Billing breakup for the supply component shall be finalized before signing of the Contract Agreement and the same shall form a part of the Contract Agreement.

If the contractor fails to complete the supply within the stipulated period as per approved schedule, the purchaser reserves the right to encash the bank guarantee submitted towards down payment. In case of encashment of BG, the 1.5% (one and half percent) interest above BPLR shall also be recoverable.

(b) For Inland Transportation, Transit Insurance and Local Insurance:

Inland Transportation (including port-handling) and Inland Insurance charges shall be paid to the Contractor pro-rata to the value of the equipment received at the site and on production of invoices by the Contractor. However, where equipment wise inland transportation charges shall be made after received of equipments at site and submission of documentary evidences. The aggregate of all such pro-rata payment shall, however, not exceed the total amount quoted by the Contractor and incorporated in the contract. In case the schedule completion period gets extended due to reasons not attributable to the contractor the additional insurance premium for such extended period shall be reimbursed by the purchaser on production of documentary evidences.

4.0 Mode of Payment:

All payments due to the Contractor shall be disbursed under e-payment system. The Engineer in Charge or his authorized representatives will verify and certify the Contractor's invoices, indicating payment instructions (full bank details) for disbursement.

The contractor shall have to furnish the following information for receiving payment against the work through e-payment system:

- | | | |
|----------------------------|---------------------|-----------------------|
| 1. Name of beneficiaries | 2. Name of the Bank | 3. Branch of the Bank |
| 4. IFSC code of the Branch | 4. Account No.: | 6. City/Town: |
| 7. Fax No.: | 5. Telephone No.: | 5. E-mail address |

5.0 Bank Charges:

All bank charges of the Contractor's bank, within or outside India, shall be to Contractor's account.

6.0 Paying Authority:

Paying Authority for payments shall be Head of Finance, Assam Gas Based Power Plant, Bokuloni, Dist. Dibrugarh, Assam. PIN- 786191.

7.0 Withholding Payment:

7.1 The Purchaser may withhold the whole or part of any payment for the supply claimed by the contractor which, in the opinion of the Purchaser, is necessary to protect himself from loss on account of:

- Defective work not remedied or guarantees not met
- Failure by the contractor to make payments for materials, labor employed by him and their PF dues.
- Claims filed against the Contractor
- Loss to another Contractor directly employed by the Purchaser
- Insufficient progress
- Damage or loss of property or equipment of the purchaser.
- Non-return of equipment / materials supplied by the purchaser when the same is due.
- If legal case is instituted by the local Government for default of the Contractor

7.2 When the grounds for withholding payment are removed, payments of the amount due to the contractor shall be made by the purchaser without delay.

8.0 Liquidated damage for delay in supply and completion of the works:

Time is the essence of the Contract. If the performance of the Contract is delayed beyond the time schedules incorporated in the Contract, due to reasons attributable to the Contractor, the Purchaser shall, without prejudice to his right, recover the following damages for breach of the Contract.

- For delay in commissioning of the unit beyond the scheduled dates of the contract, deduct 1/2 % (half percent) of the Total Contract Price of Contract per week or part thereof of delay, subject to a maximum of 10% (Ten Percent) of the Total Contract Price of Contract
- Execute or authorize the execution of the work departmentally or through any other Agency without any notice to the Contractor at the risk and cost of the Contractor. Action against this sub-clause shall be taken after giving notice of 15(Fifteen) days by the Purchaser to the Contractor for any delay in performance of the Contract. The decision of the Purchaser in this regard shall be final and binding upon the Contractor. However, the above action shall be taken without cancelling the Contract in respect of work not yet due for execution or
- Cancel the entire Contract or a portion thereof and, if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest for executing through other agency

D. Where action is taken under Sub-Clause B or Sub-Clause C above for failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. However, the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be at the entire discretion of the Corporation. It shall not be necessary for the purchaser to serve a notice of such execution on the Contractor.

9.0 Force Majeure:

- 9.1 If either Contractor or Purchaser (hereafter called as party) is temporarily unable by reason of Force Majeure or the laws or regulations of India to meet any of its obligations under this Agreement and if such party gives to the other party written notice of the event within 14 (fourteen) days after its occurrence, such obligations of the party as it is unable to perform by reason of the event shall be suspended for as long as the Force Majeure condition continues.
- 9.2 The Purchaser or his authorized representative, on receipt of notification, shall ascertain the facts and extent of the delays and suitably extend the time for completing the work or stage of work where, in his judgment the findings of facts justify an extension. The period of extension of time shall be determined by the Purchaser or his authorized representative after taking into consideration the nature of the work delayed and practicability of its execution during the period of extension.
- 9.3 Although the time for completion of works shall be suitably extended as indicated in Clause no. 9.2 above, such extension shall not result in any other financial claim of the Contractor against the Purchaser on any account, whatsoever.
- 9.4 Neither party shall be liable to the other party for loss or damage sustained by the other party arising from any event referred to in clause or delays arising from such event.
- 9.5 If, by virtue of clause referred above, either party shall be exempted from the performance of punctual performance of any obligation for continuous period of 6 (six) months, then the parties shall consult together with a view to agreeing what action should, in the circumstances, be taken and what amendments to the terms of this Agreement ought to be made.
- 9.6 The term "Force Majeure" shall, herein, mean riots (other than among the Contractor's employees), Civil commotion (to the extent not insurable), war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, revolution, insurrection, military or usurped power, damage from aircraft, nuclear fission, acts of God, such as floods, earthquake, lightning, fires not caused by Contractor's negligence and other such cause over which the Contractor has no control and are accepted as such, by the Engineer-in-Charge, whose decision shall be final and binding. In the event of either party being rendered unable by "Force Majeure" to perform any obligation required to be performed by them under the Contract, the relative obligation of the party effected by such "Force Majeure" shall be treated as suspended for the period during which such "Force Majeure" cause lasts, provided the party alleging that it has been rendered unable, as aforesaid, thereby shall notify within 10 (ten) days of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of such cause.

10.0 Guarantee / Warranty:

- a. For a period of 12 (Twelve) calendar months from the date of the first commercial operation of the unit or 24 (Twenty-Four) calendar months from the date of last supply, whichever is earlier (called the Warranty Period), the Contractor shall remain liable to replace any defect and/or rectify any damage/deficiency that may develop or remained undetected in the equipment/works of his own or those of his sub-Contractors. Such defects and / or damage shall be repaired or replaced as per the decision of the Engineer-in-charge and solely at the cost of the Contractor. The replaced defective parts will be returned to the Contractor at his own expense, unless otherwise arranged. No repairs or replacement shall normally be carried out by the Engineer-in-charge when the equipment is under the erection / supervision of the Contractor's engineers. If, during the period of warranty, any portion of the equipment/works is found defective and is rectified/replaced, the

provision of this clause shall apply to the portion of the equipment so replaced/rectified until expiry of 12 (Twelve) calendar months from the date of such replacement / rectification. The rectification / replacement / repairs shall be done at the shortest possible time to minimize the loss of the Purchaser and as mutually agreed to. If any defects are not remedied within a reasonable period of time, the Purchaser may proceed to do the work through any other Agency at the Contractor's risk and expenses, but without prejudice to any other rights which the Purchaser may have against the Contractor.

- b. In the event of emergency where, in the judgment of the Engineer-in-charge, delay would cause serious loss or damage, repairs, replacement, rectification, adjustment etc. may be done by the Engineer-in-charge or by any other Agency chosen by the Engineer-in-charge at the cost of the Contractor and without any advance notice to the Contractor. However, the Contractor will be notified promptly and he shall assist the Purchaser/other Agency employed for necessary corrections. This shall not relieve the Contractor from any of his liability under the terms of the Contract. In case of defective parts which are not repairable at site but are essential for the commercial operation of the equipment, the Contractor and the Engineer-in-charge shall mutually agree to a programme of replacement or renewal, which will minimize interruption to the maximum extent, in the operation of the equipment.
- c. The repair or new parts will be furnished and erected free of cost by the Contractor. If any repair is carried out on his behalf at the site, the Contractor shall bear the cost of such repair/replacement.
- d. In respect of goods supplied and or works done by the Sub-Contractors to the Contractor where a longer guarantee is provided by such sub-Contractors, the Purchaser shall be entitled to the benefit of such longer guaranteed period.
- e. In case of defective parts which are not repairable at site but are essential for the operation of the equipment, the Contractor and the Engineer-in-charge shall mutually agree to an improvised arrangement to be made by the Contractor to ensure continued plant operation and to a programme of replacement or renewal which will minimize interruption / dislocation to the maximum extent in the operation of the equipment. The cost of transportation, including all taxes & duties etc. as applicable, insurance of defective parts from site and replacement will be borne by the Contractor.
- f. The above mentioned Clauses shall also be applicable to spares purchased before or after the completion of the Contract.
- g. The provision of latent defects shall be applicable up to the end of 6 (six) years from the date of successful completion of trial operation of the unit.
- h. It shall be expressly understood that all expenses in respect of replacement / repair during the warranty period or extended warranty period or as latent defects as noted above including, but not limited to, transportation cost, all taxes, duties and levies as applicable, etc. till such spare parts are installed in the main equipment/ plant after necessary repairs/ replacement and the main equipment/ plant is put back into operation, shall entirely be to the Contractor's account.

11.0 Spares:

- a. All spares for the equipment under the Contract will strictly conform to the specification and documents and will be identical to the corresponding main equipment /components supplied under the Contract and shall be fully interchangeable.
- b. Mandatory spares, as per list detailed in the technical specification shall be part of the contract.
- c. The Contractor will provide the Purchaser with all the addresses and particulars of his sub-suppliers while placing the order on vendors for items/components/equipment covered under the Contract and will further ensure with his vendors that the Purchaser will have the right to place the order for spares directly on them on mutually agreed terms based on offers of such vendors, if so desired.
- d. The spares will be warranted for a period of 12 (Twelve) calendar months from the date of Final Acceptance of the unit or 24 (Twenty-Four) calendar months from the date of last supply, whichever is earlier.
- e. Without any extra cost, the Contractor shall provide the Purchaser with the manufacturing drawings, catalogues, assembly drawings, part numbers and any other information/documents required by the Purchaser in the form of manual(s) so as to enable the Purchaser to identify the mandatory, recommended and all other spares required during the whole life of all the equipment to be supplied.

- f. The Contractor shall guarantee the long term availability of spares to the Purchaser for the full life of the equipment covered under the Contract. The Contractor shall guarantee that before going out of production of spare parts of the equipment covered under the Contract, he shall give the Purchaser at least 12 (twelve) months advance notice so that the latter may order his bulk requirement of spares, if he so desires. The same provision will also be applicable to subcontractors. Also, the Contractor / Sub-Contractors will provide the Purchaser full manufacturing drawings, material specifications and technical information required by the Purchaser for the purpose of manufacture of such items for his own use or to procure such spares from alternate source.
- g. Further in case of discontinuance of supply of spares by the Contractor or his Sub-Contractors, the Contractor will provide the Purchaser with full information for replacement of such spares with other equivalent make's if so required by the Purchaser.
- h. The quality plan and the inspection requirement finalized for the main equipments will also be applicable for corresponding spares.
- i. All spares covered under the Contract shall be produced and delivery of the spares will be effected along with the main equipments in a phased manner and the delivery would be completed by the respective dates for various categories of goods as per the agreed schedule.

12.0 Contract Performance Bank Guarantee (CPBG):

Within 30(thirty) days from the date of issue of purchase order, the supplier shall furnish bank guarantee from a scheduled nationalized bank for an amount equal to the 10% (ten percent) of the contract value towards faithful performance of the contract.

- 12.1 The Performance Guarantee shall cover additionally the following guarantees to the Purchaser:
 - i) The Contractor shall, on receipt of written instruction from the Purchaser, at his own cost, get the validity period of Bank Guarantee furnished by him, extended from time to time as per the instructions of the Purchaser and shall furnish the extended / revised Bank Guarantee or any extension thereof. In case the extended / revised Bank Guarantee is not received by the Purchaser within the specified period, the Purchaser, entirely at his discretion, shall be at liberty to encash the aforesaid Bank Guarantee.
 - ii) The successful and satisfactory operation of the equipment furnished and erected under the Contract as per the specifications and documents.
 - iii) That the equipment provided and installed by him shall be free from all defects in design, material and workmanship and shall, upon written notice from the Purchaser, fully remedy free of expenses to the Purchaser such defects as developed under the normal use of the said equipment within the period of guarantee, specified in this Volume.
 - iv) The Performance Guarantee will be returned to the Contractor without any interest at the end of the 90 (ninety) days after the Warranty Period, subject to fulfilment of the work in all respects.
 - v) It is expressly understood and agreed that the amount of Performance Guarantee shall not be construed as limiting factor / amount for various liabilities under the Contract.

13.0 Rejection of defective materials and equipments:

- 13.1 If, during the progress of works, the Engineer-in-charge shall decide and inform in writing to the Contractor that the Contractor has manufactured any plant or part of the plant unsound or imperfect or has furnished any plant inferior to the quality specified, the Contractor, on receiving details of such defects or deficiencies shall, at his own expense, within 15 (fifteen) days of receiving notice or otherwise, and for a period of time as may be decided by the Engineer-in-charge for making it good, proceed to alter, reconstruct or remove such work and furnish fresh equipment up to the standard of specifications. In case the Contractor fails to do so, the Engineer-in-charge may, on giving the Contractor minimum 7 (seven) days notice in writing of his intentions to do so, proceed to remove the portion of the work so complained of and at the cost of the Contractor, perform all such work or furnish all such equipment, provided that nothing in this Clause shall be deemed to deprive the Purchaser of or affect any rights under the Contract which the Purchaser may otherwise have in respect of such defects and deficiencies.

- 13.2 In case of such replacement / rectification by the Purchaser, the Contractor shall be liable to pay to the Purchaser the extra cost, if any, for such replacement / by delivery and / or erected, as provided for in the original Contract, such extra cost being the ascertained difference between the price by the Purchaser under the provision above mentioned for such replacement and the Contract price for the plant so replaced. If the Purchaser does not so replace the rejected plant within a reasonable time, the Contractor shall be liable only to repay to the Purchaser all money paid by the Purchaser to him in respect of such plant.
- 13.3 In the event of such rejection, the Purchaser shall be entitled to the use of the plant in responsible and proper manner till a time reasonably sufficient to enable him to obtain other replacement plant.

14.0 Packing, Forwarding and Shipment:

- 14.1 The Contractor shall be responsible for securely protecting and packing the plant and equipment, taking special care for protruding parts and such other vulnerable parts as per prescribed standards enforced to withstand the journey and ensuring the safety of materials and also arrival of materials at destination in good and original condition for contemplated use, so as to avoid damage under normal conditions of transport, loading & unloading, handling and storage at site till the time of erection and such conditions as specified in the Contract. While packing all the materials, the limitation from the point of view of availability of Railway Wagons Sizes in India should be taken account of. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. The Purchaser shall bear no responsibility for the availability of Railway wagons and for any loss or damage during transportation, loading & unloading, handling and storage.
- 14.2 Each bundle or package shall have the following marking on it:
- The name and address of the consignee.
 - Destination Railway station / Destination place by road
 - The relevant marks, reference numbers etc., for identification
 - Directions for handling the materials
- Each package shall also be accompanied with detailed packing list to facilitate checking of the contents at the destination.
- 14.3 The Contractor shall notify the Purchaser the date of each despatch from his works, and expected date of arrival at the Project site for the information of the Purchaser
- 14.4 The Contractor shall also give all despatch information concerning the weight, size and content of each package, including any other information which the Purchaser may require.
- 14.5 The following documents shall be sent by mailed through COURIER Post to the Purchaser within 3 (three) days from the date of despatch to enable the Purchaser to make progressive payment to the Contractor
- Application for payment in standard format to the Purchaser (6 copies)
 - Test Certificate (6 copies)
 - Certificate of waiver, if inspection is waived (6 copies)
 - Invoice (6 copies)
 - Certificate of Insurance (6 copies)
 - Proof of despatch (6 copies)

The above documents each in duplicate will be mailed through COURIER to each of the following address:

- The Head of Project,
Assam Gas Based Power Plant,
North Eastern Electric Power Corporation Limited
No. 3 Bokuloni Village, Dist. Dibrugarh, Assam - 1 (one) Copy.
- The Sr. Manager (Finance),
Assam Gas Based Power Plant,
North Eastern Electric Power Corporation Limited
No. 3 Bokuloni Village, Dist. Dibrugarh, Assam - 1 (one) Copy
- The Sr. Manager (E/M), MMW,
Assam Gas Based Power Plant,
North Eastern Electric Power Corporation Limited
No. 3 Bokuloni Village, Dist. Dibrugarh, Assam - 1 (one) Copy

- 14.6 The Contractor shall prepare detailed packing list of all packages and containers, bundles and loose materials forming each and every consignment despatched to site. The Contractor shall further be responsible for making all necessary arrangements for loading, unloading and other handling, right from his works till the consignment reaches the site and also till the equipment is erected, tested and commissioned. He shall be solely responsible for proper storage and safe custody of all equipment.
- 14.7 The Contractor shall send at least 10 (ten) copies of Model packing list/PGMA (Part Group Manufacturing Agency) of various equipment/materials within 15(fifteen) days of finalization of the PERT network. These lists will be used as Check Lists for the despatch of all the equipment and materials to be supplied under the Contract. These lists shall be periodically updated by the Contractor, based on changes on subsequent detailed Engineering.
- 14.8 All demurrage, wharf age and other expenses incurred due to delayed clearance of the material and which are attributable to the Contractor and Sub-Contractor during transportation shall be to the account of the Contractor.

15.0 Inspection and Testing:

The Contractor shall give the Engineer-in-Charge / Inspector 15 (fifteen) days written notice of any material being ready for testing. The Engineer-in-Charge / Inspector, unless the inspection of the tests is in writing waived, shall attend such tests within 15 (fifteen) days of the date of which the equipment is notified by the Contractor as being ready for test / inspection, failing which the Contractor may proceed with the tests which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Engineer-in-charge duly certified copies of test results in quadruplicate, for approval of the Engineer-in-charge. However, waiver accorded by the Engineer will not absolve the Contractor towards the execution of the Contract in conformity with the Contract Agreement.

16.0 Deduction of Contract Price:

- 16.1 All costs, claims, damages or expenses which the Purchaser may have paid for which the Contractor is liable under the Contract, shall have to be refunded by the Contractor within 30 (thirty) days of receipt of the bills. If the bills are not paid within the said period, this may be deducted by the Engineer-in-charge from the Performance Guarantee or from any money due or which will become due to the Contractor under this Contract.
- 16.2 In addition to the provision of Clause no. 17.1 above, which relates to the recovery by the Purchaser of any amounts that the Purchaser may have paid for which the Contractor is liable under the Contract, the Purchaser shall also be entitled to recover all dues in terms of the Contract including, but not limited to, Liquidated Damages for delay etc. by way of deductions from the payments due to the Contractor or that may become due to the Contractor in future or from any securities/guarantees under the Contract and/or otherwise.
- 16.3 In case of any dispute, the sum of money so withheld or obtained under this clause by the Purchaser will be kept withheld or retained as such by the Purchaser till all the claims arising out of the Contract is either mutually settled or determined by the Arbitrator, or by the competent Court, as the case may be, and that the Contractor shall have no claim for interest or damages whatsoever on this account.

17.0 Delivery of Plant / Equipment:

- 17.1 No plant/equipment/material shall be dispatched, until dispatch instruction is given by the Head of Project/ Engineer-In-Charge in writing to the Contractor.
- 17.2 The Contractor shall deliver the plant/equipments/materials at the place (s) and in the manner as specified in the Contract. The Contractor shall comply with all instructions that may be given by the Purchaser from time to time regarding transportation of the plant/equipment/materials.
- 17.3 Immediately after dispatch, delivery notification of delivery or dispatch in regard to each and every consignment shall be made to the designated consignee and any other personnel as may be specified in the Contract.
- 17.4 In case of any damage or loss occurred in transit, it should be the liability of the Contractor to initiate or pursue the claim with the Insurance Company. The contractor shall also take

- immediate steps to repair the damages or to replace the loss and damages as per the instruction of the Engineer-in-Charge
- 17.5 Property or title of the plant/equipment/goods shall not pass to the Purchaser unless these are actually delivered at the designated places
- 17.6 The Purchaser shall not be responsible to the Contractor to secure/arrange/provide means of transport. However, if any documentary assistance is necessary to facilitate transportation, these will be supplied to the contractor to the extent possible.

18.0 Cross – Fall Breach Liability

Based on your offer, the purchaser has also decided to award the work order for Transportation and delivery to site, Unloading and handling at site, insurance from source of supply till commissioning and handing over, associated civil works, erection, testing and commissioning, successful performance testing, handing over of entire facilities in Renovation and Modernization of Gas Booster Station of Assam Gas Based Power Plant (291 MW), Assam, India, (referred to as Contract No. 2). The Contractor agrees and confirms that all the terms and conditions applicable in purchase/supply order (referred to as Contract No. 1) shall also be applicable in Contract No. 2 and vice versa and it is expressly understood and agreed to by the bidder that any breach in the Contract No. 1 shall automatically be deemed to be a breach in the Contract No. 2 and vice versa. Any breach or occurrence giving the Corporation the right to terminate the Contract No. 1 and / or recover damages there under shall also give the Corporation the right, at its sole discretion, to terminate the Contract No. 2 and / or to recover damages and / or to get the work done under the Contract No. 2 from alternative sources at the risk, cost and responsibility of the Contractor, but without any right to the Contractor for any compensation, whatsoever. Any such breach in the Contract No. 1 shall not relieve / discharge the Contractor in any manner, whatsoever, from any of the Contractor's obligations under the Contract No. 2, unless permitted in writing by the Corporation. It is also agreed by the Contractor that plant / machinery / equipment supplied under the Contract No. 1, when erected and commissioned under the Contract No.2 shall give satisfactory performance in accordance with the terms and conditions of both Contract No. 1 & 2.

All other terms and conditions of this contract shall be governed by the terms and conditions of our earlier order for R&M of Gas Engine and its Auxiliaries for GBS Unit 1,2 and 3 vide our Order ref: NEEPCO/FD(C&P)/AGBP/R&M/484 dtd 10.06.2013 and contract agreement thereof.

19.0 Governing Laws / Arbitration:

- 19.1 M/s Clarke Energy Pvt. Ltd. and NEEPCO shall make all reasonable efforts to amicably resolve any dispute arising out of this contract.
- 19.2 Arbitration if any shall be as per the Indian Arbitration and Reconciliation Act 1996. Each party shall appoint one arbitrator. The two appointed arbitrator shall then select the third arbitrator.
- 19.3 Place of arbitration shall be Guwahati / Delhi.

Kindly acknowledge the receipt of this supply order and confirm your acceptance of this order.

Thanking you.

Yours faithfully,

24/01/19

Sr. Manager (E/M)
for & on behalf GM (E/M)
& Head of Project, AGBP

Annexure - ISchedule of Prices

Sl. No.	Description	Amount in ₹
1	Price of materials as details in enclosed Annexure - II (Schedule of Items) and Annexure - III (Details of Mandatory Spares) inclusive of GST	17,41,09,988.00
2	Inland transportation & inland insurance (Lumpsum inclusive of all taxes & duties)	64,99,227.00

Total = ₹ 18,06,08,215.00

(Rupees Eighteen Crores Six Lakhs Eight Thousand Two Hundred Fifteen) only

24/01/19
D. G. SWAMI, Sr. Mgr. (EM)
C&A Dept

Annexure - II

Schedule of Items

Sl. No.	Items	Quantity
1	Gas Engine 12 V 275 GL+, with mandatory spares as per list enclosed at Annexure - III	1 No.
2	Metallic disc coupling for connection to existing Gas Compressor	1 No.
3	Air Cooled Heat Exchangers (ACHE) with Expansion Tank, Louver, Auto Control Louvers, other Electrical items, Vibration Switch, JIB etc.	1 No.
4	Exhaust Silencer for Gas Engine	2 Nos.
5	Bellows for Exhaust and Water Pipelines	1 lot
6	MCC Panel, Breaker (Drawout type) with other instrument / cables / Power Cables etc. to complete the system	1 lot
7	First fill Lubo Oil, Lubricants, Coolants, Consumables	1 lot
8	Various Pipes, fittings, valves, gauges, strainers, support structures, expansion tank, insulation materials with cladding and miscellaneous items, consumables, Nozzles etc.	1 lot
9	Necessary C&I materials (Cables, Gauges, Field Instruments etc.) required for the Unit and integration with LCP & Master Control panel with necessary instrumentation & control etc. and MCC panel. Extra Items: a) Moisture separator, Air Filter, Air Pressure Regulator for Auto Louver arrangement of ACHE. b) RTD Transmitters Thermowells, Level Controller for Expansion Tank in ACHE. c) Vibration Transducer for Engine. d) Epoxy for Grouting. e) Shims for Engine. f) Hardware for Engine foundation.	1 lot
10	Cabling for power cable, control & instrumentation cable, cable tray, casting strips, Gland and miscellaneous items	1 lot

Copy
24/04/19
D. C. BAWANI, Sr. Mgr./ES&E
dir, P&S&C

Annexure - III

Details of Mandatory Spares

Sl. No.	GEW P/n	Description	Qty.	Remarks
1	209364	ELEMENT AIR FILTER	12	
2	206385	PAD PRE FILTER	12	
3	211665D	KIT ADMISSION VALVE REPAIR	24	
4	292679	O RING, 94X1 19X 12, NITRILE	48	
5	292843	O RING, 1.73X 21, NITRILE	12	
6	296173	O RING, SILICONE	24	
7	740011	BOOT HIGH TEMP (5 ID)	24	
8	68919D	SPARK PLUG, WALKESHA	24	
9	100395B	FILTER, LUBE OIL	12	
10	325197A	SEALS KIT, FM500	2	
11	325196A	PAPER INSERT, FM500	1	
12	291077	GASKET	2	
13	294093L	GASKET SPIRAL WOUND 3.38 I.D. X 3.75 O.D. 12 THK	4	
14	294093V	GASKET, SPIRAL WOUND 4.25 I.D. X 4.62 O.D. 12 THK	6	
15	209992K	O RING, 1.88X2 12X 12 VTR8550	12	
16	211670C	SEAL RING SQUARE 1.88X2 38X 25	12	
	295687A	TUBE DRAIN TURBO	12	Item p/n is 'No Longer Available' (NLA)
17	295328	WASHER, PRE-CHAMBER	12	
18	295389C	O RING 2.12X2 38X 12, VTR8650	24	
19	295388A	O RING 2.25X2 50X 12 VITON	24	
20	285620C	WASHER, IGNITER SLEEVE	12	
21	A740127	ASSEMBLY, NOx SENSOR	2	
22	21051	WASHER LOCK, 312 & M8	8	
23	295254A	GASKET INTERCOOLER PLENUM	2	
24	325320	O RING - V12	2	
25	207559J	GASKET, PIPE FLANGE 4 IN	1	
26	207559H	GASKET, PIPE FLANGE 5 IN	2	
27	296614	GASKET, THERMOSTAT HOUSING	1	
28	496832	SEAL, ELEMENT	6	
29	296252	GASKET, PLENUM OUTLET	1	
30	296244C	GASKET, INTERCOOLER/TURBO	4	
31	291823	WASHER, COPPER, 35X27X2	1	NOx sensor assembly gasket offered in place of oxygen sensor
32	290807	GASKET	1	

दिनांक 24/01/19
 D. G. SINGH, Sr. Mgr (R&M)
 Co. The ICP



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(आम जनता का संस्थान)

असम गैस आधारित शक्ति संयंत्र

पुस्तान, किला-इलुवाहा, असम, पिन - 785 251

North Eastern Electric Power Corporation Ltd
(A Govt. of India Enterprise)

ASSAM GAS BASED POWER PLANT

POKSILOM DIST. DISBULGAH ASSAM PIN - 785 251

Phone: 0361-2224487/2224488/2224489

Dated 24.01.2019

No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/642

To,

M/S Clarke Energy India Private Limited
Shivkiran, Plot No. 160, Lane No. 4, C18 No. 632
Dahanukar Colony, Kothrud, Pune, Maharashtra
India - 411 038

Kind Attn. Mr Punit Garg, Managing Director

Subj: NEEPCO Assam Gas Based Power Plant - Detail Work Order for Renovation & Modernization of Waukeshamake Gas Engine and its Auxiliaries (GBS Unit 4) at AGBP

- Ref:
1. Our enquiry ref: NEEPCO/AGBP/SFC/GBS-25(R&M)/2018-19/122 Dated 07/09/2018
 2. Our enquiry ref: NEEPCO/AGBP/SFC/GBS-25(R&M)/2018-19/359 Dated 14/09/2018
 3. Your Techno Commercial offer ref: WT/CEI-18/S-Quote-S-1165/R01/164 Dated 05/10/2018
 4. Our letter No. NEEPCO/AGBP/SFC/GBS-25(R&M)/2018-19/418 Dated 15/10/2018
 5. Your letter ref: VVT/CEI-18/S-Quote-S-1165/R01/218 Dated 31/0/2018
 6. Our letter No. NEEPCO/AGBP/SFC/GBS-25(R&M)/2018-19/489 Dated 16/11/2018
 7. Your letter ref: VVT/CEI-18/S-Quote-S-1165/R01/223 Dated 23/11/2018
 8. MOM held at AGBP, NEEPCO Dated 12/12/2018
 9. Your E-mail Dated 24/12/2018
 10. MOM held at HQ, NEEPCO, Shillong Dated 27/12/2018
 11. Our LOI ref: NEEPCO/AGBP/HOP/2018-19/W-10(A)/577 Dated 31/12/2018
 12. Your E-mail Dated 03/01/2019
 13. Our letter No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/590 Dated 04/01/2019
 14. Your acceptance of LOI vide Ref: SM/CEI-2019/224 dtd 4th January, 2019

Dear Sirs,

With reference to above, the North Eastern Electric Power Corporation Ltd is pleased to place this detail work order for Unloading and handling at site, insurance from source of supply till commissioning and handing over, associated civil works, Erection, Testing and Commissioning, successful performance testing, handing over of control facilities and Supervision of Operation and Maintenance of the unit for specified period as per the bid document complete in all respect for Renovation and Modernization of Gas Booster Station of Assam Gas Based Power Plant (291 MW), Assam, India as per Schedule of Requirement for services at ANNEX RE-II and terms and conditions mentioned below. This contract shall also cover all activities other than those in the scope of supply against our order ref: NEEPCO/AGBP/HOP/2018-19/W-10(A)/635 dtd 24.01.2019. The scope of work shall also include all items which are required for satisfactory performance of the work as per requirement of bid documents even though not specifically mentioned in the Detailed Work Order.

1.0 Contract Price:

- 1.1 The total Contract Price for this Contract for the entire scope of services shall be Rs. 2,03,37,735.00 (Rupees Two Crores Three Lakhs Thirty-Seven Thousand Seven Hundred Thirty-Five) only as per Schedule of Prices at Annexure-I including all applicable taxes and duties (GST).
- 1.2 The Contract Price shall remain FIRM during the entire period of the Contract and no escalation shall be allowed on the same.

(Signature)

2.0 Completion Schedule:

Time is the essence of the contract. Transportation and delivery to site, Unloading and handling at site, insurance from source of supply till commissioning and handing over, associated civil works, erection, testing and commissioning, successful performance testing, handing over of entire facilities complete in all respect along with the supply of materials under Contract No. 1 shall be completed within 12 (twelve) months from the date of techno-commercially clear Purchase and Work Order. The work shall be completed within such time as per the approved project schedule. The Contractor shall so organize his resources and perform his work as to complete it not later than the date agreed to. The time for completion of his works Contracted for shall be reckoned from the date of issue of the Purchase and Work Order by the Purchaser.

3.0 Terms of Payment:

(a) For Erection, Testing & Commissioning:

- (i) 10% (Ten percent) of the Contract Price for Erection, Testing and Commissioning shall be paid as interest bearing recoverable Mobilization Advance at the rate of 1.5% (one and half percent) above BPLR of State Bank of India, against submission of Bank Guarantee equivalent to 110% of total advance amount, as per proforma enclosed. The advance shall be paid in 2(two) instalments; the first instalment of 5% (five percent) shall be paid for site mobilization and site Office establishment on handing over of site by the Corporation. The remaining 5% (five percent) of the Contract Price for Erection, Testing and Commissioning shall be released in such instalments as may be considered commensurate with the progress of the initial mobilization, preliminary and ancillary works, duly certified and evaluated by the Engineer-in-Charge. For evaluation of initial mobilization, the Contractor shall have to furnish a programme of mobilization period, showing details of work to be done, machinery and labour to be engaged to start the work as per schedule. The programme shall form part of the Contract Agreement.
- (ii) If the Contractor fails to mobilize the work within stipulated period as per approved schedule, the Corporation reserves the right to encash the Bank Guarantee submitted towards interest bearing advance.

Date of Recovery	Amount of Recovery
Last day of the 2 nd quarter of the schedule time of completion	50% of Mob. Advance + eligible accrued interest
Last day of the 3 rd quarter of the schedule time of completion	30% of Mob. Advance + eligible accrued interest

- (iii) The recovery of Mobilisation Advance along with the accrued interest thereon shall be time based and not linked with the progress of work, which shall commence from the last day of the 2nd quarter of the scheduled time of completion, and shall be effected as follows:

The recovery of mobilization advance shall be made from all interim bills as Running Account Bills and any other interim bills related to works. Mobilization Advance along with accrued interest shall stand fully recovered on the last day of 3rd Quarter of schedule time of completion of the work as specified in the Contract Agreement. At any point of time, even if the Contractor's money on account of work done is not available with the Corporation or if the Contractor is not executing the work or executing it at a slow pace, recovery of Mobilization Advance shall be made by encashing BG of required value submitted against Mobilization Advance. For release of Mobilization Advance, the Contractor is to submit 2 (Two) numbers of Bank Guarantees valued at 110% of each recovery amount matching with the above Recovery Schedule. The Validity Period of Bank Guarantees shall be kept 3 (three) months beyond the scheduled date of recovery as shown in recovery schedule.

- (iv) 90% (Ninety percent) of the Contract Price for unloading, storage & handling at site, Erection, Testing and Commissioning including insurance towards storage until erection, testing and commissioning, reliability & PG test along with 100% GST shall be paid on pro-rata basis against progressive Erection of the plant equipment. Billing Break up for Erection, Testing and Commissioning works shall be finalized before signing of the Contract Agreement and the same shall form a part of the Contract Agreement.
- (v) Balance 10% (Ten Percent) of the total Contract Price for Erection, Testing and Commissioning shall be paid after "Final Acceptance" of the entire plant equipment.

(b) Payment for Supervision of O&M:

The contract price for Supervision of Operation and Maintenance shall be paid in 6 (six) equal monthly instalment. The monthly instalment shall be paid at the end of the particular month on submission of invoice/bill to the Engineer in Charge.

4.0 Mode of Payment:

All payments due to the Contractor shall be disbursed under e-payment system. The Engineer in Charge or his authorized representatives will verify and certify the Contractor's Invoices, indicating payment instructions (full bank details) for disbursement.

The contractor shall have to furnish the following information for receiving payment against the work through e-payment system:

1. Name of beneficiaries;
2. Name of the Bank;
3. Branch of the Bank;
4. IFSC code of the Branch;
5. Account No.;
6. City/Town;
7. Telephone No.;
8. E-mail address;

5.0 Bank Charges:

All bank charges of the Contractor's bank, within or outside India, shall be to Contractor's account.

6.0 Paying Authority:

Paying Authority for payments shall be the Head of Finance, Assam Gas Based Power Plant, No. 3 Bofalooi Village, Dist. Dibrugarh, Assam.

7.0 Withholding Payment:

- 7.1 The Purchaser may withhold the whole or part of any payment for the work claimed by the Contractor which, in the opinion of the Purchaser, is necessary to protect himself from loss on account of:
- a) Defective work not remedied or guarantees not met.
 - b) Failure by the Contractor to make payments for materials, labour employed by him and their PF dues.
 - c) Claims filed against the Contractor.
 - d) Loss to another Contractor directly employed by the Purchaser.
 - e) Insufficient progress.
 - f) Damage or loss to property or equipment of the Purchaser.
 - g) Non-return of equipment/material supplied by the Purchaser when the same is due; and
 - h) If legal case is instituted by the local Government for default of the Contractor.
- 7.2 When the grounds for withholding payment are removed, payments of the amount due to the Contractor shall be made by the Purchaser without delay.

8.0 Guarantee / Warranty:

- a. For a period of 12 (Twelve) calendar months from the date of the first commercial operation of the last unit or 24 (Twenty-Four) calendar months from the date of last supply, whichever is earlier (called the Warranty Period), the Contractor shall remain liable to replace any defect and/or rectify any damage/deficiency that may develop or remained undetected in the equipment/works of his own or those of his sub-Contractors. Such defects and / or damage shall be repaired or replaced as per the decision of the Engineer-in-charge and solely at the cost of the Contractor. The replaced defective parts will be returned to the Contractor at his own expense, unless otherwise arranged. No repairs or replacement shall normally be carried out by the Engineer-in-charge when the equipment is under the erection / supervision of the Contractor's engineers. If, during the period of warranty, any portion of the equipment/works is found defective and is rectified/replaced, the provision of this clause shall apply to the portion of the equipment so replaced/rectified until expiry of 12 (Twelve) calendar months from the date of such replacement / rectification. The rectification / replacement / repairs shall be done at the shortest possible time to minimize the loss of the Purchaser and as mutually agreed to. If any defects are not remedied within a reasonable period of time, the Purchaser may proceed to do the work through any other Agency at the Contractor's risk and expenses, but without prejudice to any other rights which the Purchaser may have against the Contractor.
- b. In the event of emergency where, in the judgment of the Engineer-in-charge, delay would cause serious loss or damage, repairs, replacement, rectification, adjustment etc. may be done by the Engineer-in-charge or by any other Agency chosen by the Engineer-in-charge at the cost of the Contractor and without any advance notice to the Contractor. However, the Contractor will be notified promptly and he shall assist the Purchaser/other Agency employed for necessary corrections. This shall not relieve the Contractor from any of his liability under the terms of the Contract. In case of defective parts which are not repairable at site but are essential for the commercial operation of the equipment, the Contractor and the Engineer-in-charge shall mutually agree to a programme of replacement or renewal, which will minimize interruption to the maximum extent, in the operation of the equipment.
- c. The repair or new parts will be furnished and erected free of cost by the Contractor. If any repair is carried out on his behalf at the site, the Contractor shall bear the cost of such repair/replacement.
- d. In respect of goods supplied and/or works done by the Sub-Contractors to the Contractor where a longer guarantee is provided by such sub-Contractors, the Purchaser shall be entitled to the benefit of such longer guarantee period.
- e. In case of defective parts which are not repairable at site but are essential for the operation of the equipment, the Contractor and the Engineer-in-charge shall mutually agree to an improvised arrangement to be made by the Contractor to ensure continued plant operation and to a programme of replacement or renewal which will minimize interruption/dislocation to the maximum extent in the operation of the equipment. The cost of transportation, including all taxes & duties etc. as applicable, Insurance of defective parts from site and replacement will be borne by the Contractor.
- f. The above mentioned Clauses shall also be applicable to spares purchased before or after the completion of the Contract.
- g. The provision of latent defects shall be applicable up to the end of 6 (six) years from the date of successful completion of trial operation of each unit.
- h. It shall be expressly understood that all expenses in respect of replacement / repair during the warranty period or extended warranty period or as latent defects as noted above including, but not limited to, transportation cost, all taxes, duties and levies as applicable, etc. till such spare parts are installed in the main equipment/ plant after necessary repairs/ replacement and the main equipment/ plant is put back into operation, shall entirely be to the Contractor's account.

9.0 Liquidated Damage for delay in completion:

Time is the essence of the Contract. If the performance of the Contract is delayed beyond the time schedules incorporated in the Contract, due to reasons attributable to the Contractor, the Purchaser shall, without prejudice to his right, recover the following damages for breach of the Contract: -

- A. For delay in commissioning of the units beyond the scheduled dates of the contract, deduct 1.2 % (half percent) of the Total Contract Price of First Contract and Second Contract per week or part thereof of delay, subject to a maximum of 10% (Ten Percent) of the Total Contract Price of First Contract and Second Contract.
- B. Execute or authorize the execution of the work departmentally or through any other Agency without any notice to the Contractor at the risk and cost of the Contractor. Action against this sub-clause shall be taken after giving notice of 15 (fifteen) days by the Purchaser to the Contractor for any delay in performance of the Contract. The decision of the Purchaser in this regard shall be final and binding upon the Contractor. However, the above action shall be taken without cancelling the Contract in respect of work not yet due for execution, or
- C. Cancel the entire Contract or a portion thereof and, if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest for executing through other agency.
- D. Where action is taken under Sub-Clause B or Sub-Clause C above for failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. However, the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be at the entire discretion of the Corporation. It shall not be necessary for the purchaser to serve a notice of such execution on the Contractor.

10.0 Force Majeure:

- 10.1 If either Contractor or Purchaser (hereafter called as party) is temporarily unable by reason of Force Majeure or the laws or regulations of India to meet any of its obligations under this Agreement and if such party gives to the other party written notice of the event within 14 (fourteen) days after its occurrence, such obligations of the party as it is unable to perform by reason of the event shall be suspended for as long as the Force Majeure condition continues.
- 10.2 The Purchaser or his authorized representative, on receipt of notification, shall ascertain the facts and extent of the delays and suitably extend the time for completing the work or stage of work where, in his judgment the findings of facts justify an extension. The period of extension of time shall be determined by the Purchaser or his authorized representative after taking into consideration the nature of the work delayed and practicability of its execution during the period of extension.
- 10.3 Although the time for completion of works shall be suitably extended as indicated in Clause no. 10.2 above, such extension shall not result in any other financial claim of the Contractor against the Purchaser on any account, whatsoever.
- 10.4 Neither party shall be liable to the other party for loss or damage sustained by the other party arising from any event referred to in clause or delays arising from such event.
- 10.5 If, by virtue of clause referred above, either party shall be exempted from the performance of partial performance of any obligation for continuous period of 6 (six) months, then the parties shall consult

together with a view to agreeing what action should, in the circumstances, be taken and what amendments to the terms of this Agreement ought to be made.

- 10.6 The term "Force Majeure" shall, herein, mean riots (other than among the Contractor's employees), Civil commotion (to the extent not insurable), war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, revolution, insurrection, military or usurped power, damage from aircraft, nuclear fission, acts of God, such as floods, earthquake, lightning, fires not caused by Contractor's negligence and other such cause over which the Contractor has no control and are accepted as such, by the Engineer-in-Charge, whose decision shall be final and binding. In the event of either party being rendered unable by "Force Majeure" to perform any obligation required to be performed by them under the Contract, the relative obligation of the party affected by such "Force Majeure" shall be treated as suspended for the period during which such "Force Majeure" cause lasts, provided the party alleging that it has been rendered unable, as aforesaid, thereby shall notify within 10(ten) days of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of such cause.

11.0 Rejection of Defective Plant:

- 11.1 If, during the progress of works, the Engineer-in-charge shall decide and inform in writing to the Contractor that the Contractor has manufactured any plant or part of the plant unsound or imperfect or has furnished any plant inferior to the quality specified, the Contractor, on receiving details of such defects or deficiencies shall, at his own expense, within 15 (fifteen) days of receiving notice or otherwise, and for a period of time as may be decided by the Engineer-in-charge for making it good, proceed to alter, reconstruct or remove such work and furnish fresh equipment up to the standard of specifications. In case the Contractor fails to do so, the Engineer-in-charge may, on giving the Contractor minimum 7 (seven) days notice in writing of his intentions to do so, proceed to remove the portion of the work so complained of and at the cost of the Contractor, perform all such work or furnish all such equipment, provided that nothing in this Clause shall be deemed to deprive the Purchaser of or affect any rights under the Contract which the Purchaser may otherwise have in respect of such defects and deficiencies.

- 11.2 In case of such replacement / rectification by the Purchaser, the Contractor shall be liable to pay to the Purchaser the extra cost, if any, for such replacement / by delivery and / or erected, as provided for in the original Contract, such extra cost being the ascertained difference between the price by the Purchaser under the provision above mentioned, for such replacement and the Contract price for the plant so replaced. If the Purchaser does not so replace the rejected plant within a reasonable time, the Contractor shall be liable only to repay to the Purchaser all money paid by the Purchaser to him in respect of such plant.

- 11.3 In the event of such rejection, the Purchaser shall be entitled to the use of the plant in responsible and proper manner till a time reasonably sufficient to enable him to obtain other replacement plant.

12.0 DEDUCTION FROM CONTRACT PRICE:

- 12.1 All costs, claims, damages or expenses which the Purchaser may have paid for which the Contractor is liable under the Contract, shall have to be refunded by the Contractor within 30 (thirty) days of receipt of the bills. If the bills are not paid within the said period, this may be deducted by the Engineer-in-charge from the Performance Guarantee or from any money due or which will become due to the Contractor under this Contract.

12.2 In addition to the provision of Clause no. 14.1 above, which relates to the recovery by the Purchaser of any amounts that the Purchaser may have paid for which the Contractor is liable under the Contract, the Purchaser shall also be entitled to recover all dues in terms of the Contract including, but not limited to, Liquidated Damages for delay etc. by way of deduction from the payments due to the Contractor or that may become due to the Contractor in future or from any securities/guarantees under the Contract and/or otherwise.

12.3 In case of any dispute, the sum of money so withheld or obtained under this clause by the Purchaser will be kept withheld or retained as such by the Purchaser till all the claims arising out of the Contract is either mutually settled or determined by the Arbitrator, or by the competent Court, as the case may be, and that the Contractor shall have no claim for interest or damages whatsoever on this account.

13.0 **Contract Performance Bank Guarantee (CPBG):**

Within 30(thirty) days from the date of issue of purchase order, the supplier shall furnish bank guarantee from a scheduled nationalized bank for an amount equal to the 10% (ten percent) of the contract value towards faithful performance of the contract.

- 13.1 The Performance Guarantee shall cover additionally the following guarantees to the Purchaser:
- i) The Contractor shall, on receipt of written instruction from the Purchaser, at his own cost, get the validity period of Bank Guarantee furnished by him, extended from time to time as per the instructions of the Purchaser and shall furnish the extended / revised Bank Guarantee or any extension thereof. In case the extended / revised Bank Guarantee is not received by the Purchaser within the specified period, the Purchaser, entirely at his discretion, shall be at liberty to encash the aforesaid Bank Guarantee.
 - ii) The successful and satisfactory operation of the equipment furnished and erected under the Contract as per the specifications and documents.
 - iii) That the equipment provided and installed by him shall be free from all defects in design, material and workmanship and shall, upon written notice from the Purchaser, fully remedy free of expenses to the Purchaser such defects as developed under the normal use of the said equipment within the period of guarantee, specified in this Volume.
 - iv) The Performance Guarantee will be returned to the Contractor without any interest at the end of the 90 (ninety) days after the Warranty Period, subject to fulfilment of the work in all respects.
 - v) It is expressly understood and agreed that the amount of Performance Guarantee shall not be construed as limiting factor / amount for various liabilities under the Contract.

14.0 **Compensation for fuel consumption of gas engine in excess of guaranteed value:**

During engine package performance test, in case the engine package fails to meet the guaranteed values, the compensation shall be claimable by the owner and the same shall be recovered by the owner from any payment due to the supplier. In case such claims are not fully recovered, then supplier will pay the balance amount to the owner. The compensation per package shall be calculated as per CL No. 1.01.02, Volume-2, Part-A of bid document and procedure communicated to you vide letter No. NEEPCO/13 (C&P, AGRP, R&M) 2047 dated 12-02-2013 and its acceptance vide letter no. VVI/CH-13/155 dated 14-02-2013 during last contract agreement for R&M of GBS Unit 1,2 and 3 at AGRP and that will form part of the Contract Agreement.

The total penalty to be charged for non-conformance of guaranteed parameter on account of fuel consumption shall not exceed 10% of basic supply cost on FOR basis. No advantage shall be given for higher performance than the guaranteed.

15.0 Compensation for higher auxiliary consumption in excess of guaranteed value:

During compressor package performance test, in case the auxiliary consumption fails to meet the guaranteed values, the compensation (calculated as per formula given under here) shall be claimable by the owner and the same shall be recovered by the owner from any payment due to the supplier. In case such claims are not fully recovered, then supplier will pay the balance amount to the owner. The compensation per package shall be the differential cost calculated as follows:

$$PY \text{ (in ₹)} = 2 \times (PT - PG) \times CP \times 788$$

Where,

PY – Differential Cost

PT – Auxiliary power consumption in kWh as obtained from field test in kWh.

PG – Guaranteed Auxiliary Power Consumption in kWh

CP – Unit cost of power as ₹3.25/- per kWh.

16.0 Cross – Fall Breach Liability:

Based on your offer, the purchaser has also decided for design, manufacture, testing, packing, despatch and insurance and supply of plant, equipment, materials and other components for Renovation and Modernization of Gas Booster Station of Assam Gas Based Power Plant (291 MW), Assam, India, (referred to as Contract No. 1). The Contractor agrees and confirms that all the terms and conditions applicable in Contract No. 2 shall also be applicable in Contract No. 1 and vice versa and it is expressly understood and agreed to by the bidder that any breach in the Contract No. 2 shall automatically be deemed to be a breach in the Contract No. 1 and vice versa. Any breach or occurrence giving the Corporation the right to terminate the Contract No. 2 and / or recover damages there under shall also give the Corporation the right, at its sole discretion, to terminate the Contract No. 1 and / or to recover damages and / or to get the work done under the Contract No. 1 from alternative sources at the risk, cost and responsibility of the Contractor, but without any right to the Contractor for any compensation, whatsoever. Any such breach in the Contract No. 2 shall not relieve / discharge the Contractor in any manner, whatsoever, from any of the Contractor's obligations under the Contract No. 1, unless permitted in writing by the Corporation. It is also agreed by the Contractor that plant / machinery / equipment supplied under the Contract No. 1, when erected and commissioned under the Contract No.2 shall give satisfactory performance in accordance with the terms and conditions of both Contract No. 1 & 2.

All other terms and conditions of this contract No. 2 shall be governed by the Bid Documents and subsequent clarifications / amendments issued thereon.

Kindly acknowledge receipt and confirm unconditional acceptance of this work order at the earliest to facilitate signing of the Contract Agreement.

Thanking you,

Yours faithfully,

[Handwritten Signature]
24/6/19

Sr. Manager (E/M)
for & on behalf GM (E/M) &
Head of Project, AGBP

Annexure - I

W.O. No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/642 Dated 24/01/2019

Schedule of Prices

Sl. No.	Description	Amount in ₹
1	Unloading, storage, handling at site, erection, testing & commissioning including insurance towards storage cum erection, testing & commissioning including reliability and PG test, Expatriate supervisor, etc charges excluding GST. Broad Scope of services for above enclosed at Annexure - II	1,60,47,205.00
2	O & M Supervision charges for 6 (six) months after taking over	11,85,164.00
3	GST on Services	31,02,366.00

Total = ₹ 2,03,37,735.00

(Rupees Two Crores Three Lakhs Thirty Seven Thousand Seven Hundred Thirty Five) only

24/01/19

W.O. No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/642 Dated 24/01/2019

The Broad Scope of Services is as described below:

- Design, Engineering, Manufacturing, Inspection and Testing at manufacturer's works before Dispatch, Packing and Forwarding, Supply, Transportation to site, Insurance from the source of supply till commissioning, Material handling, Loading and unloading, storage at site, Erection, Testing and commissioning of all the equipment.
- Dismantling of existing Gas Engine and associated axillaries including ACHE etc., without interrupting of running units.
- Providing necessary handling & lifting arrangement with necessary tools & equipment for dismantling & safe storage of the Gas Engine & accessories at designated place.
- Necessary modification of existing civil structure of ACHE, Gas Engines etc. for the purpose of dismantling/replacement of Gas Engine, ACHE etc.
- Successful erection and commissioning of Gas Engines and other accessories etc.
- 72 Hrs. uninterrupted trial operation, reliability test.
- Performance guarantee test after successful completion of trial operation.
- Supervision of operation and maintenance of the unit for a period of 6 (six) months from the date of taking over the unit by posting adequate numbers of Engineers and Technicians.
- Training and Transfer of Technology of NEEPCO's Engineers for safe & reliable operation & maintenance.
- The Gas Engine, ACHE etc. to be installed in the existing skid of Unit # 4 only.
- Any in-situ modification of the skid of Gas Engine, ACHE etc. to be done.
- Leveling, alignment, grouting etc. shall be done for installation of Gas Engine, ACHE, Silencer, etc. and other accessories.
- Providing necessary instrumentation and control system for operation of Engine and compressor package including axillaries, P & ID including Local panel, PLC, HMI system as per Unit # 1, 2 & 3.
- Hooking up with the master control panel.
- Paintings of equipment, piping etc. as per standard procedure.
- Insulation for hot part/ piping etc. provided as per Unit # 1, 2 & 3.
- Proper storing of New Engine and other accessories as per standards.
- Guards and protection for rotating equipment to be provided as per Unit # 1, 2 & 3.
- Platforms and ladders for maintenance of equipment to be provided as per Unit # 1, 2 & 3.
- To furnish all the relevant data, drawings, part catalogue, operation and maintenance manuals of the all equipment, test reports etc.
- To submit as build drawings after completion of the work.
- To submit all electrical drawings, software, program etc.
- To carry out 100% radiography inspection report of all welded joints.

14/01/19
24/1/19



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(NORTH EASTERN ELECTRIC POWER CORPORATION)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN- 786 101

Ref. No.

No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/332

Date

Dated 21/08/2018

To,

M/S Dresser-Rand India Private Limited,
A Siemens Business
701, Ashoka Estate,
24, Barakhamba Road,
New Delhi - 110 001, India

Kind attention: Mr. Sanjib Bhasit, Regional Director, Dresser-Rand India Private Limited

SUB: Detail purchase order for Supply of materials for Renovation & Modernization of Dresser-Rand Gas Compressors, model: 6-HOS 4-2 of Gas Booster Station at Assam Gas Based Power Plant (291MW), Assam.

REF: 1. Our letter No. NEEPCO/AGBP/SFC/GRS-25/2017-18/344 Dated 09/08/2017
2. Your Technical Offer No. QP17IN5591 Rev 01 Dated 15/09/2017
3. Our E-mail dated 16/09/2017
4. Your E-mail Dated 18/09/2017
5. Your firm Techno-commercial offer No. QP17IN5591 Rev 01 Dated 22/09/2017
6. Your E-mail Dated 25/11/2017
7. Our E-mail dated 22/01/2018
8. Your E-mail Dated 23/01/2018
9. Our E-mail dated 12/04/2018
10. Your E-mail Dated 12/04/2018
11. Our E-mail dated 14/05/2018
12. Your E-mail Dated 14/05/2018
13. Our letter No. NEEPCO/ED(OSM)/AGBP-24/2018-19/268 Dated 23/05/2018
14. Your letter Dated Nil
15. Our LOI (issued vide No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/135 Dated 30/05/2018
16. Our letter No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/219 Dated 26/06/2018

Dear Sirs

With reference to above, the Corporation is pleased to place this supply order for design, manufacturing, testing, packing, dispatch and supply of equipments, materials and other components for Renovation & Modernization of Dresser-Rand Gas Compressor, model: 6-HOS 4-2 of Gas Booster Station at Assam Gas Based Power Plant (291MW), Assam as per Schedule of Requirement for supply at ANNEXURE-I and terms and conditions mentioned below:

1.0 Contract Price:

- 1.1 The contract Price for the entire scope of supply shall be ₹ 6,10,46,866.00 (Rupees Six Crore Ten Lakh Forty-Six Thousand Six Hundred Sixty-six) only.
- 1.2 The above contract price for the supply of materials is ex-works, Naroda & Ahmadabad, India.
- 1.3 All the Taxes and Duties shall be paid extra as applicable on the date of delivery on submission of documentary evidences.
- 1.4 The schedule of Prices against the contract is enclosed at ANNEXURE-II.
- 1.5 The contract price shall remain FIRM during the entire period of the Contract and no escalation shall be allowed on the same.
- 1.6 Freight & Octroi (if applicable) shall be paid extra at actual against submission of documentary evidences.
- 1.7 Packing and forwarding charges shall be paid extra @ 0.5% on the basic value

18/8/18

1.8 EIC sale, if applicable, shall be resorted by the supplier.

2.0 Completion Schedule / Delivery of materials:

- 2.1 The delivery schedule of the materials shall be completed within 8 (Eight) months from date of receipt of purchase order.
- 2.2 There will be no holds for inspection.
- 2.3 No plant / equipment / materials shall be dispatched, until dispatch instruction is given by the Engineer-in-charge in writing to the contractor.
- 2.4 Immediately after dispatch, the detailed information of dispatch or delivery in regards of each and every consignment shall be made to the consignee and Engineer-in-charge.
- 2.5 Any road permit required for dispatch of materials shall be issued to the contractor. Request letter for road permits shall be addressed to Engineer-in-charge with details of materials and value of the consignment. The value of all the road permits shall not be exceeded the basic contract value for the supply of materials.

3.0 Terms of Payment:

- 3.1 10% (Ten Percent) Advance payment against submission of Master Document list and submission of equivalent bank guarantee.
- 3.2 10% (Ten Percent) progressive payment against submission of compressor data sheets and submission of equivalent bank guarantee.
- 3.3 30% (Thirty Percent) progressive payment against submission of un-priced purchase order for major brought out items submission of equivalent Bank Guarantee.
- 3.4 50% (Fifty Percent) progressive payment along-with full taxes and duties on production of dispatch documents and submission of following documents to the consignee.
 - a. Proof of dispatch (bill of lading / LR copy / railway receipt etc.)
 - b. Detailed invoices in triplicate
 - c. Detailed packing list.
 - d. Test certificates, if any.
 - e. Documentary evidences against payment of Taxes and Duties.
- 3.5 All the bank Guarantees submitted against the progressive payments shall be valid for 21 (twenty-one) months from the date of LOI and will be released by NEEPCO only after completion of the last supplies, i.e., receipt at site.
- 3.6 Additionally, the contractor will submit individual Performance Bank Guarantees of 10% (Ten Percent) of basic material value. The said Bank Guarantee's will be valid for till the completion of the contract. The Bank Guarantee shall contain a suitable clause indicating a claim period of 3 (Three) months from the date of expiry.
- 3.7 All BG shall be submitted to EIC and payment shall be made after acceptance of the BG.
- 3.8 The format of the BG is enclosed at ANNEXURE-III.

4.0 Mode of Payment:

All payments due to the contractor shall be disbursed through e-payment system. The Engineer-in-charge (EIC) or his authorized representatives will verify and certify the Contractor's invoices. The contractor shall have to furnish the information (Bank details) as per Annexure- IV.

5.0 Bank Charges:

All bank charges shall be to the contractor's account.

6.0 Paying Authority:

Paying Authority for payments shall be Head of Finance, Assam Gas Based Power Plant, Bokuloni, Dist. Dibrugarh, Assam, PIN: 786191.

7.0 Withholding Payment:

- 7.1 The Purchaser may withhold the whole or part of any payment for the supply claimed by the contractor which, in the opinion of the Purchaser, is necessary to protect himself from loss on account of:
 - a. Defective materials supplied or not fit for the revamping works.
 - b. Failure by the contractor to make payments for materials, labour employed by him and their PF dues.

1/2/2017

- c. Insufficient progress of Revamping works,
- d. Damage or loss of property or equipment of the purchaser,
- e. Non-return of equipments / materials supplied by the purchaser when the same is due.

7.2 When the grounds for withholding payment are removed, payments of the amount due to the contractor shall be made by the purchaser without delay.

8.0 Liquidated damage for delay in supply and completion of the works:

8.1 Time is the essence and LD is the sole remedy.

8.2 In case the supplier fails to deliver the materials within contractual delivery period (or any extension thereof) due to reasons attributable to the supplier, then the Corporation reserve the right to recover from the supplier's sum towards Liquidated Damage @ ½ % (half percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account of this shall, however, not exceed 5 % (five percent) of the value of the undelivered portion of supply. However, the Liquidated Damage will not be imposed if the supplier fails to deliver the materials within the scheduled delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquakes, storms, floods, explosion or fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.

9.0 Force Majeure:

In case of any force majeure conditions arising out of the acts of God, acts of public enemy, war, insurrections, riots, epidemics, landslides, acts of terrorism, and any other similar events beyond the control of the contractor or purchaser, and which by exercise of due diligence neither contractor or purchaser is able to overcome, the delivery period shall be extended without imposition of any penalty. If force majeure conditions persist beyond 90 (ninety) days, NEEPCO and Dresser-Rand shall jointly decide on further course of action.

10.0 Guarantee / Warranty:

Guarantee / warranty of the materials supplied shall be for a period 18 (Eighteen) months from the date of shipment or 12 (Twelve) months from the date of start-up, whichever is earlier. The contractor shall remain liable to replace any defect and / or rectify any damage / deficiency that may develop or detected during Warranty period. Such defects and /or damage shall be repaired or replaced as per decision of the Engineer-in-charge and solely at the cost of the contractor. The replaced defective parts will be returned to the contractor at his own expenses.

11.0 Insurance:

Transit insurance shall be covered under NEEPCO's open marine policy. The details of consignment with value shall be intimated to Engineer-in-charge prior to dispatch of materials for arrangement of necessary transit insurance.

12.0 Contract Performance Bank Guarantee (CPBG):

Within 30(thirty) days from the date of issue of purchase order, the supplier shall furnish bank guarantee from a scheduled nationalized bank for an amount equal to the 10% (ten percent) of the contract value towards faithful performance of the contract. The Bank Guarantee shall be valid for a period to cover 90(ninety) days after expiry of warranty period.

13.0 Rejection of defective materials and equipments:

13.1 If any materials shall found defective / inferior / not found fit for the R&M works at the time of receipt of materials or during the progress of R&M works, the same shall be immediately intimated to the contractor in writing. On receiving the details of any such discrepancies / deficiencies, the contractor shall have to replace the materials /equipments within a period of time frame as jointly decided by contractor and NEEPCO's EIC at the contractor's own expenses.

13.2 In the event of any rejection of materials, any delay in the process of execution of R&M works thereof shall be considered & treated under the clause of LD.

14.0 Transportation and Title of transfer:

The Contractor shall dispatch the materials Ex-Works, Naroda / Ahmadabad, Gujarat. The materials shall be transported through reputed transporter approved by NEEPCO. Payment against freight shall be at actual on submission of documentary evidences and subject to a ceiling of 1% (One Percent) of the basic value of the materials.

15.0 Packing, Forwarding and Shipment:

- 15.1 Packing and forwarding charges shall be paid extra @ 0.5% on the basic value.
- 15.2 The Contractor shall be responsible for securely protecting and packing the plant and equipment or materials / spares, taking care for protruding parts and such other vulnerable parts to withstand the journey and ensuring the safety of materials and also arrival of materials at site in good and original condition for contemplated use, so as to avoid damage under normal conditions of transport, loading & unloading, handling and storage at site till the time of erection. The contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.
- 15.3 Each bundle of package shall have following marking on it:
- The name and address of the consignee,
 - Destination place shall be as below:
"The Sr. Manager (E/M), MMW,
Assam Gas Based Power Plant, NEEPCO Ltd.
P.O.: Bokuloni (Near Duliajan)
Dist: Dibrugarh, Assam-786191"
 - The relevant marks, reference numbers etc, for identification,
 - Direction for handling the materials.
- 15.4 Each package shall also be accompanied with detailed packing list to facilitate checking of the contents at the site.
- 15.5 The Contractor shall notify the Purchaser the date of each dispatch from his works, and expected date of arrival at the project site for the information of the purchaser.
- 15.6 The contractor shall also provide all dispatch information concerning the weight, size and content of each package, including any other information which the purchaser may require.
- 15.7 All demurrage and other expenses incurred due to delayed clearance of the materials and which are attributable to the contractor and sub-contractor during transportation shall be to the account of the Contractor.

16.0 Governing Laws / Arbitration:

- 21.1 Dresser-Rand and NEEPCO shall make all reasonable efforts to amicably resolve any dispute arising out of this contract.
- 21.2 Arbitration if any shall be as per the Indian Arbitration and Reconciliation Act 1996. Each party shall appoint one arbitrator. The two appointed arbitrator shall then select the third arbitrator.
- 21.3 Place of arbitration shall be Guwahati / Delhi.

17.0 Set Off: No set offs are applicable to the contract**18.0 Site Insurance:**

Site insurance for all site activities, relating to all works including materials handling will be under the scope of Contractor's.

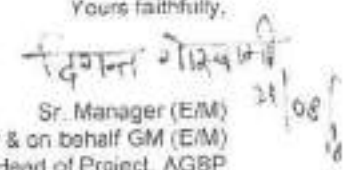
19.0 Contract agreement:

The Contract agreement shall be signed within 15-20 days from the date of acceptance of this order. You are to depute one of your authorized signatory for signing of the contract agreement.

Kindly acknowledge the receipt of this supply order and confirm your acceptance of issue of this order.

Thanking you.

Yours faithfully,


Sr. Manager (E/M)
for & on behalf GM (E/M)
& Head of Project, AGBP

ANNEXURE-I

P. O. No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/332 Dated 21/08/2018

Details Scope for Supply of materials & revamping of 4th Dresser Rand Gas Compressor

SL NO.	BROAD SCOPE OF SUPPLY & REVAMPING OF 4 th GAS COMPRESSOR	QUANTITY
1.	<p>2 (Two) numbers of complete gas ends 16.25" (each consists of cylinders, pistons & rod ASM, magnum valves for 1st & 2nd stage cylinders, outer heads, VVCP, new rod pickings and other scope detailed in the last PO for revamping of 3 nos. of Dresser Rand Gas compressor. The details are as follows:</p> <p>A. 16.25" complete gas ends for 2nd Stage for 1 (One) unit with</p> <ul style="list-style-type: none"> - Lubricated construction - Cast iron solid bore cylinder barrel with integral crank end head - Cast gray iron or aluminum piston - AISI 4142 steel piston rod - D-R make magnum valves for both 1st stage and 2nd stage cylinders for 3 units - Thermoplastic combination piston rings - Teflon piston rod packing rings - 0.75 NPT plugged connections for indicator ports on outer end and frame end of all cylinders <p>B. New Clearance pockets for existing 1st stage 23.00" cylinders for 1 Unit.</p> <p>C. Supply of new instruments for 1st stages, 2nd stage, safety relief valves for process gas piping, NRV and SOV operated ON OFF valve in the process gas piping.</p>	1 lot
2	<p>2 nos. of suction separators and 2 nos. of suction & discharge pulsation suppressors, piping, instrumentation etc.</p> <p>A. 1 no. new PULSATION DAMPENERS for 2nd stage</p> <ul style="list-style-type: none"> - Suction volume bottle & discharge volume bottles (Horizontal Type) - Designed as per ASME code Section VIII, Division 1 - MOC: Carbon steel construction with 1/8" (3.18mm) corrosion allowance - Designed pressure to suit the relevant stage relief valve pressure - Design temperature 350 deg F (177 deg. C) <p>Sized to meet API 618 pulsation levels at the line flanges</p> <ul style="list-style-type: none"> - Connection reinforced in accordance with ASME code - NPT connections for vessel mounted instrumentation <p>B. New Suction condition at inlet of 1st stage and 2nd stage for 1 unit.</p> <ul style="list-style-type: none"> - Designed as per ASME code section VIII Division 1 	1 lot

दिनांक 21/08/18

SL. NO.	BROAD SCOPE OF SUPPLY & REVAMPING OF 4 th GAS COMPRESSOR	QUANTITY
	<ul style="list-style-type: none"> - Skid mounted - MOC: Carbon Steel SA 516 Gr. 60 with vane pack. C. Miscellaneous supply of materials by DR: <ul style="list-style-type: none"> - Process Gas Piping downstream of 2nd stage discharge pulsation suppressor till after cooler inlet flange and from after cooler discharge flange to common discharge header - Hydrostatic test for new cylinders - Painting as per DR standard D. Materials required for modification of process gas, vent and drain piping within Dresser-Rand skid limit, as required. E. Thermal insulation for 2nd stage discharge pulsation dampener and discharge piping which is modified as a part of revamping of gas Compressors F. General arrangement drawings and process gas P&ID E. Erection and commissioning spares including O-rings and gaskets. 	1 lot
3.	Digital pulsation study for the 1 unit	

Digitally signed by [Signature]

ANNEXURE-II

P. O. No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/332 Dated 21/08/2018

Schedule of prices for supply of materials

SL. NO.	DESCRIPTION	QTY	TOTAL PRICE IN RS.
1	Piping materials supply related to Header modification & Gas Piping material for all three machines	1 lot	83,33,333.00
2	Material supply related to 1 st Reciprocating compressor unit	1 lot	1,75,71,111.00
3	Material supply related to 2 nd Reciprocating compressor unit	1 lot	1,75,71,111.00
4	Material supply related to 3 rd Reciprocating compressor unit	1 lot	1,75,71,111.00
			6,10,40,666.00
(Rupees Six Crore Ten Lakhs Forty Six Thousand Six Hundred Sixty Six Only)			

Handwritten signature and date: 21/08/18

ANNEXURE-IIIFormat of Draft Bank Guarantee:

PERFORMA OF BANK GUARANTEE FOR ADVANCE
(On Bank's letterhead with adhesive stamps)

Ref Date
Bank Guarantee No.

To,
.....
.....

Dear Sirs,

In consideration of the North Eastern Electric Power Corporation Ltd. (hereinafter referred to as the Purchaser which expression shall unless repugnant to the context or meaning thereof include its successors, executors, administrators or and assigns) having awarded to M/s..... with its registered office at..... (hereinafter referred to as the Contractor which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors or and assigns) a Contract (hereinafter referred to as the Contract) for the..... (scope of work) on terms and conditions set out inter-alia in the Purchaser's letter of Intent No..... dtd. Valued at Rs..... (Rupees.....) only and the purchaser having agreed to make an advance payment of Rs..... (Rupees.....) only for utilizing it for the purpose of the contract on his furnishing as guarantee as herein provided from a Nationalized Bank, We..... (hereinafter referred to as the said bank) having our (Name & Address of the Bank) registered office at..... do hereby guarantee the due recovery by the Corporation of the said advance thereon as provided, according to terms and conditions of the Contract. If the said contractor fails to utilize the said advance for the purpose of the contract and or the said advance together thereon is not fully recovered by the Corporation, we..... (Name of the Bank) hereby unconditionally and irrevocably undertake to pay to the Corporation on demand and without demur, reservation, contest, recourse or protest and without any reference to the Contractor and without waiting for outcome/award of any dispute, litigation whatsoever in this regard pending before any Court, Tribunal, Arbitrator etc. to the extent of the said sum of Rs..... (Rupees.....) only against any claim made by the Corporation on us for the loss or damage caused to or suffered by the Corporation by reason of the Corporation not being able to recover in full the amount of Rs..... (Rupees.....) only with interest as fore said.

2. We..... (Name of the bank) Further agree that the Corporation shall be sole judge of and as to whether the said Contractor has not utilized the said advance or any part thereof for the purpose of the contract and the extent of loss or damage caused to or suffered by the Corporation on account of the said advance together with interest not being recovered in full and decision of the Corporation that the said Contractor has not utilized the said advance or any part thereof for the purpose of the Contract and as to the amount of loss or damage caused to or suffered by the Corporation shall be final and binding on us

3. We, the said bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said contract and till the said advance with interest has been fully recovered and Corporation's claims satisfied or discharged and till Corporation certifies that the said advance has been fully recovered from the said Contractor, and accordingly shall have no claim under this guarantee after..... months from the date of satisfactory completion of the said Contract (as per certificate issued by the Corporation) whichever is earlier unless a notice of the claim under this Guarantee has been served on the bank before the expiry of the said period of..... months i.e. before DD/MM/YYYY in which case the same shall be enforceable against the Bank.

4. The "Corporation" shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee from time to time, to vary any of the terms and conditions of the said contract or the advance or to extend time of performance by the said contractor or to postpone for any time and time to time any of the powers exercisable by it against the said Contractor and either to enforce or forbear

from enforcing any of the terms and conditions governing the said contract of the security available to the Corporation and the said bank shall not be released from its liability under these presents by any exercise by the Corporation of the liberty with reference to the matters aforesaid or by reasons of time being given to the said Contractor or any other forbearance, act or omission on the part of the Corporation or any indulgence shown by the Corporation to the said Contractor or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of so releasing the Bank from its such liability.

5. It shall not be necessary for the Corporation to proceed against the contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding any security which the Corporation may have obtained from the Contractor shall at the time when proceeding and taken against the Bank hereunder be outstanding or unrealized.

6. We the said Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Corporation in writing and agree that any change in the constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

The Bank also agrees that the purchaser shall at its option be entitled to enforce this guarantee against the Bank as a principal debtor, in first instance notwithstanding any other security or guarantee that it may have in relation to the Contractor's liabilities of the said advance.

The liability or obligation of the Bank under this guarantee bond shall not be affected or suspended by any dispute between the purchaser and the supplier and the payment under this guarantee bond need not wait till the dispute are decided by a competent court or tribunal or any other authority and that any payment made by bank to the purchaser under the guarantee bond shall be deemed to have been rightfully and lawfully made.

Lastly the bank also assures that the guarantee bond will not be discharged due to the change in the constitution of the bank or the contractor

7. Notwithstanding anything contained herein above our liability under this guarantee is restricted to Rs. (Rupees,) only and it will remain in force upto and including and shall be extended from time to time for such periods as may be advised by the purchaser who is the beneficiary under this guarantee and in the event if the contractor fails to comply such extension within the validity period, this shall be treated as a claim by the purchaser on the bank. Standard clause of Notwithstanding clauses utilized by Nationalized Bank shall apply

Dated this ... day of ... 20... Place

WITNESS:

↑
.....
(Signature)

.....
(Signature)

.....
(Name)

.....
(Name)

.....
(Official address)

.....
(Designation)

Authority as per power of Attorney

No. dtd.

• In case of Bank Guarantees issued by a Foreign Bank, the same shall be confirmed by any of the Nationalized Banks in India.

ANNEXURE-IVBank Details:

SAMPLE

(To be submitted on the letter head of the firm)

Ref. No.

Date:

To,

The Sr. Manager (Finance)
 AGBPP, NEEPCO Ltd.
 Bokuloni, Dibrugarh
 Pin: 786191

Sub: Submission of Bank Details and Pre-receipt
 Ref:

Dear Sir,

This has reference to the subject cited above. As desired, we are pleased to furnish our Bank Details as under:

Sl No	Particulars	Details
1	Name of Bank & address	
2	IFSC Code	
3	MICR Code	
4	Bank Account No.	
5	Account Type	
6	Account Code	

Thanking you,

Yours faithfully,

()

Affix a revenue stamp with seal & sig



नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भाग मंत्रालय का सम्बन्ध)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

Assam Gas Based Power Plant

BOKULONI DIST GUWAHATI ASSAM PIN - 781 101

NEEPCO/AGBP/HOP/2018-19/W-10(A)/ 457

9 May 2018

Date: 03/11/18

Ref. No: NEEPCO/AGBP/HOP/2018-19/W-10(A)/ 457

To,
M/s Dresser Rand India Pvt Ltd
(A Siemens Business)
Plot No. 187 GIDC Naroda Estate
Naroda, Ahmedabad - 382 330

Kind attn.: Mr. Mihir Patel, Project Management, Dresser-Rand India Private Limited

SUB: Detail work order for Renovation & Modernization of Dresser-Rand Gas Compressors, model 6-HOS 4-2 of Gas Booster Station at Assam Gas Based Power Plant (291MW), Assam

- REF:
1. Our letter No. NEEPCO/AGBP/SFC/GBS-25/2017-18/344 Dated 06/09/2017
 2. Your Technical offer No. QP17IN5591 Rev 01 Dated 16/09/2017
 3. Our E-mail dated 16/09/2017
 4. Your E-mail Dated 18/09/2017
 5. Your firm Techno-commercial offer No. QP17IN5591 Rev 01 Dated 22/09/2017
 6. Your E-mail Dated 25/11/2017
 7. Our E-mail dated 22/01/2018
 8. Your E-mail Dated 23/01/2018
 9. Our E-mail dated 17/04/2018
 10. Your E-mail Dated 12/04/2018
 11. Our E-mail dated 14/05/2018
 12. Your E-mail Dated 14/05/2018
 13. Our letter No. NEEPCO/ED/IO&M/AGBP-24/2018-19/256 Dated 23/05/2018
 14. Your letter Dated Nil
 15. Our L.OI issued vide No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/136 Dated 30/05/2018
 16. Our letter No. NEEPCO/AGBP/HOP/2018-19/W-10(A)/219 Dated 26/06/2018

Dear Sirs,

With reference to above, the North Eastern Electric Power Corporation Limited is pleased to place this detail work order for Renovation & Modernization of Dresser-Rand Gas Compressor, model 6-HOS 4-2 of Gas Booster Station at Assam Gas Based Power Plant (291MW) Assam, as per Annexure-I and terms and conditions mentioned below:

1.0 Contract Price:

- 1.1 The contract Price for the entire scope of works shall be ₹ 1,29,83,333.00 (Rupees One Crore Twenty Nine Lakh Eighty-Three Thousand Three Hundred Thirty-Three) only.
- 1.2 The above price is exclusive of GST. GST is as applicable on the date of execution of contract against submission of documentary evidences.
- 1.3 The contract price shall remain FIRM during the entire period of the Contract and no escalation shall be allowed on the same.

2.0 Completion Schedule of Works / Service:

- 2.1 The work order for Renovation & Modernization shall be completed within 45 (Forty Five) days from date of receipt of all revamp hardware at site and handing over of the machine to the firm.
- 2.2 NEEPCO shall issue the commissioning certificate after 72 hours of continuous successful operation of Gas Compressor unit after startup.
- 2.3 The necessary modification of discharge piping, installation of isolation valve etc. shall be completed within shut down period for revamping works.
- 2.4 No additional plant shut down shall be allowed in any other conditions.

3.0 Criteria for Performance Test:

The Predicted Compressor Performance is as per Annexure - II. Dresser Rand has to establish predicted performance at site condition. Payment shall be released after acceptance of Performance Test by EIC (Engineer-in-charge) NEEPCO or his authorized representative.

4.0 Terms of Payment for Works / Service:

100% (Hundred Percent) payment shall be released after successful completion of works with applicable taxes and duties within 30 (Thirty) days on submission of the followings to the EIC or representative of EIC:

- a. Detailed Invoices in triplicate.
- b. Commissioning / job completion / field report in triplicate.
- c. PG Test report duly accepted by NEEPCO.
- d. Documentary evidences for payment of GST as per prevailing GST norms.

5.0 Mode of Payment:

All payments due to the contractor shall be disbursed through e-payment system. The Engineer-in-charge (EIC) or his authorized representatives will verify and certify the Contractor's Invoices. The contractor shall have to furnish the information (Bank details) as per Annexure-III.

6.0 Bank Charges:

Bank charges, if any, shall be to the contractor's account.

7.0 Paying Authority:

Paying Authority for payments shall be Head of Finance, Assam Gas Based Power Plant, Bokuloni, Dist. Dibrugarh, Assam, PIN: 786191

8.0 Withholding Payment:

8.1 The Purchaser may withhold the whole or part of any payment for the works claimed by the contractor which, in the opinion of the Purchaser, is necessary to protect himself from loss on account of:

- a. Defective works.
- b. Failure by the contractor to make payments for materials, labour employed by him and their PF dues.
- c. Insufficient progress of Revamping works.
- d. Damage or loss of property or equipment of the Purchaser.
- e. Non-return of equipment's / materials supplied by the Purchaser when the same is due.

8.2 When the grounds for withholding payment are removed, payments of the amount due to the contractor shall be made by the purchaser without delay.

9.0 Liquidated damage for delay in supply and completion of the works:

9.1 Time is the essence and LD is the sole remedy.

9.2 In case the contractor fails to execute the works within contractual period (or any extension thereof) due to reasons attributable to the contractor, then the Corporation reserves the right to recover from the contractor's sum towards Liquidated Damage @ ½ % (half percent) value of the uncompleted portion of the works for each calendar week or part thereof delay from the schedule of date of works (or extension thereof). The total recovery from the contractor's account of this shall, however, not exceed 5 % (five percent) of the value of the uncompleted portion of the works. However, the Liquidated Damage will not be imposed if the contractor fails to complete the works within the scheduled period due to Force Majeure conditions, which shall include without limitation wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, floods, explosion or fire not caused by the contractor's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.

10.0 Force Majeure:

In case of any force majeure conditions arising out of the acts of God, acts of public enemy, war, insurrections, riots, epidemics, landslides, acts of terrorism, and any other similar events beyond the control of the contractor or purchaser, and which by exercise of due diligence neither contractor or purchaser is able to overcome, the period of completion of works shall be extended without imposition of any penalty if force majeure conditions persist beyond 90 (ninety) days. NEEPCO and Dresser-Rand shall jointly decide on further course of action.

11.0 Guarantee / Warranty:

Guarantee / warranty of the works shall be for a period 6 (Six) months from the date of completion of the works or from the date of startup. Any claim for defective works shall be made in writing immediately upon discovery. The contractor shall remain liable to replace any defect and / or rectify any damage / deficiency that may develop or detected during Warranty period. Such defects and for damage shall be repaired or replaced as per decision of the Engineer-in-charge and solely at the cost of the contractor. The replaced defective parts will be returned to the contractor at his own expenses.

12.0 Contract Performance Bank Guarantee (CPBG):

Within 30 (thirty) days from the date of issue of work order, the supplier shall furnish bank guarantee from a scheduled nationalized bank for an amount equal to the 10% (ten percent) of the contract value towards faithful performance of the contract. The Bank Guarantee shall be valid for a period to cover 90 (ninety) days after expiry of warranty period.

13.0 Buyer's suspension of work:

In case NEEPCO suspended the works at site beyond 30 days, it shall pay the contractor for the suspension period and suspension beyond 30 days will be handled as per MD 001, D-R standard curve for cancellation charges.

14.0 Change in Order:

It is recognized that the Buyer / purchaser may request for changes in the work to be performed hereunder. The purchaser / buyer and the contractor / seller agrees upon the increase or decrease in the amount due under the Purchase order or in the time required for performance, if any, prior to the seller / contractor implementing the changes to work.

15.0 Limitation of Liability/indemnity:

The purchaser accepts the Limitation of liability clause of Dresser-Rand without any prejudice to the interest of the corporation (NEEPCO) within the limit of the Revamp job (i.e. 100% of the contract value). Mutual indemnification shall be applicable.

16.0 Governing Laws / Arbitration:

16.1 Dresser-Rand and NEEPCO shall make all reasonable efforts to amicably resolve any dispute arising out of this contract.

16.2 Arbitration if any shall be as per the Indian Arbitration and Reconciliation Act 1996. Each party shall appoint one arbitrator. The two appointed arbitrator shall then select the third arbitrator.

16.3 Place of arbitration shall be Guwahati / Delhi.

17.0 Site Insurance:

Site insurance for all site activities, relating to all works including materials handling will be under the scope of Contractor's.

18.0 Contract agreement:

The Contract agreement shall be signed within 15 days from the date of acceptance of this order. You are to depute one of your authorized signatory for signing of the contract agreement.

Kindly acknowledge the receipt of this work order and confirm your acceptance.

Thanking you.

Yours faithfully,

(H. K. Chakrabarti)

G.M. & Head of Project,

AGBP, NEEPCO (M).

ANNEXURE-IDetails of Works for Revamping works of 4th Dresser Rand Gas Compressor:

SL. NO.	DETAILS OF WORKS FOR REVAMPING OF 4 TH DRESSER RAND GAS COMPRESSOR:
1.	Dismantle, inspect, overhaul, and re-assemble of Old frames and running gear (Compressor frame components) of existing Gas Compressor
2.	Overhaul & cleaning of 1 st stage 73.00' cylinders of Gas Compressor.
3.	<p>Installation of followings:</p> <ul style="list-style-type: none"> • Installation of 2 X 16.25" new Gas Ends of Gas Compressor • Installation of 1st stage suction Knock out drum (KOD) with new instrumentation, manual and auto drain system of Gas Compressor • Installation of 2nd stage Knock Out drum (KOD) with new instrumentation, manual and auto drain system for Gas Compressor • Installation of 2nd stage suction volume bottle with new instrumentation for Gas Compressor • Installation of 2nd stage discharge volume bottle with new instrumentation for Gas Compressor • Installation of new instruments for existing 1st stage suction & discharge volume bottles for Gas Compressor • Overhauling & inspection of old components-main bearings, crankshaft, connecting rods, 1st stage cylinders of Gas Compressors • Installation of 2nd stage discharge gas line with new check valve, solenoid operated ON-OFF valve, manual operated ball valve for Gas Compressor • Installation of 1st and 2nd stage Suction Separator: shifting, replacement and erection of new separators, hooking up with existing pipe line, including Materials (instruments) and consumables & modification of drain & vent piping • Installation of 2nd stage Suction & Discharge volume bottles: shifting, replacement and erection of new volume bottles, hooking up with existing pipe line, including Materials (instruments) and consumables & modification of drain & vent piping • Installation of new gas piping from 2nd stage discharge volume bottle to After cooler (with cladding & thermal insulation) and After cooler to discharge header • Common discharge header modification during common shutdown (all materials required shall be under DR scope) • Installation of new instruments for 1st & 2nd stage volume bottles & separators.

SL. NO.	DETAILS OF WORKS FOR REVAMPING OF 4 TH DRESSER RAND GAS COMPRESSOR:
	<ul style="list-style-type: none"> • Inspection of the Compressor base structure area and Epoxy grouting if required • Barricade wall to isolate working area.
4	<ul style="list-style-type: none"> • Field Servicing • Unloading and shifting of all materials within site. • Stores Watch and Ward • Temporary Site Stores • GAS COMPRESSORS • Recording of existing operating parameters. • Shutdown and depressurization of the compressor • Draining of lube oil and cleaning of the compressor • Opening and removal of suction strainer • Blinding of Suction / Discharge lines & fire lines • Dismantling and removal of inter-stage jacket cooling water lines • Dismantling and removal of volume bottles, un-loaders, suction and discharge valves • Dismantling and removal of lube oil pump, lubricator, filter and lines • Cleaning of the compressor jackets • Checking of existing piston end clearances • Piston rod run out and measurements • Opening and removal of cylinder heads, gland packings, piston and piston rods • Opening and removal of cross heads, big end bearings & connecting rods • Opening and removal of lube oil cooler • Checking of cylinders alignment prior to dismantling • Checking of crankshaft deflection before dismantling • Opening and removal of 1st stage and 2nd stage cylinders yokes • Removal of crankshaft & inspection, installation of crankshaft with new main bearings • Measuring clearances of Main Bearings • Cleaning of the dismantled other parts, pipes etc. and inspection and deflection • Replacement of 2nd stage new cylinders (2 nos) and alignment • Fitting of connecting rods, BEBs and crossheads • Fitting of piston rod / piston assemblies and cylinder heads • Assembly of all the gland packing • Measurements of piston end clearances, crosshead clearances BEB clearances etc. and piston rod run outs after reassembly of various parts.

SL. NO.	DETAILS OF WORKS FOR REVAMPING OF 4 TH DRESSER RAND GAS COMPRESSOR:
	<ul style="list-style-type: none">• Fitting of volume bottles• Fitting of lube oil pumps and its auxiliaries• Removal of blinds and hooking up of the inlet / outlet gas, water and lube oil pipe lines, flare lines and Mechanical Test Run• Pre-commissioning, Commissioning Test Run
5.	<ul style="list-style-type: none">• Loading and Unloading of materials at site• Loading and unloading of materials shall be under the scope of Dresser-Rand
6.	<ul style="list-style-type: none">• Modification of process gas piping within the battery limit
7.	<ul style="list-style-type: none">• All the tools and tackles including lifting arrangement except crane (EOT crane of 5 Ton capacity inside GBS compressor building) required for job shall be arranged by Dresser-Rand

ANNEXURE-II

Predicted Compressor Performance:

Operating Parameters			
	Units	Case-I	Case-II
Suction Pressure	Kg/Cm ²	3.65	3.65
Discharge Pressure	Kg/Cm ²	21.00	21.00
Suction Temperature	Deg. C	40	20
Wet Capacity	NM ³ /Hr	29,043	30,729
Clearance Pocket First Stage	Open / Closed	Closed	Closed
Clearance Pocket Second Stage	Open / Closed	Closed	Closed
Compressor details:			
Type of Compressor		Four throw Reciprocating Compressor	
Model		23" X 23" X 16.25" X 16.25" X 6" 4HOS-2	
No. of Stage		Two (2)	
No. of Cylinders		Four (4)	
No. of Throws		Four (4)	
Stroke		6	
Speed	RPM	900	900
Comp. Shaft Power	BHP	2585	2755
Type of Drive		Direct	

Note 1: The VVCP shall have necessary limit / capacity for manual adjustment in both ways, so that the flow can be increased or decreased either way of 28,000 NM³/Hr @ 900RPM.

Note 2: Dresser-Rand to establish predicted performance at site condition

PO Ref No.: NEEPCO/AGBP/SFC/GBS-3/2018-19/ 296

Date: 20/07/2018

To

M/S Dresser-Rand India Pvt. Limited,
(A Siemens Business)
Plot No. 187, GIDC Estate, Naroda
Ahmedabad-382 330, Gujrat-India

ATTEN: Mr. Manish Agarwal, Accounts Manager-East & North East India

SUB: Detail purchase order for supply of spares for Dresser-Rand Gas Compressors, model: 6-HOS 4-2 of Gas Booster Station at Assam Gas Based Power Plant (291MW), Assam.

- REF: 1. Your offer ref. no. CAE-41147 dtd. 07/03/2018.
2. Your mail dtd. 26/04/2018.
3. Our mail dtd. 26/04/2018.
4. Your response mail dtd. 30/04/2018.
5. Our mail dtd. 13/07/2018.
6. Your response mail dtd. 13/07/2018 & 19/07/2018

37NBT/09
16/11/18
Manish
13/07/2018

Dear Sirs,

With reference to above, we are pleased to place this detail supply order for supply of following spares for Dresser-Rand Gas Compressors, model: 6-HOS 4-2 of Gas Booster Station at Assam Gas Based Power Plant (291MW), Assam:

Sl. no.	Description	Part Number	Qty.	Unit Rate in INR	Total amount in INR
1	Piston and Rod Assy. 16.25" HOS	MLJEHA1621G1	1 no.	17,63,694.00	17,63,694.00
2	Piston and Rod Assy. 23.00" HOS	MLH50185AG32	1 no.	24,33,346.00	24,33,346.00
3	Bullet	R83865AIM	1000 nos.	430.00	4,30,000.00
4	Spring & insert	PP1389NBIM	1000 nos.	163.00	1,63,000.00
Total Basic Price in INR					47,90,040.00
(Rupees Forty Seven Lakh Ninety Thousand and Forty) only					

The terms and conditions are as follows:

1.0 Scope of Contract:

The Scope of this contract shall include Supply and Delivery of Spares as listed above for Dresser-Rand Gas Compressors, model: 6-HOS 4-2 of Gas Booster Station at Assam Gas Based Power Plant (291MW), Assam

2.0 Contract Price:

- 2.1 The total contract Price for the entire scope of supply shall be **Rs.47,90,040.00 (Rupees Forty-Seven Lakh Ninety Thousand and Forty) only** for the spares indicated at scope of the contract.
- 2.2 The contract price for the supply of materials is ex-works, Neroda, Ahmadabad, India.
- 2.3 All the Taxes and Duties shall be paid extra as applicable.
- 2.4 The price mentioned above is accepted without any prejudice to the rights of this corporation to recover / reclaim any payment made in excess.
- 2.5 The contract price shall remain FIRM during the entire period of the Contract and no escalation shall be allowed on the same.

3.0 Terms of Payment:

Payment: 100% payment shall be made through bank against dispatch documents. All bank charges shall be borne by the supplier. **Our banker is the State Bank of India, Bokuloni Chariali Branch, Dibrugarh.** 60 (sixty) days' time shall be allowed for retiring of the bank documents. A copy of non-negotiable dispatch documents comprising the following shall be forwarded to the consignee with a copy to this office in advance. (All bank charges shall be borne by the contractor.)

- a) Invoice in triplicate.
- b) Packing list.
- c) Transpotters' consignment note.
- d) Guarantee/warranty certificate.
- e) PAN, GST details.
- f) Documentary evidences against P&F charges.
- g) Bank details as per Annexure-1

4.0 Mode of Payment:

All payments shall be disbursed through e-payment system. The contractor shall have to furnish the information (Bank details) as per Annexure- 1.

5.0 GST:

GST shall be applicable extra on the basic prices as per GOI prevailing norms.

6.0 Bank Charges:

All bank charges shall be to the contractor's account.

7.0 Paying Authority:

Paying Authority for payments shall be "Sr. Manager (F&A), Assam Gas Based Power Plant, Bokuloni, Dist.: Dibrugarh, Assam, PIN: 786191".

8.0 Delivery Period:

The materials shall be delivered within 34 weeks for item sl. No. 1 & 2 and 16 weeks for item sl. No. 3 & 4 Ex-Works from the date of issue of purchase order. The date of dispatch from the supplier's works shall be considered as date of delivery.

9.0 Guarantee / Warranty:

Guarantee / warranty of the materials supplied shall be for a period 12 (Twelve) months from the date of installation or 18 (Eighteen) months from the date of supply, whichever is earlier

10.0 E-way bill:

The e-way bill shall be generated by the supplier. The portal for generation of e-way bill is "https://ewaybillgst.gov.in".

11.0 Transit Insurance:

Transit insurance shall be covered under NEEPCO's open marine policy. The details of consignment with value shall be intimated to Corporation prior to dispatch of materials for arrangement of necessary transit insurance. In case of non-intimation prior to dispatch of materials for arrangement of transit insurance, any damage or losses in transit shall be borne by you.

12.0 Rejection of defective materials and equipment:

If any materials shall found defective / inferior / not found fit for the existing machines at the time of receipt of materials, the same shall be immediately intimated to the contractor in writing. On receiving the details of any such discrepancies / deficiencies, the contractor shall have to replace the materials /equipment immediately at the contractor's own expenses.

13.0 Transportation & Freight Charges:

The materials shall be transported through reputed courier or transporter on freight paid basis to the site, AGBP. The transportation or freight charges shall be paid at actual on submission of documentary evidences.

14.0 Packing & Forwarding:

14.1 Packing and forwarding charges shall be paid extra at actual basis subject to maximum of @1% of the total basic prices and submission of documentary evidence.

14.2 The Contractor shall be responsible for securely protecting and packing of materials / spares, taking care for protruding parts and such other vulnerable parts to withstand the journey and ensuring the safety of materials and also arrival of materials at site in good and original condition for contemplated use, so as to avoid damage under normal conditions of transport, loading & unloading, handling and storage at site. The contractor shall be responsible for any damage during transportation, handling and storage due to improper packing.

14.3 Each bundle of package shall have following marking on it.

- a. The name and address of the consignee,
- b. Destination place shall be as below:

*Sr. Manager (E/M), MMW,
Assam Gas Based Power Plant, NEEPCO Ltd.
P.O.: Bokuloni (Near Duliagan)
Dist: Dibrugarh, Assam-786191*

- c. The relevant marks, reference numbers etc, for identification,
d. Direction for handling the materials,
14.4 Each package shall also be accompanied with detailed packing list to facilitate checking of the contents at the site.

Kindly acknowledge the receipt of this supply order and confirm your acceptance within 10 (ten) days from the date of issue of this order. Acceptance letter not received within stipulated period shall be considered as your acceptance.

Thanking you,

Yours faithfully,

जितून कुमार गोगोई

26/7/18

(जितून कुमार गोगोई)

(Jitun Kumar Gogoi)

बरिस्थ प्रवन्धक (बि./या.)

Sr. Manager (E/M)

स्टेशन फेसिलीटिस कॉम्प्लेक्स

Station Facilities Complex

आ.जी.बी.पि., नीपको, बोकुलोनी

AGBP, NEEPCO LTD, Bokuloni

NIO:

No. NEEPCO/AGBP/SFC/GBS-3/2018-19/ 297-301

Dtd. 26/07/2018.

Copy to:

1. The HOP, AGBP, NEEPCO Ltd., for his kind information, please. This has reference to his approval conveyed vide U.O. ref. no. NEEPCO/HOP/798 dtd. 25/07/2018.
2. O/O the DGM (E/M), for record.
3. The Sr. Manager (E/M), MMW, AGBP, NEEPCO Ltd., for needful.
4. The Sr. Manager (Fin), F&A Wing, AGBP, NEEPCO Ltd., for his information and needful.
5. The Sr. Manager (E/M), Vigilance Wing, AGBP, NEEPCO Ltd. for information. The order is issued to OEM.

O/C

जितून कुमार गोगोई

26/7/18

(जितून कुमार गोगोई)

(Jitun Kumar Gogoi)

बरिस्थ प्रवन्धक (बि./या.)



ISO - 9001-2000
ISO-14001-2004
OHSAS - 18001-1999

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का अस्थान)
असम गैस आधारित शक्ति संयंत्र

बोकुलोनि, डिस्ट-दिब्रुगढ़, असम, पिन - 786 191

North Eastern Electric Power Corporation Ltd.

(A Govt. of India Enterprise)

www.neepco.gov.in

ASSAM GAS BASED POWER PLANT

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

Ph: 2226453/2226454/2226455/2226456 FAX: 0374-2226462/2226467

E-mail: assp@neepco.com

Dtd. 29/10/2020

No NEEPCO/AGBP/SFC/O&M-13/2020-21/ 5300

To

M/s Ankit Appliances,
A.T. Road, Tinsukia-786125
Assam

Sub: Detailed Purchase Order cum Work order for Supply of supply of materials, installation, erection and commissioning of 5 (five) numbers of (8 Ton capacity each) Floor Standing Tower Air Conditioner (AC) for Central Control Room (CCR) of Assam Gas Based Power Plant NEEPCO Ltd., Bokuloni, Dist: Dibrugarh, Assam, PIN - 786 191, as per following Terms and Conditions:-

Ref: 1. E Tender No. AGBP/SFC/O&M-13/2020-21/200 dtd. 22/07/2020
2. Tender ID: 2020_NEEPCO_53499_1
3. Your Bid ID: 193903 submitted on 28/08/2020
4. Our mail dtd. 30/09/2020
5. Your clarification mail dtd. 12/10/2020

Dear Sir,

With reference to above, we are pleased to place this Purchase Order cum Work Order for Complete Supply of materials (Outdoor unit, Indoor unit, mechanical and electrical accessories), installation, erection & commissioning of 5 (five) numbers of (8 Ton capacity each) Floor Standing Tower Air Conditioner (AC) for Central Control Room (CCR) of Assam Gas Based Power Plant NEEPCO Ltd., Bokuloni, Dist: Dibrugarh, Assam, PIN - 786 191, as per following Terms and Conditions:-

TERMS AND CONDITIONS

- SCOPE OF CONTRACT:** The Scope of this contract shall include:
 - Supply of Materials: Details Schedule of Supply of materials and price shall be as per Annexure-I enclosed herewith. Technical details of materials are at Annexure-II
 - Complete installation, erection & commissioning of 5 numbers of Floor Standing AC.
- CONTRACT PRICES:** The price part of this contract shall have two components:
 - Price for Supply of materials
 - The total basic price payable for complete supply of materials, as per Annexure-I, shall be **Rs. 09,51,653.00 (Rupees Nine Lakhs Fifty-One Thousand Six Hundred and Fifty-Three) only** which shall remain FIRM till the completion of the supply.
 - GST shall be applicable as extra as per prevailing GDI norms
 - The price mentioned above, is accepted without any prejudice to the rights of this Contract to recover / retain any payment made in excess.
 - Charges for Complete installation and Erection & commissioning.
 - The Complete installation and Erection & commissioning charges, as per Annexure-II, shall be **Rs. 08,475.00 (Rupees Eight Thousand Four Hundred and Seventy-Five) only**
 - GST shall be applicable extra as per prevailing GDI norms
- TAXES AND DUTIES:** GST shall be paid extra as applicable as per prevailing GDI norms
- TCS:** TCS on sales of goods vide 206C (1H) of Income Tax Act 1961 introduced vide Finance Act 2020 shall be applicable as per GDI norms
- PAN:** The PAN number of NEEPCO is AAACN981J
- PAYMENT:** The payment term is "100% payment shall be made after successful commissioning of all the units as per schedule of completion within 30 days from the date of supply". The supplier shall submit the following documents to the consignee:
 - Invoice in triplicate
 - Packing List
 - Consignment note/Lorry receipt
 - Documents in support of Taxes and Duty payment
 - Job completion report
 - Guarantee certificate
 - Bank details (Annexure-IV) for equipment


29/10/2020

- 7. E-WAY BILL:** The e-way bill shall be generated by the supplier. The portal for generation of e-way bill is <https://ewaybillgst.gov.in>
- 8. COMPLETION PERIOD:** The supply of materials, installation, erection & Commissioning shall be completed within 2 months from receipt of this order.
- 9. LIQUIDATED DAMAGE:** In case the suppliers fail to deliver the materials within contractual delivery period (or any extension thereof) due to reasons attributable to the supplier, then the Corporation reserve the right to recover from the supplier's sum towards Liquidated Damage @ 1/2 % (half percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account this shall, however, not exceed 15% (fifteen percent) of the value of the undelivered portion of supply. However, the Liquidated Damage will not be imposed if the supplier fails to deliver the materials within the schedule delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, flood, explosion or the fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.
- 10. GUARANTY / WARRANTY:** The compressor shall be covered under guaranty / warranty for a period of at least for 5 (five) years and other components shall be covered under guarantee / warranty for a period of 1 (One) year from the date of installation and successful commissioning of all the units from any defects / malfunctioning of the units or parts thereof and to be replaced free of cost.
- 11. SECURITY-CUM-PERFORMANCE BANK GUARANTEE:** The supplier shall submit Security-cum-Performance Bank Guarantee of 10(ten) percent of contract value within 30 (thirty) days from the date of Issue of Letter of Intent as per relevant Clause of GTCC (Vol-IV). The format of BG is enclosed herewith at Annexure-V.
- 12. REJECTION OF DEFECTIVE MATERIALS:** If the materials are found to be defective at the time of receipt or not fit for the equipment as intended for, the same will be rejected and the supplier's shall replace the same at their own cost with new materials.
- 13. VERIFICATION OF MATERIALS:** One authorized representative from your side shall have to be deputed at the time of verification of materials at site and the material will be verified jointly.
- 14. BOARDING AND LODGING:** NEEPCO shall provide boarding and lodging for the service team at site on chargeable basis, if required.
- 15. PAYING AUTHORITY:** The DGM (Finance), F&A Wing, AGBP, NEEPCO Ltd, Bokuloni, Assam.
- 16. DELIVERY DESTINATION AND CONSIGNEE:** The DGM (EM), MMW, AGBP, NEEPCO Ltd, Bokuloni, Assam.
- 17. ENGINEER-IN-CHARGE:** The AM (EM), SFC, AGBP, NEEPCO Ltd, Bokuloni, Assam.
- 18. ALL OTHER TERMS AND CONDITIONS:** The bid documents are part of this contract and T&C shall be applicable as per BID documents.

Please acknowledge the receipt of this supply order and convey your acceptance.
Thanking you,

Yours Sincerely

- End: Annexure-I: Schedule of spares and prices
Annexure-II: Schedule of Service and price
Annexure-III: Technical details of Floor Standing AC
Annexure-IV: Format of Bank details
Annexure-V: Format of BG


(Digitally signed by Jagan Kumar Gogo)
जगन्नाथ गुगो (जे/एम)
Dy. General Manager (EM)
राष्ट्रीय विद्युत निगम (एम्/एम)
Rajon Finance Complex
क.पी.सी. रो. दीनाब, दीनाबरी
AGBP, NEEPCO LTD, Bokuloni
Dibrugarh, Assam-786151

Annexure-I

Order ref. no. NEEPCO/AGBP/SFC/G&M-13/2020-21/10/1-5/55 dtd. 29/10/2020

Schedule of rates and prices:

Sl No	Description of Items	Qty	Unit / Vol	Per unit rate in INR	Total Amount in INR
a	b	c	d	e	f
1	HAIER make - 6 Tr. Tower AC (Indoor Unit Model: AP96TN1QAA and Outdoor Unit Model: JUB6TN1QAB)	5	No.	1,87,500.00	9,37,500.00
2	Various Accessories (Electrical and Mechanical Accessories)	5	Lot	2,830.51	14,152.55
3	Total in INR				9,51,652.55
4	R/O in INR:				9,51,653.00
Rupees Nine Lakh Fifty One Thousand Six Hundred and Fifty Three Only.					

29/10/2020

Annexure-II

Order ref. no. NEEPCO/AGBP/SFC/O&M-13/202 21/01/2020 dtd 29/10/2020

SCHEDULE OF PRICES FOR INSTALLATION AND ERECTION & COMMISSIONING

Sl. No	Description of Items	Qty.	Unit / Vol	Per unit rate in INR	Total Amount in INR
a	b	c	d	e	f
1	Installation and Erection & Commissioning charges	5	No.	1,695.00	8,475.00
3	Total in INR				8,475.00

Rupees Eight Thousand Four Hundred and Seventy Five Only

29/10/2020

Annexure-III

TECHNICAL SPECIFICATION OF STANDING FLOOR AC

SL NO.	DESCRIPTION	DETAIL SPECIFICATION
1	MAKE	HAIER
2	MODEL	INDOOR UNIT: AP95TN1QAA OUTDOOR UNIT: 1U95TN1QAB
3	CAPACITY	1 TON
4	TYPE	TOURER TYPE
5	COMPRESSOR TYPE	SCROLL TYPE
6	NOMINAL COOLING CAPACITY RTU	95,000 BTU
7	REFRIGERANT TYPE	R-410A
8	POWER SUPPLY	
	PHASE	3
	VOLTAGE	480-415 V
	FREQUENCY	50 HZ


 24/10/2022



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित प्रक्ति संयंत्र

बकुलनि, जिला- दिब्रुगढ़, असम, पिन - 786 191

ISO - 9001:2000
ISO 14001:2004
ENFSI - 18001:2007

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)

www.neepco.gov.in

ASSAM GAS BASED POWER PLANT

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

Ph: 0374-261080, 261081, 261082, 261083, 261084, 261085, 261086, 261087

E-mail: enquiry@neepco.gov.in, toppaper@neepco.gov.in

Dtd. 27/07/2021

No: NEEPCO/AGBP/SFC/O&M-13/2021-22/254

To

M/S RB Electronics,
Prakash Bazar, Tinsuka-786125
Assam

Sub: Detailed Purchase Order cum Work order for Supply of supply of materials, installation, erection and commissioning of 10 (Ten) numbers of (2 Ton capacity each) Ductable Split Air Conditioner (AC) for AGBP, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam.

Ref: 1. NILT no. NEEPCO/AGBP/SFC/O&M-13/2021-22/01 dtd. 25/06/2021
2. Your bid submission letter ref. no. Nil dtd. 30/06/2021

Dear Sir,

With reference to above, we are pleased to place this Purchase Order cum Work Order for Complete Supply of materials (Outdoor unit, Indoor unit, mechanical and electrical accessories), installation, erection & successful commissioning of 10 (ten) numbers of (2 Ton capacity each) Ductable Split Air Conditioner (AC) for DM plant and other area of Assam Gas Based Power Plant, NEEPCO Ltd, Bokuloni, Dist Dibrugarh, Assam, PIN-786 191 as per following Terms and Conditions. -

TERMS AND CONDITIONS:

- SCOPE OF CONTRACT:** The Scope of the contract shall include
 - Supply of Materials: Details Schedule of Supply of materials and price shall be as per Annexure-I enclosed herewith. Technical details of materials shall be as per Annexure-II.
 - Complete installation, erection & successful commissioning of 10 numbers of ductable split AC.
- CONTRACT PRICES:** The price part of this contract shall have two components:
 - Price for Supply of materials:**
 - The total basic price payable for complete supply of materials, as per Annexure-I, shall be **Rs. 04,76,844.00 (Rupees Four Lakhs Seventy Six Thousand Eight Hundred and Forty-Four) only** which shall remain EIR till the completion of the supply.
 - GST shall be applicable as extra as per prevailing GOI norms.
 - The price mentioned above is accepted without any prejudice to the rights of this Corporation to recover / recover any payments made in advance.
 - Charges for Complete Installation and Erection & commissioning.**
 - The Complete Installation and Erection & commissioning charges, as per Annexure-I, shall be **Rs. 15,000.00 (Rupees Fifteen Thousand) only**.
 - GST shall be applicable extra as per prevailing GOI norms.
- TAXES AND DUTIES:** GST shall be paid extra as applicable as per prevailing GOI norms.
- TCS:** TCS on sales of goods up to 20% (1%) of Income Tax Act 1951 introduced vide Finance Act 2020 shall be applicable as per GOI norms.
- PAN:** The PAN number of NEEPCO is AAUAC2985Q.
- PAYMENT:** The payment for the work shall be made after successful commissioning of all the units as per schedule of completion within 30 days from the date of supply. The contractor shall submit the following documents to the contractor:
 - Invoice in triplicate
 - Packing List
 - Consignment note/delivery receipt
 - Documents in support of Taxes and Duty payment
 - Job completion report
 - Guarantee certificate
 - Bank details Annexure-IV for payment

जिसु कुमार प्रसाद
राजेश्वर

Regd. Office: Brookland Compound, Lower New Colony, Shillong - 793 003

Ph: (0364) 2224487 / 2226451 FAX: 2226417

7. **E-WAY BILL:** The e-way bill shall be generated by the supplier. The portal for generation of e-way bill is "https://ewaybillgst.gov.in".
8. **COMPLETION PERIOD:** The supply of material, Installation, erection & Commissioning shall be completed within 1 month from receipt of this order.
9. **LIQUIDATED DAMAGE:** In case the suppliers fail to deliver the materials within contractual delivery period (or any extension thereof) due to reasons attributable to the supplier, then the Corporation reserve the right to recover from the supplier's sum towards Liquidated Damage @ 1% (half percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account this shall, however, not exceed 15% (fifteen percent) of the value of the undelivered portion of supply. However, the Liquidated Damage will not be imposed if the supplier fails to deliver the materials within the schedule delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquakes, storms, flood, explosion or fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.
10. **GUARANTY / WARRANTY:** The guaranty / warranty for a period shall be for a period of 1 (One) year from the date of installation and successful commissioning of all the units from any defects / malfunctioning of the units or parts thereof and to be replaced free of cost.
11. **REJECTION OF DEFECTIVE MATERIALS:** If the materials are found to be defective at the time of receipt or not fit for the equipment as intended for, the same will be rejected and the supplier's shall replace the same at their own cost with new materials.
12. **COMPRESSORS WARRANTY:** The compressor shall be under warranty for a period of 10 years.
13. **PAYING AUTHORITY:** The DGM (Finance), F&A Wing, AGBP, NEEPCO Ltd., Bokuloni, Assam.
14. **DELIVERY DESTINATION AND CONSIGNEE:** The DGM (EM), MMW, AGBP, NEEPCO Ltd., Bokuloni, Assam.
15. **ENGINEER-IN-CHARGE:** The AM (EM), SFC, AGBP, NEEPCO Ltd. Bokuloni, Assam.
16. **ALL OTHER TERMS AND CONDITIONS:** The bid documents are part of this contract and T&C shall be applicable as per BID documents.

Please acknowledge the receipt of this supply order and convey your acceptance
Thanking you,

- Encl. Annexure-I: Schedule of spares and prices
Annexure-II: Schedule of Service and price
Annexure-III: Technical details of Floor Standing AC
Annexure-IV: Format of Bank details

Yours Sincerely,

(Handwritten signature)
21/07/2024

(Signature)
(Name)
General Manager (EM)
Station Facilities Complex
AGBP, NEEPCO LTD, Bokuloni
Dauguri, Assam India

Annexure-I

Order ref. no. NEEPCO/AGBP/SFC/DSM-13/2021-1P/Q/S/F

date: 27/07/2021

SCHEDULE OF SPARES AND PRICES:

Sl. No.	Description of Items	Qty.	Unit / Vol	Per unit rate in INR	Total Amount in INR
a	b	d	e	f	g
1	Penasonic make 2 Tr. Split AC (Indoor Unit Model: CS-KU24XKYX and Outdoor Unit Model: CU-KU24XKYX)	10	No.	46,484.38	04,64,843.80
2	Heavy duty bracket for outdoor AC unit with Anchor nuts.	10	Set	1,200.00	12,000.00
3	Total in INR				04,76,843.80
4	R/O in INR				04,76,844.00
Rupees Four Lakh Seventy Six Thousand Eight Hundred and Forty-Four Only					

Note: 1. Present GST rate is @28% shall be applicable for the item sl. No.1 and shall be paid extra.

2. Present GST rate is @ 12% shall be applicable for the item sl. No.2 and shall be paid extra.

(However GST shall be applicable as per CCA norms at the time of invoicing only and shall be paid extra as applicable.)

Signature
27/07/2021

Annexure-II

Order ref. no. NEEPCO/AGBP/SFC/O&M-13/2021-22

dtd. 27/07/2021

SCHEDULE OF PRICES FOR INSTALLATION AND ERECTION & COMMISSIONING

Sl. No.	Description of Items	Qty.	Unit / Vol	Per unit rate in INR	Total Amount in INR
a	b	c	d	e	f
1	Installation and Erection & Commissioning charges	10	No.	1,500.00	15,000.00
	Total in INR				15,000.00
Rupees Fifteen thousand Only					

Note: 1. Present GST rate is @ 18% shall be applicable on Installation and commissioning charges and shall be paid extra as applicable. However, GST shall be applicable as per the prevailing rate of GOI at the time of invoicing and shall be paid extra.

लि. प्र. अ. अ. अ. अ. अ. अ.
27/07/2021

Annexure-II

TECHNICAL SPECIFICATION OF STANDING FLOOR AC

SL. NO.	DESCRIPTION	DETAIL SPECIFICATION
1	MAKE	FUJITSU
2	MODEL	INDOOR UNIT: CS-KU24XKYX OUTDOOR UNIT: CU-KU24XKYX
3	CAPACITY	2 TON
4	TYPE	DUCTABLE SPLIT AC
5	NOMINAL COOLING CAPACITY BTU	2155 - 8250
6	REFRIGERANT TYPE	R-32
7	STAR RATING	4

FOR BT GATE SPTS
27/07/2021



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र

North Eastern Electric Power Corporation Ltd
(A Govt. of India Enterprise)
www.neepco.gov.in

0361-2601-2000
0361-2601-2004
0361-2601-1990

बकुलनि, जिला - डिब्रुगढ़, असम, पिन - 781191

ASSAM GAS BASED POWER PLANT

BOKULONI DIST DIBRUGARH ASSAM PIN - 781191

2a, 0361-2601-2000 Fax: 0361-2601-2004 0361-2601-1990
E-mail: spc@neepco.gov.in, assam@neepco.gov.in

No: NEEPCO/AGBP/SFC/O&M-13/2021-22/197

Dtd: 28/06/2021

To

M/s Blue Star Ltd,
Oasis Commercial, 1st Floor,
Dr. B Barooah Road, Ulubari,
Guwahati, Assam,
PIN: 781007
Attn: Mr. Sourav Jana

Subj: Detailed Purchase Order cum Work order for Complete Supply of materials, installation, erection & commissioning of 2 (two) numbers of 80 Tr Screw Compressors along with other accessories for Central Air Conditioning Plant of Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni Dist Dibrugarh, Assam.

- Ref:
1. Our mail & letter ref. no. NEEPCO/AGBP/SFC/O&M-13/2021-22/59 dtd. 18/05/2021
 2. Your mail dtd. 19/05/2021
 3. Our mail dtd. 20/05/2021
 4. Your mail dtd. 20/05/2021
 5. Our mail & letter ref. no. NEEPCO/AGBP/SFC/O&M-13/2021-22/56 dtd. 21/05/2021
 6. Your mail dtd. 21/05/2021
 7. Our mail dtd. 22/05/2021
 8. Your offer letter no. SD/CPSD/NEEPCO/21-22/02 dtd. 24/05/2021
 9. Our mail dtd. 28/05/2021
 10. Your reply mail dtd. 31/05/2021
 11. Our mail dtd. 19/06/2021
 12. Your clarification mail and letter dtd. 19/06/2021
 13. Our mail dtd. 19/06/2021
 14. Your letter ref. no. SD/CPSD/NEEPCO/21-22/02 dtd. 19/06/2021

Dear Sir,

With reference to above, we are pleased to place this Purchase Order cum Work Order for Complete Supply of materials (As per Annexure-I), installation, erection & commissioning of 2 (two) numbers of 80 Tr Screw Compressors along with their accessories as per Annexure-I & II for Central Air Conditioning Plant of Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist Dibrugarh, Assam, PIN - 781191, as per following Terms and Conditions:-

TERMS AND CONDITIONS:

1. **SCOPE OF CONTRACT:** The scope of this contract shall include:
 - A. Supply of Materials: Details Schedule of Supply of materials and price shall be as per Annexure-I enclosed herewith. The details technical data sheet of 80 Tr Screw Chiller and Cooling Tower are enclosed at Annexure-II & IV.
 - B. Complete installation, erection & commissioning of 2 numbers of 80 Tr Screw Chiller along with other accessories and hooking up with the existing system of the Central AC plant of AGBP as per Annexure-II enclosed herewith.
 - C. Dismantling of 2 numbers of the Non-pressurized Chiller and 2 numbers of CFC Cooling tower of Central AC plant and shifting to designated area for disposal.
2. **CONTRACT PRICES:-** The price per set of this contract shall have two components.
 - A. Price for Supply of materials:
 - The total basic price payable for complete supply of materials, as per Annexure-I, shall be Rs. 45,48,494.00 (Rupees Forty-Five Lakhs Forty-Eight Thousand Four Hundred and Ninety-Four) only which shall remain FIRM till the completion of the supply.
 - GST shall be applicable as extra as per prevailing GST norms.
 - The price mentioned above is accepted along with its applicability to the norms of this Corporation to recover/retain any payment made/awarded.

Regd Office: Brookland Compound, Lower New Colony, Shillong - 793001

Ph: (0364) 2224487 / 2226453 FAX: 2226417

[Handwritten signature and stamp]

B. Charges for Dismantling and shifting of old Equipment and Complete installation and Erection & commissioning of new equipment:

- The dismantling & shifting of old equipment and Complete Installation and Erection & commissioning charges, as per Annexure-II, shall be Rs. 04,34,245.00 (Rupees Four Lakhs Thirty Four Thousand Two Hundred and Forty Six) only.
- GST shall be applicable extra as per prevailing GOI norms.

3. **TAXES AND DUTIES:** GST shall be paid extra as applicable as per prevailing GOI norms.
4. **TCS:** TCS on sales of goods u/s 206C (1H) of Income Tax Act 1961 introduced vide finance Act 2020 shall be applicable as per GOI norms.
5. **PAN:** The PAN number of NEEPCO is ANHCN3991J.
6. **PAYMENT:**

A. For Supply of Equipment and other Accessories: The payment term for supply of materials is 100% payment shall be made on invoice basis of delivery of materials in full or part thereof in good condition within 30 days from the date of supply. The supplier shall submit the following documents to the consignee i.e. DGM (E/M), MMW

- Invoice in triplicate
- Packing List
- Consignment note/Lorry receipt
- Guarantee / warranty certificate
- Fitment Certificate
- Bank details (Annexure-VI) for e-payment

B. For Dismantling and shifting of old Equipment and Complete installation and Erection & commissioning of new equipment: The payment term for supply of dismantling & shifting of old equipment, installation, erection & Commissioning of new equipment is 100% payment shall be made in full within 30 days from the date of successful commissioning of all the units. The supplier shall submit the following documents to the Site-Engineer i.e. AM (EM), SFC

- Invoice in triplicate
- Guarantee / warranty certificate
- Fitment Certificate
- Job Completion certificate
- Bank details (Annexure-VII) for e-payment

7. **E-WAY BILL:** The e-way bill shall be generated by the supplier. The portal for generation of e-way bill is <https://ewaybillgst.gov.in>
8. **COMPLETION PERIOD:** The supply of services, installation, erection & Commissioning shall be completed in all respect within 4-5 months from receipt of this order.
9. **LIQUIDATED DAMAGE:** In case the supplier fails to deliver the materials within contractual delivery period (or any extension thereof) due to reasons attributable to the supplier, then the Corporation reserve the right to recover from the supplier a sum towards Liquidated Damage @ 1% (one percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account this shall, however, not exceed 10% (ten percent) of the value of the undelivered portion of supply. However, the Liquidated Damage will not be imposed if the supplier fails to deliver the materials within the schedule delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, sabotage, strike, riots, epidemics, earthquake, storms, flood, explosion or the fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.
10. **GUARANTY / WARRANTY:** The guaranty / warranty shall be for a period of 12 months from the date of installation and successful commissioning of all the units from any defects / malfunctioning of the units or parts thereof and to be replaced free of cost or 18 months from the date of supply of all the equipment, as mentioned in contract.

10/01/2021
28/01/2021

- 11. **SCOPE OF WORK DURING WARRANTY PERIOD:** The scope of work during warranty period is indicated at Annexure-V
 - 12. **SECURITY-CUM-PERFORMANCE BANK GUARANTEE:** The supplier shall submit "Security cum-Performance Bank Guarantee" of 3 (three) percent of contract value within 30 (thirty) days from the date of issue of this order. The format of B/G is enclosed herewith at Annexure VI.
 - 13. **REJECTION OF DEFECTIVE MATERIALS:** If the materials are found to be defective at the time of receipt or not fit for the equipment as intended for, the same will be rejected and the supplier's shall replace the same at their own cost with new materials.
 - 14. **VERIFICATION OF MATERIALS:** One authorized representative from your side shall have to be deputed at the time of verification of materials at site and the material will be verified jointly.
 - 15. **BOARDING AND LODGING:** NEEPCO shall provide boarding and lodging for the service team at site on chargeable basis, if required.
 - 16. **PAYING AUTHORITY:** The DGM (Finance) F&A Wing, AGBP, NEEPCO Ltd. Bokuloni, Assam
 - 17. **DELIVERY DESTINATION AND CONSIGNEE:** The DGM (EM) MMW, AGBP, NEEPCO Ltd Bokuloni, Assam.
 - 18. **ENGINEER-IN-CHARGE:** The AM (EM), SFC, AGBP, NEEPCO Ltd Bokuloni, Assam
- Please acknowledge the receipt of this supply order and convey your acceptance.

- Encl: Annexure-I: Schedule of material and purchase billing break up
- Annexure-II: Schedule of Service for installation, erection and commissioning
- Annexure-III: Technical details of Screw Drive
- Annexure-IV: Technical details of Cooling Tower
- Annexure-V: Scope of work during Warranty period
- Annexure-VI: Format of B/G
- Annexure-VII: Format of Bank Details

Thanking You

Yours Sincerely,

(Handwritten signature)
 22/11/2017

— (Signature) —
 — (Signature) —
 — (Signature) —
 Dy. General Manager (EM)
 Joint Project Office (JPO)
 Joint Project Office (JPO)
 Joint Project Office (JPO)
 Assam NEEPCO Ltd Bokuloni
 Dispuram Assam 781012

ANNEXURE-I

ORDER REF. NO. NEEPCO/AGBP/SFC/O&M-1/2021-22/117

DTD. 28/06/2021

SCHEDULE OF MATERIAL AND PRICES CUM BILLING BREAK-UP:

Sl. No.	Description of Items	Qty.	Unit / Vol	Per unit rate in INR	Total Amount in INR
a	b	c	d	e	f
1	Supply of Blue Star make AHRI certified Water-Cooled Screw Chiller having 80 TR nominal cooling capacity complete with horizontal twin screw type compressor, flooded cooler, shell & tube water cooled condenser, micro-processor based control panel and unit mounted star delta starter, complete with all refrigerant piping and accessories including first charge of R134A refrigerant and compressor oil as required. Make: Blue Star Limited Nominal Capacity, 80 Tr. Or more Model: LCW1-080 Details Technical Data Sheet is as per Annexure-III	2	Nos	16,89,329.00	33,78,658.00
2	Supply of FRP Induced draft Counter / Cross Flow Cooling Tower suitable for 80 Tr Water-Cooled Air-Conditioning Plant. Details Technical Data Sheet is as per Annexure-IV	2	Nos	02,10,209.00	04,40,418.00
3	Supply of necessary M/C class pipe for chilled & condenser water hook up connection with existing system along-with necessary fittings (Make: Jindal / Tata)	1	Lot	02,92,548.00	02,92,548.00
4	Supply of necessary Pipe insulation of 50 mm thick TF quality EPS (16Kg/Cu. mtr density) pipe section on chilled water pipe (Make: Astha / Beacraft / Thermowel)	1	Lot	23,172.00	23,172.00
5	Supply of necessary water line valves with fittings for hook up connection line. (Make: Advance / Honeywell / C&R)	1	Lot	02,55,932.00	02,55,932.00
6	Supply of necessary electrical cable and accessories required for connection of new equipment with the existing panel	1	Lot	58,096.00	58,096.00
3	Total in INR				45,48,494.00
4	RO in INR				45,48,494.00
Rupees Forty-Five Lakh Forty-Eight Thousand Four Hundred and Ninety-Four Only					



ANNEXURE-II

ORDER REF. NO. NEEPCO/AGBP/SFC/O&M-1/2021-22/1797

DTD: 28/06/2021

SCHEDULE OF PRICES FOR INSTALLATION, ERECTION & COMMISSIONING CUM BILLING BREAK-UP:

Sl. No.	Description of Items	Qty.	Unit / Vol	Per unit rate in INR	Total Amount in INR
1	Erection and commissioning of Blue Star make AHRI certified Water-Cooled Screw Chiller having 80 TR nominal cooling capacity complete with horizontal twin screw type compressor, frother cooler, shell & tube water cooled condenser, micro-processor based control panel and unit mounted star-delta starter complete with all refrigerant piping and accessories including first charge of R134A refrigerant and compressor oil as required.	2	Nos	20,556.00	41,112.00
2	Erection and Commissioning of FRP Indirect draft Counter / Cross Flow Cooling Tower suitable for 80 Tr Water-Cooled Air-Conditioning Plant.	2	No.	20,075.00	40,150.00
3	Installation and hooking up with existing system of necessary MS C class pipe for chilled & condenser water hook up connection with existing system along-with necessary fittings.	1	Lot	01,00,452.00	01,00,452.00
4	Installation & fixing of necessary pipe insulation of 20 mm thick TF quality GRS (10Kg/Cu m) density pipe section of chilled water pipe.	1	Lot	23,448.00	23,448.00
5	Installation and fixing of necessary water flow valves with fittings for hook up connection line.	1	Lot	95,632.00	95,632.00
6	Installation and fixing of necessary electrical cable and accessories required for connection of new equipment with the existing panel.	1	Lot	06,754.00	06,754.00
7	Dismantling of existing system like 2 nos. of chiller units and 2 nos. of cooling tower along with accessories to be dismantled and removed from their places and shifted to designated area.	1	Lot	01,20,098.00	01,20,098.00
8	Total in INR				04,34,246.00
9	R/O in INR				04,34,246.00
Rupees Four Lakh Thirty-Four Thousand and Two Hundred and Forty-Six Only					



ANNEXURE-III

TECHNICAL DATA SHEET FOR CHILLER:

SR. NO.	DESCRIPTION	UNITS	CHILLER MODEL
			LCW1-080
(A)	Nominal Cooling Capacity	TR	80.0
(B)	Compressor		
1	Make		Blue Star
2	Quantity	No.	1
3	Type		Semi-Hermetic Screw
5	Motor Type : Refrigerant Gas Cooled		Semi-Hermetic, 3Ph., 2 Pole Squirrel-Cage Induction Motor
7	Locked Rotor Current	Amp	730
8	Starting Current of Chiller	Amp	243
9	Class of Motor Insulation		F
10	Operating Speed	RPM	2950
11	Oil Separation System		Integrated Oil Separator in Condenser
12	Oil Separator Type		Horizontal Impingement Type
13	Oil charge quantity	lit.	25
(C)	Electrical Power Supply		360-440 V, 3 PH, 50HZ
(D)	Condenser		
1	Make		Blue Star
2	Shell Diameter	mm	408.4
3	Tube type and Material		Both side Finned Copper Tubes
4	Tube OD	mm	19
5	Tube Length	mm	1500
6	No. of Pass (Water side)	Nos	3
7	No. of Tubes	Nos	130
8	No. of Refrigerant Circuit	Nos	1
9	Condenser in/out Temperature	Deg F	93Deg F/ 97.5 Deg F
10	Fouling Factor	1/PS	0.00025
(E)	Flooded Cooler		
1	Make		Blue Star
2	Shell Diameter	mm	408.4
3	Tube type and Material		Both side Finned Copper Tubes
4	Tube OD	mm	19
5	Tube Length	mm	1500
6	No. of Pass (Water side)	Nos	3
7	No. of Tubes	Nos	130
8	No. of Refrigerant Circuit	Nos	1
9	Cooler in/out Temperature	Deg F	54Deg F/ 44 Deg F
10	Fouling Factor	1/PS	0.0001
(F)	Refrigerant Charge Quantity	kg	91

SR. NO.	DESCRIPTION	UNITS	CHILLER MODEL
(F)	Expansion Valve		Electronic
(G)	Overall Dimensions:		
1	Length	mm	2249
2	Width	mm	1075
3	Height	mm	1705
(H)	Net Weight (approx.)		
	Operating Weight (approx.)	Kg	2013
	PHASE		3
	VOLTAGE		390-415 V
	FREQUENCY		60 HZ

जिवाजी एअर कंडीशनिंग
22/06/2021

ANNEXURE-IV

TECHNICAL DATA SHEET FOR COOLING TOWER:

Sl. No.	DESCRIPTION	TECHNICAL DETAILS
1	Type	Induced draft Counter Flow/ Cross Flow
2	Make	Poharpur/ Advance/ Bull
3	No of Cell per tower	Single
DUTY CONDITION		
4	Capacity, Usqpm	320
5	Hot water Temp, °F	97.5
6	Cold water Temp, °F	80
7	Design Wet Bulb Temp, °F	83
8	Shipping Weight (Aprox)	670 Kg
9	Operating Weight (Aprox)	1987 Kg
10	Tentative dimension (LXWXH)	1650 mm X 1650 mm X 3700 mm
MATERIALS OF CONSTRUCTION		
11	Casing	FRP
12	Basin	FRP
13	Fib/ Nozzle	PVC/ ABS/ Polypropylene
14	Bolts, Nuts, Misc hardware	MS HDG/ SS 304
15	Fan Blades	FRP/ Cast Aluminium alloy/ Engineering Plastics
MOTOR DETAILS		
16	Manufacturer	Marathon/ Drexeloni/ Havels/ Hindustan motor/ New India motor
17	Type	TEFC, IP-55 Weather proof
18	Current Characteristics	415V±10% 3-Ph/ 60±5%

विष्णु कुमार अग्नि
 28/08/2021

ANNEXURE-V**SCOPE OF WORK DURING WARRANTY PERIOD**

The scope of work shall include maintenance services for the listed equipment repair, maintenance, servicing, and manufacturing defects. M/S Blue Star Limited shall supply/repair all the manufacturing defective parts required for efficient functioning of the plant during warranty period.

QUARTERLY MAINTENANCE / PREVENTIVE MAINTENANCE**1. CHILLERS**

- Checking and rectification, if required for abnormal noise and vibration.
- Checking for leakage of oil and refrigerant.
- Checking the operation of oil separator, Oil Heater, Motor Protector, flow switch, slide valve mechanism, overload etc.
- Checking condition of oil filter.
- Checking of Microprocessor control panel & programming of Cards, if required.
- Checking healthy operation of safety devices.
- Checking tightness of all electrical terminations, re-terminating of lugs.
- Meggering, checking of earthing of the motors, electrical panels.
- Develop action plan for rectifying abnormalities if any observed in performance of the unit.
- To attend break down calls as and when required, investigate, locate defects, repair or manufacturing defect if any and verify defects and re-commission the chiller.

2. COOLING TOWER

- Cleaning of nozzles, strainers, pump, if required.
- Checking and rectification of fans, gear box, bearing, noise, abnormal sound, motor vibration etc.

GENERAL MAINTENANCE

All breakdown calls will be attended as & when required. All breakdown calls will be mandatorily logged at M/S BSL Call Centre (24x7 09-1172 / 1800-266-5656) for secondary time resolution.

EXCLUSION

1. Any replacement required because of theft, fire, sabotage or any natural calamity.
2. Any modification, shifting, alteration to fulfill future requirements.
3. Any repairing of civil structure related to AC plant.
4. Replacement of any major equipment as a whole i.e. Compressor, Motor, Condenser, Evaporator, Chiller, Cooling Coil, VFD, etc.
5. Main electrical panel for the system with all components & replacement of any incoming cables for chillers.
6. Replacement of cooling tower fan, gear box, shaft, bearings.
7. Any repairing / replacement of Air and Water distribution system, including piping with gills, all kinds of water line valves, actuators, strainers, isolation valves, diffusers, Thermostat, Heater, water piping and insulation.
8. Any repair / replacement of parts / equipment which has not been originally supplied and installed by us.
9. Painting of the equipment.
10. Day to Day Operation of the equipment.

SPECIAL NOTE:

10/11/2018
28/11/2018

1. NEEPCO shall issue necessary Gate Pass for all maintenance activity inside the establishment upon prior official intimation received from M/S BSL.
2. NEEPCO shall provide water, electricity, soap, ladder etc for Maintenance activity inside the establishment.

जिनसु कुमार झा
22/07/2021

श्री. जिनसु कुमार झा
अधीक्षक, सुरक्षा
श्री. जिनसु कुमार झा
अधीक्षक, सुरक्षा
श्री. जिनसु कुमार झा
अधीक्षक, सुरक्षा

No: NEEPCO/AGBR/SFC/O&M-13/2021-22/526

Dtd. 21/12/2021

To

M/s Blue Star Ltd.,
Oasis Commercial, 1st Floor,
Dr. B Barooah Road, Ulubari,
Guwahati, Assam,
PIN: 781007
Attn: Mr. Sourav Jana

- Sub: Detailed Purchase Order cum Work order for Complete Supply of materials, installation, erection & commissioning of 1 (One) number of 80 Tr Screw Compressors along with other accessories for Central Air Conditioning Plant of Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist Dibrugarh, Assam
- Ref: 1. Our last PO & WO ref. no. NEEPCO/AGBP/SFC/O&M-13/2021-22/197 dtd. 28/06/2021
2. Our mail dtd. 27/11/2021
3. Our letter ref. no. NEEPCO/AGBP/SFC/O&M-13/2021-22/454 dtd. 26/11/2021.
2. Your mail dtd. 29/11/2021.
3. Your offer letter no. Ref: SD/CPSD/NEEPCO/21-22/01 dtd. 29/11/2021

Dear Sir,

With reference to above, we are pleased to place this Purchase Order cum Work Order for Complete Supply of materials (As per Annexure-I), installation, erection & commissioning of 1 (One) number of 80 Tr Screw Compressors along with other accessories as per Annexure-I & II for Central Air Conditioning Plant of Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam, PIN – 786 191. as per following Terms and Conditions: -

TERMS AND CONDITIONS:

1. **SCOPE OF CONTRACT:** The Scope of this contract shall include:
 - A. Supply of Materials: Details Schedule of Supply of materials and price shall be as per Annexure-I enclosed herewith. The details technical data sheet of "80 Tr Screw Chiller" and "Cooling Tower" are enclosed at Annexure-III & IV
 - B. Complete installation, erection & commissioning of 1 (One) number of 80 Tr. Screw Chiller along with other accessories and hooking up with the existing system of the Central AC plant at AGBP as per Annexure-II enclosed herewith.
 - C. Dismantling of 1 number of old Reciprocating Chiller and 1 number of old Cooling tower at Central AC plant and shifting to designated area for disposal.
2. **CONTRACT PRICES:** The price part of this contract shall have two components:
 - A. Price for Supply of materials:
 - The total basic price payable for complete supply of materials, as per Annexure-I, shall be Rs. 22,74,247.00 (Rupees Twenty-Two Lakhs Seventy-Four Thousand Two Hundred and Forty-Seven) only which shall remain FIRM till the completion of the supply.
 - GST shall be applicable as extra as per prevailing GOI norms.
 - The price mentioned above is accepted without any prejudice to the rights of this Corporation to recover / reclaim any payment made in excess.
 - B. Charges for Dismantling and shifting of old Equipment and Complete installation and Erection & commissioning of new equipment:
 - The dismantling & shifting of old equipment and Complete Installation and Erection & commissioning charges, as per Annexure-II, shall be Rs. 02,17,123.00 (Rupees Two Lakhs Seventeen Thousand One Hundred and Twenty-Three) only.
 - GST shall be applicable extra as per prevailing GOI norms.
3. **TAXES AND DUTIES:** GST shall be paid extra as applicable as per prevailing GOI norms.
4. **TCS:** TCS on sales of goods u/s 206C (1H) of Income Tax Act 1961 introduced vide finance Act 2020 shall be applicable as per GOI norms.
5. **PAN:** The PAN number of NEEPCO is AAACN9991J.
6. **PAYMENT:**
 - A. For Supply of Equipment and other Accessories: The payment term for supply of materials is "100% payment shall be made on prorata basis of delivery of materials in full or part thereof

Signature: Sourav Jana
21/12/2021

in good condition within 30 days from the date of supply'. The supplier shall submit the following documents to the consignee i.e. DGM (E/M), MMW:

- Invoice in triplicate.
- Packing List.
- Consignment note/Lorry receipt
- Guarantee / warranty certificate.
- Fitment Certificate.
- Bank details (Annexure-VII) for e-payment

- B. For Dismantling and shifting of old Equipment and Complete installation and Erection & commissioning of new equipment:** The payment term for supply of dismantling & shifting of old equipment, installation, erection & Commissioning of new equipment is "100% payment shall be made in full within 30 days from the date of successfully commissioning of all the units". The supplier shall submit the following documents to the Site-Engineer i.e. AM (E/M), SFC:

- Invoice in triplicate.
- Guarantee / warranty certificate.
- Fitment Certificate.
- Job Completion certificate
- Bank details (Annexure-VII) for e-payment

7. **E-WAY BILL:** The e-way bill shall be generated by the supplier. The portal for generation of e-way bill is "https://ewaybillgst.gov.in".
 8. **COMPLETION PERIOD:** The supply of materials, installation, erection & Commissioning shall be completed in all respect within 4-5 months from receipt of this order.
 9. **LIQUIDATED DAMAGE:** In case the suppliers fail to deliver the materials within contractual delivery period (or any extension thereof) due to reasons attributable to the supplier, then the Corporation reserve the right to recover from the supplier's sum towards Liquidated Damage @ ½ % (half percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the schedule delivery date (or extension thereof). The total recovery from the supplier on account this shall, however, not exceed 10% (Ten percent) of the value of the undelivered portion of supply. However, the Liquidated Damage will not be imposed if the supplier fails to deliver the materials within the schedule delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, flood, explosion or the fire not caused by the supplier's negligence, lightning, acts of God or the public enemy which is of such a nature as to delay, curtail or prevent timely action by either party.
 10. **GUARANTY / WARRANTY:** The guaranty / warranty shall be for a period of 12 months from the date of installation and successful commissioning of all the units from any defects / malfunctioning of the units or parts thereof and to be replaced free of cost or 18 months from the date of supply of all the equipment, whichever is earlier.
 11. **SCOPE OF WORK DURING WARRANTY PERIOD:** The scope of work during warranty period is indicated at Annexure-V.
 12. **SECURITY-CUM-PERFORMANCE BANK GUARANTEE:** The supplier shall submit "Security-cum-Performance Bank Guarantee" of 3 (three) percent of contract value within 30 (thirty) days from the date of issue of this order. The format of BG is enclosed herewith at Annexure-VI.
 13. **REJECTION OF DEFECTIVE MATERIALS:** If the materials are found to be defective at the time of receipt or not fit for the equipment as intended for, the same will be rejected and the supplier's shall replace the same at their own cost with new materials.
 14. **VERIFICATION OF MATERIALS:** One authorized representative from your side shall have to be deputed at the time of verification of materials at site and the material will be verified jointly.
 15. **BOARDING AND LODGING:** NEEPCO shall provide boarding and lodging for the service team at site on chargeable basis, if required.
 16. **PAYING AUTHORITY:** The GM (Finance), F&A Wing, AGBP, NEEPCO Ltd. Bokuloni, Assam.
 17. **DELIVERY DESTINATION AND CONSIGNEE:** The DGM (E/M), MMW, AGBP, NEEPCO Ltd. Bokuloni, Assam.
 18. **ENGINEER-IN-CHARGE:** The AM (E/M), SFC, AGBP, NEEPCO Ltd. Bokuloni, Assam.
- Please acknowledge the receipt of this supply order and convey your acceptance.

Encl: Annexure-I: Schedule of material and prices cum billing break up
Annexure-II: Schedule of Service for installation, erection and commissioning

जिंदू कुमार झा
21/12/2021

- Annexure-III: Technical details of Screw Chiller
 Annexure-IV: Technical details of Cooling Tower
 Annexure-V: Scope of work during warranty period.
 Annexure-VI: Format of PBG
 Annexure-VII: Format of Bank Details.

Thanking You,

Yours' Sincerely

जितून कुमार गोगोई
 21/12/2021

(जितून कुमार गोगोई)
 (Jitun Kumar Gogoi)
 उप महा प्रबन्धक (बि./या.)
 Dy. General Manager (E/M)
 स्टेशन फेसिलीटिस कॉम्प्लेक्स
 Station Facilities Complex
 आ.जी.बी.पि., नीपको, बोकुलोनी
 AGBP, NEEPCO LTD, Bokuloni
 Dibrugarh, Assam-786191

NIO

Memo No. No: NEEPCO/AGBP/SFC/O&M-13/2021-22/527-31

Dtd. 21/12/2021

Copy to:

1. The Head of Project, AGBP, NEEPCO, Bokuloni, for his kind information, please. This has ref. to his approval vide FLM dtd 20/12/2021.
2. The GM (E/M), AGBP, NEEPCO, Bokuloni, for record.
3. The GM (Fin), AGBP, NEEPCO, Bokuloni. A copy of approval enclosed.
4. The DGM (E/M), MMW, AGBPP, NEEPCO, Bokuloni, for kind information.
5. The DGM (E/M), Vigilance, for information, pl

जितून कुमार गोगोई
 21/12/2021

(जितून कुमार गोगोई)
 उप महा प्रबन्धक (बि./या.)
 स्टेशन फेसिलीटिस कॉम्प्लेक्स

ORDER REF. NO. NEEPCO/AGBP/SFC/O&M-13/2021-22/526

DTD. 21/12/2021

SCHEDULE OF MATERIAL AND PRICES CUM BILLING BREAK-UP:

Sl. No.	Description of Items	Qty.	Unit / Vol	Per unit rate in INR	Total Amount in INR
a	b	d	e	f	g
1	Supply of Blue Star make AHRI certified Water-Cooled Screw Chiller having 80 TR nominal cooling capacity complete with horizontal twin screw type compressor, flooded cooler, shell & tube water cooled condenser, micro-processor based control panel and unit mounted star-delta starter, complete with all refrigerant piping and accessories including first charge of R134A refrigerant and compressor oil as required. Make: Blue Star Limited. Nominal Capacity: 80 Tr. Or more Model: LCW1-080 Details Technical Data Sheet is as per Annexure-III	1	No	16,89,329.00	16,89,329.00
2	Supply of FRP Induced draft Counter / Cross Flow Cooling Tower suitable for 80 Tr Water-Cooled Air-Conditioning Plant. Details Technical Data Sheet is as per Annexure-IV	1	No	02,70,209.00	02,70,209.00
3	Supply of necessary MS C class pipe for chilled & condenser water hook up connection with existing system along-with necessary fittings (Make: Jindal / Tata)	1	Lot	01,46,274.00	01,46,274.00
4	Supply of necessary Pipe insulation of 50 mm thick TF quality EPS (16Kg/Cu mtr density) pipe section on chilled water pipe (Make: Astha / Beardsell / Thermowell)	1	Lot	11,586.00	11,586.00
5	Supply of necessary water line valves with fittings for hook up connection line (Make: Advance / Honeywell / C&R)	1	Lot	01,27,816.00	01,27,816.00
6	Supply of necessary electrical cable and accessories required for connection of new equipment with the existing panel	1	Lot	29,033.00	29,033.00
A	Total in INR				22,74,247.00
B	R/O in INR				22,74,247.00
Rupees Twenty-Two Lakh Seventy-Four Thousand Two Hundred and Forty-Seven Only					

जिन्दन कुमार शर्मा
21/12/2021

ORDER REF. NO. NEEPCO/AGBP/SFC/O&M-13/2021-22/526

DTD. 21/12/2021

SCHEDULE OF PRICES FOR INSTALLATION, ERECTION & COMMISSIONING CUM BILLING BREAK-UP:

Sl. No.	Description of Items	Qty.	Unit / Vol	Per unit rate in INR	Total Amount in INR
1	Erection and commissioning of Blue Star make AHRI certified Water-Cooled Screw Chiller having 80 TR nominal cooling capacity complete with horizontal twin screw type compressor, flooded cooler, shell & tube water cooled condenser, micro-processor based control panel and unit mounted star-delta starter, complete with all refrigerant piping and accessories including first charge of R134A refrigerant and compressor oil as required.	1	No.	20,556.00	20,556.00
2	Erection and Commissioning of FRP Induced draft Counter / Cross Flow Cooling Tower suitable for 80 Tr Water-Cooled Air-Conditioning Plant.	1	No.	20,075.00	20,075.00
3	Installation and hooking up with existing system of necessary MS C class pipe for chilled & condenser water hook up connection with existing system along-with necessary fittings	1	Lot	53,226.00	53,226.00
4	Installation & fixing of necessary Pipe insulation of 50 mm thick TF quality EPS (16Kg/Cu mtr density) pipe section on chilled water pipe	1	Lot	11,724.00	11,724.00
5	Installation and fixing of necessary water line valves with fittings for hook up connection line	1	Lot	47,816.00	47,816.00
6	Installation and fixing of necessary electrical cable and accessories required for connection of new equipment with the existing panel	1	Lot	03,377.00	03,377.00
7	Dismantling of existing system like 1 no. of chiller unit and 1 no. of cooling tower along with accessories to be dismantled and removed from their bases and shifted to designated area.	1	Lot	60,349.00	60,349.00
A	Total in INR				02,17,123.00
B	R/O in INR				02,17,123.00
Rupees Two Lakh Seventeen Thousand One Hundred and Twenty-Three Only					

जिन्दु कुमार गर्ग
21/12/2021

TECHNICAL DATA SHEET FOR CHILLER:

SR. NO.	DESCRIPTION	UNITS	CHILLER MODEL
			LCW1-080
(A)	Nominal Cooling Capacity	TR	80.0
(B)	Compressor		
1	Make		Blue Star
2	Quantity	No.	1
3	Type		Semi-Hermetic Screw
5	Motor Type : Refrigerant Gas Cooled		Semi-Hermetic, 3PH, 2 Pole Squirrel Cage Induction Motor
7	Locked Rotor Current	Amp.	730
8	Starting Current of Chiller	Amp.	243
9	Class of Motor Insulation		F
10	Operating Speed	RPM	2950
11	Oil Separation System		Integrated Oil Separator in Condenser
12	Oil Separator Type		Horizontal, Impingement Type
13	Oil charge quantity	lit.	25
(C)	Electrical Power Supply		265-440 V, 3 PH, 50Hz
(D)	Condenser		
1	Make		Blue Star
2	Shell Diameter	mm	406.4
3	Tube type and Material		Both side Finned Copper Tubes
4	Tube OD	mm	19
5	Tube Length	mm	1800
6	No. of Passes (Water side)	No.	3
7	No. of Tubes	No.	120
8	No. of Refrigerant Coils	No.	1
9	Condenser inlet Temperature	Deg F	90Deg F / 97.5 Deg F
11	Flowing Factor	FPS	0.0000
(E)	Flooded Cooler		
1	Make		Blue Star
2	Shell Diameter	mm	406.4
3	Tube type and Material		Both side Finned Copper Tubes
4	Tube OD	mm	19
5	Tube Length	mm	1800
6	No. of Passes (Water side)	No.	3
7	No. of Tubes	No.	111
8	No. of Refrigerant Coils	No.	1
9	Condenser Inlet Temperature	Deg F	90Deg F / 97.5 Deg F
11	Flowing Factor	FPS	0.0000
(F)	Refrigerant Charge Capacity	kg	25
(G)	Expansion Valve		Factory

2035
29/01/2019

पावर

ऑफ इंडिया लिमिटेड
(भारत सरकार का कर्मागार)
**POWER GRID CORPORATION
OF INDIA LIMITED**



(A Government of India Enterprise)

Dongtich, Lower Nongrah, Lapalang, (Shillong)-793001
Phone: (0364) 2536178, Fax: (0364) 2536397

उत्तर - पूर्वाञ्चल

NORTH EASTERN REGION

Ref: NESH/OS/F-1008/404

Date: 15.01.2018

To,
The General Manager (E/M),
North Eastern Electric Power Corporation Ltd,
AGBPP, Bokulani, Dibrugarh (Dist), Assam
Fax No. : 0364-2221789/ 2222938



S. N. K. (E/M), PEM
M/OS
E/M(E/M)
29/01/2018

Sub.: *Design, Engineering, NIT, Tender Evaluation, Finalization of Contract, Procurement, Erection, Project Management, Testing & Commissioning and other works incidental thereto for execution of Construction of 220 kV Line Reactor bay at 220 kV Kathalguri GBPP S/S including Supply & Commissioning of 20 MVAR, 3-Ph, 245 kV Shunt Reactor.*

- Ref.: (i) Ref: Agreement Dated: 29.05.2012.
(ii) Our Invoice No. NESH/OS/F-1008/ dtd. 04.10.2018
(iii) Our Invoice No. NESH/OS/F-1008/372 dtd. 20.12.2018
(iv) Your letter No. NEEPCO/AGBP/PEM/O&M-02/2018-19/487 dtd. 28.12.2018

Dear Sir,

This has reference to agreement dated 29.05.2012 for the subject work executed by POWERGRID under Consultancy Services to NEEPCO Ltd & correspondences under reference.

It is to inform that as mentioned in your letter, the Revised Project cost for Rs. 5,73,29,819.00 (Rupees Five Crore Seventy Three Lakh Twenty Nine Thousand Eight Hundred & Nineteen only) towards installation of 220KV, 20 MVAR Shunt Reactor at Kathalguri has been appraised to the 152nd OCC forum under a special agenda put up by POWERGRID. The same shall also be deliberated upon in the forthcoming RPC forum in line with minutes of 11th TCC & NEROFC meeting.

Meanwhile, it is requested to release the balance amount of 1,76,86,646.00/- (One Crore Seventy Six Lakh Eighty Six Thousand Six Hundred & Forty Six only).

It may be mentioned that the said consultancy work has been completed long back (on 21.03.2017) & in view of non-receipt of the balance amount from NEEPCO, POWERGRID is presently unable to release long pending bills to its contractors engaged for the aforesaid consultancy job- leading to strong grievances on part of the contractors.

29/01/2018

पावर ग्रिड कारपोरेशन
ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
POWER GRID CORPORATION
OF INDIA LIMITED



(A Government of India Enterprise)

Dongfich, Lower Nongrah, Lapalang, (Shillong)-793001
Phone: (0364) 2536178, Fax: (0364) 2536397

उत्तर - पूर्वी क्षेत्र

NORTH EASTERN REGION

It is therefore once again requested for necessary action for releasing the balance amount of Rs. 1,76,86,646.00 /- to POWERGRID immediately.

Thanking you and assuring of our best services at all times.
Thanking you,

Yours faithfully,

B. Paulchoudhury
12/01/19

(B Paulchoudhury)

Sr General Manager (BDD/ Consultancy)

Copy to :

The Executive Director (O&M), North Eastern Electric Power Corporation Ltd., Brookland Compound, Lower Colony, Shillong 793003



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
 NORTH EASTERN ELECTRIC POWER CORPORATION LIMITED
 (भारत सरकार का संस्थान) (A Govt. of India Enterprise)
 PLANT ELECTRICAL MAINTENANCE

U.D. No. AGBP/PEM/O&M-02/2018-19/ 594

Dtd. 07/02/2019

Inter Office Memo

From : Sr. Manager (E/M), PEM
 AGBP, NEEPCO Ltd.

To : Sr. Manager (Fin)
 F & A Wing, AGBP, NEEPCO Ltd.

Subject: Forwarding of verified Invoice in respect of Power Grid Corporation of India Ltd., Guwahati, towards the deposit works against the design, Engineering, finalization of tendering, Supply, Erection, Testing & Commissioning of 20 MVAR, 3 Phase, 245 KV Shunt Line Reactor at 220 KV New Morioni Line at AGBP, Bokuloni end.

Ref: Agreement in between NEEPCO Ltd., and Power Grid Corporation of India Ltd., Dtd. 29/05/2012.

In accordance with the agreement referred above, the deposit works against the design, Engineering, finalization of tendering, Supply, Erection, Testing & Commissioning of 20 MVAR, 3 Phase, 245 KV Shunt Line Reactor in 220 KV New Morioni Line at AGBP, Bokuloni end completed in all respect on 24.10.2017. Now, M/s PGCL, Guwahati has submitted two nos. invoices vide Ref. No. NESH/OS/F-1008 Dtd. 20/12/2018 for an amount of Rs. 1,50,26,887/- and Rs. 26,59,759/- only towards Project Cost and consultancy fees respectively.

The Bills are verified at this end for an amount of Rs. 43,17,000/- (Rupees Forty Three Lakhs Seventeen Thousand) only towards Project Cost and Rs. 7,64,109/- (Rupees Seven Lakhs Sixty Four Thousand One Hundred & Nine) only inclusive of GST @18% towards consultancy fees as per Agreement dated 29/05/2012. Total verified amount is Rs. 50,81,109/- (Rupees fifty lakhs eighty one thousand one hundred nine) only including consultancy fees.

The verified Bills are forwarded for your further needful action please.

- 1) Letter Ref. No. WESH/OS/F-1008/406 Dated 15/01/2018 received from PGCL, Stillong.
- 2) Verified Invoice two nos. in Duplicate.
- 3) Copy of Agreement in between NEEPCO Ltd., and PGCL., Dtd. 29/05/2012.

[Signature]
 06/02/2019
 Sr. Manager (E/M)
 Plant Electrical Maintenance
 AGBP, NEEPCO Ltd., Bokuloni

পাৱাৰ গ্ৰিড কোৰ্পাৰেচন
 অফ ইণ্ডিয়া লিমিটেড
 (भारत पावर ग्रीड कर्पोरेशन्)
**POWER GRID CORPORATION
 OF INDIA LIMITED**
 (A Government of India Enterprise)
 Guwahati, Assam



GSTIN No : 18AAACF0252G3ZQ
 PAN : AAACP0252G

Dongfich, Lower Nongrah, Lapalag, (Shillong)-793001
 Phone: (0364) 2536178, Fax: (0364) 2536397

৩৯ - পূর্ব ০১২ NORTH EASTERN REGION

Ref: NESH/OS/F-1008

Date: 20.12.2018

INVOICE (Consultancy Fee)

To The General Manager (E/M), North Eastern Electric Power Corporation Ltd, AGBPP, Bokulsa, Dibrugarh (Dist), Assam. GSTIN: 18AAACN9991J3ZP Place of supply: AGBPP, Bokulsa, Assam	Ref: Agreement Dated: 29.05.2012. Work: Design, Engineering, NIT, Tender Evaluation, Finalisation of Contract, Procurement, Erection, Project Management, Testing & Commissioning and other works incidental thereto for execution of Construction of 220 kV Line Reactor bay at 220 kV Kathalguri GBPP S/S including Supply & Commissioning of 20 MVAR, 3-Ph, 245 kV Shunt Reactor.
--	---

Consultancy Fee			
1	Total Consultancy Fees as per agreement dtd 29-05-2012	329965	57,19,500
2	Consultancy Fees received	507390	
3	Balance towards Consultancy Fees (1-2)	279225	6,47,550
4	GST @18% on (3)	50266	1,16,559
	Balance towards Consultancy Fees including GST	255579	7,69,109

(Rupees Twenty Six Lakh Fifty Nine Thousand Seven Hundred & Fifty Nine only)

E&OE Rupees seven lakh sixty four thousand one hundred & nine only

For & On behalf of

Power Grid Corporation of India Ltd

(Signature)

(D. Bhattacharya)

Dy. Manager (DDO) Consultancy

Note: The amount may be released through B/L to Power Grid Corporation of India Ltd
 Bank Name: State Bank of India

AV No: 1903190231

Branch: Malvi, Shillong

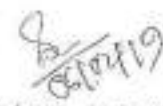
RSC: 15010000105

Divisional Bill No.: AGBP/PEM/O&M-02/2018-19/80 Dtd. 06.02.2019.

Ref: Agreement between NEEPCO & PGCIL dated 29/05/2012.


Bill verified and found correct for an amount of Rs. 7, 64,109.00 (Rupees seven lakh Sixty four thousand one hundred and nine) only including GST@18% against the balance amount of **approved consultancy fees Rs. 57,19,500.00 (i.e. 15% of Project cost Rs. 3,81,30,000/-)** towards the deposit works of supply, erection, testing and commissioning of 20 MVR, 3 Phase, 245 KV Shunt Reactor at 220 KV Line bay (New Morioni Line) at 220 KV Switch Yard, AGBP, NEEPCO, Bokuloni end. Work completed in all respect on 24.10.2017 and the Reactor has been found working satisfactorily since commissioning.

Entered in to the bill Register.


Dy. Manager (E/M), PEMC


Aast. Manager (E/M), PEMC

सहा: प्रमुख (विद्युत), बी.ए.ए.ए.
Aast. Manager (E/M), PEMC
ए.पी.सी.सी., बोकुलणी, गुजरात
AGBP/NEEPCO/220KV/02/19/80


Sr. Manager (E/M), PEMC



पावर ग्रिड कॉर्पोरेशन
ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
**POWER GRID CORPORATION
OF INDIA LIMITED**
(A Government of India Enterprise)
Guwahati, Assam

GSTIN No : 18AAACP0252G3ZQ
PAN : AAACP0252G

Dungtich, Lower Nongrah, Lapalag, (Shillong)-793001
Phone: (0364) 2536178, Fax: (0364) 2536397

उत्तर - पूर्वांचल NORTH EASTERN REGION

Ref: NESH/OS/F-1008/

Date: 20.12.2018

INVOICE (Project Cost)

To The General Manager (E/M), North Eastern Electric Power Corporation Ltd, AGBPP, Bokulan, Dibrugarh (Dist), Assam. GSTIN: 18AAACN9991J3ZP Place of supply: AGBPP, Bokulan, Assam	Ref: Agreement Dated: 29.05.2012. Work: Design, Engineering, NIT, Tender Evaluation, Finalisation of Contract, Procurement, Erection, Project Management, Testing & Commissioning and other works incidental thereto for execution of Construction of 220 kV Line Reactor bay at 220 kV Kathalguri GBPP S/S including Supply & Commissioning of 20 MVAR, 3-Ph, 245 kV Shunt Reactor.
--	---

Project Cost	
1	Total Project Cost <i>As per agreement dtd 29/05/2012</i> 48839887 5,81,39,887
2	Project Cost received 33813000
	Balance towards Project Cost(1-2) 15026887 1,31,17,000

(Rupees One Crore Fifty Lakh Twenty Six Thousand Eight Hundred & Eighty Seven Only)

E&OE *Forty three lakh seventeen thousand only,*

For & On behalf of
Power Grid Corporation of India Ltd

D. Bhowmick

(D Bhowmick)

Dy. Manager (BDD/ Consultancy)

Note : The payment may be released through RTGS to Power Grid Corporation of India Ltd.

Bank name: State bank of india

A/c No. : 10031890231

Branch : Malki, Shillong

IFSC : SBIN0009105

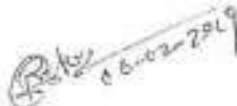
Divisional Bill No. : AGBP/PEM/O&M-02/2018-19/79 Dtd. 06.02.2019.

Ref: Agreement between NEEPCO & PGCIL dated 29/05/2012.

Bill verified and found correct for an amount of Rs. 43, 17,000.00 (Rupees Forty Three Lakhs Seventeen Thousand) only against the balance amount of **approved project cost amount Rs. 3,81,30,000/-** towards the deposit works of supply, erection, testing and commission of 20 MVR, 3 Phase, 245 KV Shunt Reactor at 220 KV Line bay (New Morioni Line) at 220 KV Switch Yard at AGBP, Bokuloni end. Work completed in all respect on 24.10.2017 and the Reactor has been found working satisfactorily since commissioning.

Entered in to the bill Register.


Dy. Manager (E/M), PEMC


Aast. Manager (E/M), PEMC

सहा: प्रबंधक (E/M), एम.
Aast. Manager (E/M), PEMC
ए.जी.वी.पी. नैपको लि०, बुकुलनी
AGBP NEEPCO LTD., Bokuloni


Sr. Manager (E/M), PEMC



मेघालय MEGHALAYA

044824

AGREEMENT

THIS AGREEMENT is made on this 23th day of May 2012 at Shillong between North Eastern Electric Power Corporation Limited, a company registered under the Companies Act of 1956, having its office at Brookland Compound, Lower New Colony, Shillong – 793 003 (hereinafter referred to as "NEEPCO" or "Owner" which expression shall unless repugnant to the context or meaning thereof include its Administrators, Successors, Executors and Permitted assigns) of the First part

and

Power Grid Corporation of India Limited, a Company incorporated under the Companies Act, 1956, having its Registered Office at B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110016 (hereinafter referred to as "POWERGRID" or "Consultant" which expression shall unless repugnant to the context or meaning thereof include its Administrators, Successors, Executors and Permitted assigns) of the Second part.

(POWERGRID and NEEPCO are hereinafter individually referred to as the 'Party' and collectively as 'Parties'.)

WHEREAS, NEEPCO desires to obtain consultancy services from POWERGRID for execution of construction of 220kV Line Reactor Bay at 220kV Kailaguri GBPP S/S including Supply & Commissioning of 20MVAR, 3-Ph, 245kV Shunt Reactor.

Page No. 1 of 13

And whereas POWERGRID has consented to provide consultancy services to NEEPCO for execution of above mentioned works on the terms and conditions stipulated herein.

NOW, THEREFORE, THIS AGREEMENT WITNESSETH AS UNDER:

For the purpose of this Agreement, the terms used herein shall, unless repugnant to the context thereof, have the meaning assigned to them as under:

1.0 DEFINITIONS :

- 1.1 "Agreement" shall mean the agreement herein containing the Terms & Conditions set forth & agreed therein, including all other documents expressly annexed thereto or incorporated therein.
- 1.2 "Project"
- 1.2.1 "Sub-station" shall mean Construction of 220kV Line Reactor Bay at 220kV Kathalgui GBPP S/S including Supply & Commissioning of 20MVAR, 3-Ph, 245kV Shunt Reactor.
- 1.3 "Bid Documents" shall mean the tender documents prepared by POWERGRID consisting of technical specifications, notice inviting tenders and other terms & conditions of contract pursuant to which POWERGRID shall invite proposals for procurement of goods and services for the Project.
- 1.4 "Contractor" shall mean the Bidder whose bid is accepted by POWERGRID on behalf of the Owner for award of contract for the total work or any part of the work of the Project resulting in a contract and shall include such contractor's legal representatives, successors and permitted assigns.
- 1.5 "Sub-Contractor" shall mean any person (other than the contractor) named in the contract for execution of any part of the works or any person to whom any part of the contract has been entrusted with the consent of POWERGRID and include such sub-contractor and the Sub-contractor's legal successors in title but not any assignee of the contractor.
- 1.6 "Nodal officer/Engineer" shall mean the officer nominated by the Owner in writing to act as coordinator for the purpose of this work.
- 1.7 "Project Manager" shall mean the official nominated by POWERGRID in writing who shall be responsible for co-ordination with the Owner and for all activities concerning the execution of the Project.
- 1.8 "Equipment/Material" shall mean the equipment/materials procured through contractor by POWERGRID on behalf of the Owner for this Project.

Page No. 2 of 13

- 1.9 "Site" shall mean and include the land & other places free from all encumbrances & disputes at which the Project and related facilities are to be constructed and any adjacent land, path etc., which may be allocated or used by the Owner/POWERGRID/Contractor/Sub-Contractor in performance of work under this Agreement.
- 1.10 "Pure Agent" shall have meaning assigned in the Explanation 1 of Sub Rule 2 of the Rule 5 of the Service Tax (Determination of Value) Rules, 2006 to the Finance Act 1994.
- 1.11 Words singular shall include the plural and vice versa, where the contexts so desire.

2.0 SCOPE OF CONSULTANCY SERVICES:

2.1 SCOPE OF SERVICES TO BE PERFORMED BY POWERGRID

The scope of services to be rendered by POWERGRID for execution of the Project on behalf of NEEPCO under this Agreement will be as under subject to specific exclusions as brought out in clause 2.2 hereinafter:

- i) The scope of work shall include ~~Design, Procurement, NIT, Tender/ Evaluation, Preparation of Bid documents, Bidding, Tendering, Project Management, Procurement & Commissioning and other works incidental thereto for execution of the following:~~
- Sub-station: Construction of 220kV Line Reactor Bay at 220kV Kathalguri GBPP S/S including Supply & commissioning of 20MVAR, 3-Ph, 245kV Shunt Reactor.
- ii) Preparation of all Bid documents including technical specifications, tender drawings, NIT BOQ, NIT Cost Estimate, QR, BPS, Conditions of Contracts etc.
- iii) Invitation of Bids, evaluation of bids, pre-award discussions with the selected vendors and finalization of awards on behalf of NEEPCO.
- iv) Placement of orders/finalisation of contract, all post contract co-ordination, approval of contractor's drawings/documents, inspection of materials at the manufacture's work or at site and witnessing of testing of equipment/materials etc., and implementation of the agreed quality assurance program of the various manufacturer/contractors on behalf of NEEPCO.
- v) Project Management including expediting to ensure supply of all materials and equipment in line with the agreed contract program and supervision of all activities such as storage, handling of materials/equipment at site, erection, testing and commissioning by the concerned contractors and making of progressive payment to the contractors on behalf of NEEPCO

Handwritten signature

Handwritten signature

subject to adequate funds being made available to POWERGRID by NEEPCO from time to time.

- vi) The scope of work shall also include preparatory work, collection/compilation of details/data and preparation of the draft proposal for statutory clearance (if any). Being the owner of the project, NEEPCO shall obtain all these clearances from the concerned authorities. However, POWERGRID shall assist for obtaining these clearances by way of documentation, representing to concerned agencies.
- vii) POWERGRID shall submit a copy of bid specifications, contract documents, purchase order copies and all drawings / designs to M/s NEEPCO for their records.
- viii) POWERGRID reserves the right to appoint any contractor on behalf of NEEPCO for any specific job to ensure timely commissioning of the project.
- ix) POWERGRID shall obtain Electrical Inspector's Clearance.
- x) At the cost of Owner, POWERGRID will assist NEEPCO in obtaining any statutory clearance subject to clause 2.2(i) of this agreement. The above cost shall form part of Project cost.
- xi) POWERGRID will function as "Pure Agent" basis for execution of the project on behalf of NEEPCO.

2.2 SCOPE OF SERVICES TO BE PERFORMED BY NEEPCO: (Exclusion from POWERGRID's scope of services)

- i) The full responsibility for obtaining the Project clearance, statutory clearance (if any), etc. shall be that of NEEPCO and POWERGRID shall assist for obtaining these clearances by way of documentation.
- ii) All clearances from CEA and other agencies and issue of necessary Notification other than Electrical Inspector's clearance under the Electricity Laws.
- iii) Liaison and follow up with Government bodies shall lie with NEEPCO.
- iv) Settlement of any disputes with public / statutory bodies / local authorities / tax authorities / state authorities including Right of Way etc. shall rest with NEEPCO.
- v) POWERGRID shall assist NEEPCO on the above as and when required.

3.0 WORKING PROCEDURE

- 3.1 POWERGRID shall execute the work as defined in clause 2.1 above within the stipulated time frame. To enable POWERGRID to discharge its obligations in a smooth and efficient manner, NEEPCO shall issue necessary authorization in favour of POWERGRID to act on behalf of Owner for the scope of services under this Agreement and also provide all other necessary documents required for this purpose including concessional sales-tax declaration forms or any other applicable forms duly filled in and signed.
- 3.2 The recovery of TDS under CST/VAT/WCT/ Income Tax Act and any other acts as per Govt. regulation related to this work shall be done by POWERGRID on behalf of the NEEPCO from the Contractor's bills. TDS so deducted by POWERGRID on behalf of the NEEPCO shall be deposited with the relevant tax authorities by using NEEPCO's PAN, TIN and TAN Nos. on or before the due date as prescribed under the respective statute. Relevant Challans shall be forwarded to NEEPCO for information & filing of necessary returns and issue TDS Certificate under intimation to POWERGRID. POWERGRID shall obtain Electrical Inspector's Clearance, etc. within time frame as per statute to enable NEEPCO to comply with the same under the respective statute.
- 3.3 Road permit, wherever necessary, shall be provided by NEEPCO using their VAT registration no. or otherwise POWERGRID representative may be authorised to obtain Road permit using NEEPCO's VAT registration No.
- 3.4 Necessary "C" Form will be issued by NEEPCO (Owner) based on the recommendation of POWERGRID and request of the contractor/supplier, as per relevant Sales Tax Rules.
- 3.5 NEEPCO shall also ensure prompt release of funds to POWERGRID to enable unhindered progress of work.
- 3.6 To ensure proper co-ordination between POWERGRID and NEEPCO for carrying out the works under the scope of this Agreement, both NEEPCO and POWERGRID shall nominate their respective Nodal Officer/Project Manager who shall be the focal point for all matters relating to this Agreement.
- 4.0 **RELEASE OF FUNDS:**
- 4.1 To facilitate smooth execution of work and to complete the work within the stipulated time schedule, NEEPCO shall ensure that the required fund is released as per clause No. 10.0 of this agreement. NEEPCO shall be responsible for any liability arising out of delay in release of funds required for execution of the project.
- 4.2 POWERGRID shall commence the work under this Agreement after the receipt of first installment payment as indicated in Clause 10.0 below.



4.3 It is clearly understood by the parties that funding of the Project cost and Consultancy Fee along with applicable service tax is the responsibility of NEEPCO and POWERGRID shall not finance any portion of the work from its own funds at any time during the execution of the Project.

5.0 AWARD OF CONTRACT (METHODOLOGY):

5.1 For the purpose of execution of work under this agreement, the entire work of the project may be in one package or divided into more contract packages to be executed by various contractors.

5.2 The contracts shall be awarded by POWERGRID on behalf of NEEPCO in line with the Works & Procurement Policy and Procedure of POWERGRID for timely execution of the project.

6.0 PROJECT COST:

6.1 The Project cost shall include:

- a) The cost of all equipment and services as paid to the contractor(s) or any other agency as required under the various contracts to be placed by POWERGRID on behalf of NEEPCO for executing the Project.
- b) Cost towards Survey & Soil investigation and any statutory clearance.

6.2 The estimated cost of the project is ₹ 3,81,30,000.00 (Rupees Three Crore Eighty One Lakh Thirty Thousand) inclusive of F&I, FD & CST.

6.3 The above estimated cost is for estimation purpose only. However, depending upon site conditions or for any other reason, the cost of the project may undergo change during the implementation of the project. As such the final executed cost of the project will be certified by POWERGRID based on the actual works executed.

7.0 CONSULTANCY FEE:

The Consultancy Fee payable to POWERGRID for the services as brought out in clause No.2.1 above shall be 15% of the final actual executed cost of the Project including applicable Taxes and Duties. Based on presently estimated cost of the project as mentioned at clause No.6.2 above, the Consultancy Fee payable to POWERGRID works out to ₹. 0.572 Crore, plus Service Tax.

The actual project cost, consultancy fee, loss for availability based incentive and O&M charges thereof to be paid by NEEPCO shall be arrived at by POWERGRID only after completion of the project.

Admission

Big

9.0 TAXES AND DUTIES:

(a) On Consultancy Fee and other charges

The Consultancy Fee and loss for availability based incentive and O&M charges indicated above do not include any taxes & duties. All present and future applicable statutory taxes, duties and levies (including any variation thereof) as applicable by any Act/Notification of Government (Central/State) or any other local bodies/authorities shall also be paid by NEEPCO.

(b) On Project Cost

The estimated project cost indicated above is inclusive of F&I, excise duty and sales tax at prevailing rates. All present and future statutory taxes / levies, duties, cess, entry tax or any kind of imposition(s) whatsoever imposed / charged by any Government (Central / State) and / or any other local bodies/ authorities on POWERGRID and / or its contractors in respect of execution of project which are not presently included in the estimated cost of the Project (including any variation thereof) shall form the integral part of the project cost and shall be payable by NEEPCO.

10.0 TERMS OF PAYMENT:

The terms of payment shall be as follows:

a) Project Cost:

NEEPCO shall arrange to release payments towards Project Cost directly to POWERGRID.

~~10% of the estimated cost shall be paid within 15 days of signing of the agreement.~~

- ii) Balance payment shall be linked to the progress of work and payable quarterly in advance.
- iii) Payment arising due to adjustment on account of variation between the presently estimated cost and the cost on award shall be made known to NEEPCO by POWERGRID when the later is determined. ~~NEEPCO shall release the cost of advance payments to POWERGRID accordingly.~~
- iv) Payment arising due to adjustment on account of variation between the cost on award and final executed cost of the project shall be made as per requirement submitted by POWERGRID.
- v) No Bank Guarantee shall be furnished by POWERGRID for receiving payments from NEEPCO.

A. Hussain

R. J. H.

- vi) At no stage POWERGRID shall use its own funds for execution of the project.
- vii) Any delay in implementation of project on account of non-availability of funds and services to be provided by NEEPCO shall not be attributable to POWERGRID and the period of implementation shall be deemed to have been extended to such delays.
- viii) The dismantled materials of existing Bay will be returned to NEEPCO. In case NEEPCO is not willing to take over these dismantled materials, salvage / scrap values of dismantled materials as may be determined by POWERGRID shall be credited to NEEPCO and adjusted in the final bill.
- ix) Immediately on receipt of entire expenditure incurred by POWERGRID towards construction/implementation of the above Project, the possession of the Project would be given to NEEPCO along with all the BG, Performance Guarantee, etc., obtained from the Contractors, Suppliers etc. However after commissioning of the Project, the operation and maintenance of the same shall be the responsibility of NEEPCO.

The bills towards Project Cost will be raised by POWERGRID through letter and all the payments shall be released by NEEPCO within 15 days of submission of such requirement.

~~4.1.2.3~~ Consultancy Fee:

NEEPCO shall arrange to release the Consultancy fee along with applicable Service Tax directly to POWERGRID.

~~4.1.2.4~~ Payment of Consultancy Fee along with applicable Service Tax shall be paid within 15 days of signing of the bill.

- ii) Balance payment of Consultancy Fee along with applicable Service Tax shall be linked to the progress of work and payable quarterly in advance.
- iii) Payment of Consultancy fee along with applicable Service Tax arising due to adjustment on account of variation between the presently estimated cost and the cost on award shall be made known to NEEPCO by POWERGRID when the later is determined. NEEPCO shall regulate the quarterly advance payments to POWERGRID accordingly.
- iv) Payment of Consultancy fee along with applicable Service Tax arising due to adjustment on account of variation between the cost on award and final executed cost of the project shall be made as per invoice raised by POWERGRID

Handwritten signature

Handwritten signature

All the payments towards Consultancy fee shall be released by NEEPCO within 15 days of submission of Invoice by POWERGRID.

11.0 ~~TIME SCHEDULE~~

~~11.1 The completion schedule of the project shall be as per the date of signing of the Agreement or receipt of first initial advance payment whichever is later.~~

This is however, subject to NEEPCO fulfilling all its obligations in time as under:

- i) Timely release of payments/funds by NEEPCO as mentioned at para 10.0 above.
- ii) Besides NEEPCO shall also obtain all other clearances from concerned authorities including issue of necessary Notifications in time.

11.2 Any delay on account of above will affect the completion schedule and therefore, the period of implementation of this Agreement shall be deemed to have been extended to cover such delay as may occur.

✓ 11.3 If by reason of extra or additional work or any industrial dispute or any cause or causes outside of and beyond the reasonable control of POWERGRID and its contractor(s) including delay in release of funds by NEEPCO, the work is delayed or impeded, the delayed period shall be construed as automatic time extension.

11.4 The completion period is indicated in good faith and is subject to fulfillment of obligation on part of the Owner and POWERGRID.

~~12.0 PROGRESS REVIEW MEETINGS~~

To review progress of work, a quarterly review meeting shall be held at the level of the Project Manager/Nodal Officer of both the parties at mutually agreed places. Project Manager, POWERGRID shall submit a monthly progress report to the Owner.

13.0 FACILITIES/INFORMATION TO BE PROVIDED BY OWNER:

13.1 All necessary information/data and facilities as may be required by POWERGRID in connection with services shall be promptly rendered by NEEPCO under this Agreement.

Atsani

A. K. K.

13.2 NEEPCO shall give their views on all matters pertaining to this Project as may be referred to by POWERGRID from time to time within a reasonable time which would normally not exceed 15(fifteen) days and shall discharge faithfully all its obligations.

14.0 FORCE MAJEURE:

14.1 Force Majeure is hereby defined as any cause, which is beyond the control of POWERGRID or its Contractor(s) or NEEPCO as the case may be, which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affects the performance of the said work including, but not limited to the followings:

- a) Natural phenomena including but not limited to floods, draughts, earthquakes, epidemics etc.,
- b) Acts of any Government, domestic or foreign, including but not limited to war, declared or undeclared, quarantines, embargoes etc.,
- c) Hostilities, revolutions, riots, civil commotions, strike, terrorism including in the premises of the Contractors.

14.2 During the period of inability to perform the services as a result of any event of Force Majeure, POWERGRID shall be entitled to continue to be paid under the terms of this contract as well as to be reimbursed for additional costs reasonably and necessarily incurred by them during such period for the purposes of the services and in reactivating the services after the end of such period, provided that such cases are notified in writing within 30 (thirty) days from the occurrence of such cause.

14.3 POWERGRID or NEEPCO shall not be liable for any delays in performing its obligation resulting from Force Majeure causes as referred to and/or defined herein above. The date of completion will be extended by corresponding period equal to the period of Force Majeure if the situation so warrants and by such period to be mutually agreed to by POWERGRID and NEEPCO. Should one or both Parties be prevented from fulfilling their obligations by state of Force Majeure lasting for a period of two months, the two (2) Parties shall consult each other and decide further course of action.

15.0 TAKING OVER:

* POWERGRID shall intimate NEEPCO as soon as the works of the project have been completed (except in minor respects that do not affect their use and/or cause any serious risks) and NEEPCO shall issue a certificate to POWERGRID Site-in-Charge (herein called the Taking Over Certificate) in which they shall certify the date on which the works have been completed and passed commissioning tests, if any. The issue of taking over certificate

shall not be unreasonably withheld by NEEPCO. In case Taking Over certificate is not issued on satisfactory completion & commissioning of the Project, it shall be deemed to have been taken over on expiry of 30 days from the date of intimation by POWERGRID. Before handing over of the facilities, POWERGRID shall hand over the concerned drawing, test certificate, pre-commissioning test result, BG, Performance Guarantee etc. to the owner.

16.0 **TERMINATION OF AGREEMENT:**

16.1 In the event when both the parties mutually agree to terminate the Agreement, on account of force majeure or any other reason, termination shall take effect from the date and time to be agreed upon mutually.

16.2 In the event of termination of this Agreement, POWERGRID shall be paid proportionately for such scope of work, which have been completed/partially completed & mutually agreed upto the date of termination.

17.0 **SETTLEMENT OF DISPUTE & ARBITRATION:**

17.1 This agreement shall be governed by and construed in accordance with the laws of India. Any dispute or difference arising out of this agreement shall be amicably settled between the Parties.

17.2 In case of non-settlement of dispute or difference, the matter shall be within 30 days referred to arbitrator as per clause 17.3 herein below as provided in Government of India, Ministry of Heavy Industries and Public Enterprises, Department of Public Enterprises letter No-DPE/4(10)/2001-PMA-GL1 dated 22.01.2004 and its subsequent amendments thereof.

17.3 As per the provisions of aforesaid circular dated 22.01.2004:

In the event of any dispute or difference relating to the interpretation and application of the provisions of the contracts, such dispute or difference shall be referred by either party for Arbitration to the sole Arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Govt. of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Govt. of India. Upon such reference the dispute shall be decided by the Law Secretary or the Special Secretary/Additional Secretary, when so authorised by the Law Secretary, whose decision shall bind the parties finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by Arbitrator.

17.4 The venue of Arbitration shall be at New Delhi.

17.5 This Agreement shall be subject to the jurisdiction of the court at New Delhi.

18.0 THIRD PARTY DISPUTE:

If any litigation/arbitration cases crop up during the process of placement of various contract orders or during the execution of the contract and thereafter between the contractor(s) and POWERGRID on behalf of NEEPCO, POWERGRID shall resolve the same on behalf of NEEPCO. NEEPCO shall provide necessary details, if required. The cost of such litigation/arbitration and liability arising out of the award thereof, if any, shall be borne by NEEPCO at actual.

19.0 LIQUIDATED DAMAGES FOR DELAY IN COMPLETION:

POWERGRID shall suitably incorporate the provisions towards levy of Liquidated Damages in their Agreements with Contractor(s) for delay in completion of the work. All amounts towards Liquidated Damages, if any, as may be received by POWERGRID under this provision, shall be suitably adjusted in the Project Cost.

20.0 PERFORMANCE GUARANTEE:

POWERGRID shall suitably incorporate the provision of Guarantee Clause in their Contract Agreements with Contractor(s) valid for a period of 12 calendar months commencing immediately after commissioning of the Project, which will be enforceable by the Owner.

21.0 AMENDMENT:

This Agreement may be amended or modified if necessary by a written instrument signed by the Parties and the same shall be considered as an integral part of this Agreement.

22.0 EFFECTIVE DATE:

~~THIS CONTRACT SHALL BE DEEMED TO HAVE COMMENCED ON THE DATE OF SIGNATURE OF ALL PARTIES TO THIS AGREEMENT.~~ All rights, obligations and responsibilities of Owner and POWERGRID shall be deemed to have commenced and accrued from the above date.

[Handwritten signature]

[Handwritten signature]

Page No. 12 of 13

23.0 NOTICE OF DEFAULT:

Notice of default given by either Party to the other Party under this Agreement shall be in writing and shall be deemed to have been duly and properly served upon the Parties hereto if delivered by Registered mail against acknowledgement due and addressed to the signatories to this Agreement.

24.0 CORRESPONDENCE:

24.1 All communications from NEEPCO to POWERGRID shall be addressed to the Project Manager nominated by POWERGRID in writing for the purpose of this work.

24.2 All communication from POWERGRID to NEEPCO shall be addressed to the Nodal Officer nominated by NEEPCO in writing for the purpose of this work.

IN WITNESS WHEREOF the Parties hereto have fully executed these present through their duly authorized representatives on the Day, Month, Year and Place mentioned above.

For and on behalf of

For and on behalf of

North Eastern Electric Power Corporation Limited

Power Grid Corporation of India Limited

A. Hussain
(AKHTAR HUSSAIN)
General Manager (E/M)

Ajoy Patir
अजय पतिर / Ajoy Patir
महाप्रबंधक / Gen. Manager

WITNESS:

पावर ग्रीड लिमिटेड / POWERGRID, Shillong

1. *[Signature]*
(Shaw) (W) (E) (M)
2. *[Signature]*
010 261 111066
नीलको लि. लि. लि.
NEEPCO Ltd., Shillong

1. *[Signature]*
(P. KANUNGO)
Gen. Manager (OS)
POWERGRID, NERTS
Shillong.

No. NEEPCO/AGBP/PEM/O&M-07/2017-18/39NBH122/580(A)

Dtd.09/03/2018

To,

M/S Namrup Sales Corporation.
 Namrup, P.O:Parhatpur, Dist:Dibrugarh
 Assam (786623)

Email:kaushal_kanda@yahoo.co.in

Sub: Detailed Order for Supply, Installation & Commissioning of 2 (two) sets of 48 V, TBS (Opz) 500 AH tubular lead acid Battery Banks(Make M/S Exide Industries Ltd.) at AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam.

- Ref 1. Our Letter No: NEEPCO/AGBP/PEM/O&M-07/17-18/196 dtd. 29/08/2017.
 2. Your offer vide Ref. No: AC/EX/AGBP/009 dtd.01/09/2017.
 3. Request for clarification vide NEEPCO/AGBP/PEM/O&M-07/17-18/390 dtd.14-12-2017.
 4. Your clarifications vide Ref. No: AC/EX/AGBP/006 dtd.21-12-2017.
 5. Our Letter Ref. No. NEEPCO/AGBP/PEM/O&M-07/17-18/410 dtd. 29-12-2017.
 6. Your clarification vide No. AC/EX/AGBP/004 dtd.29-12-2017.
 7. Our LOI No. NEEPCO/AGBP/PEM/O&M-07/17-18/541 dtd. 23-02-2018

Dear Sir,

With reference to above, Corporation is pleased to place this order for Supply, Installation/Retrofitting & Commissioning of 2 (two) sets of 48 V, TBS (Opz) 500 AH tubular lead acid Battery in transparent container (Make M/S Exide Industries Ltd.) with MS Stand, IRIT, Acid and maintenance associations (type 24TBS500) as per IS: 1651-2013 and disposal through buy back of old existing battery bank of PLCC having 2 (two) sets of cell and each set consists of 24 no. cell at AGBP, NEEPCO LTD., Bokuloni Chariali, Dibrugarh, Assam, PIN: 786 191.

A. SCOPE OF CONTRACT:

Sl. No.	Scope of Supply/Works	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
I	Supply of 2 (two) sets of 48 V, TBS (Opz) 500 AH tubular lead acid Battery in transparent container (Make M/S Exide Industries Ltd.) with MS Stand, IRIT, Acid and maintenance associations (type 24TBS500) as per IS: 1651-2013 with non-returnable container and accessories, battery terminal jelly etc. suitable for replacement of Existing System (48 V 500Ah Tubular Lead Acid Battery) to complete the battery bank in all respects for PLCC of AGBP, NEEPCO Ltd., Bokuloni, Dist: Dibrugarh, Assam.	Set	2 (two)	11,42,000.00	22,84,000.00
A	Less Discount@ 1.5%				34,260.00
B	Price after discount				22,49,740.00
C	Scrap value of old batteries Rs.850.00 x 48 Nos.				40,800.00
D	Total (B-C)				22,08,940.00
II	Installation/Retrofitting & Commissioning Charge of the above mentioned Battery Banks.	Set	2 (two)	60,000.00	1,20,000.00

B. Terms & Conditions:

1. Price: -The prices are FOR site basis and it shall remain "FIRM" till completion of delivery of the materials and execution of works as mentioned above.

2. **Taxes and Duties:** GST is applicable as per GST Rule subject to submission of GST Registration No. and payment of GST as per HSN/SAC Code. The Firm has to submit GST No. details. Present rate of GST is @28% for supply and @18% to be paid extra against installation & commissioning charges. GST @ 18% will be charged extra against the scrap value of old batteries. If any changes will come on GST rate in future, same shall be regulated accordingly. Our GSTIN No. is 18AAACN9991J3ZP.
3. **Terms of Payment :**
- i) **Supply:** 100% payment with taxes & duties against supply of materials shall be released through electronic mode after receipt of materials at AGBP Site in full and good condition and submission of following documents:
 - a) Submission of Performance of Bank Guarantee @ 10% of the contract value.
 - b) Invoice in triplicate.
 - c) Detailed packing list/ challan.
 - d) Guarantee/Warranty Certificate.
 - e) Bank Account details for e-payment through RTGS or NEFT.
 - ii) **Commissioning:** 100% payment applicable with taxes and duties shall be paid against installation/Retrofitting & Commissioning Charge of the above mentioned Battery Banks after the successful commissioning and against submission of bill in triplicate and work completion reports.
4. **Performance Bank Guarantee:** The supplier have to be submitted Performance Bank Guarantee @ 10% of the contract value in prescribed format with a validity of 90 days after expiry of the guarantee period within 20 days from issue of the purchase order on fulfilment of all the terms and conditions.
5. **Delivery:** - Delivery of the materials shall be made within 8-10 weeks from the date of receipt of approved drawing and commercially cleared Purchase Order. The date of installation & commissioning will be intimated in due course of time after receipt of materials at site.
6. **Guarantee / Warranty:** - The Battery Bank shall be guaranteed for manufacturing defects for a period of 12 (twelve) months from the date of commissioning or 18 (eighteen) months from the date of supply whichever is earlier.
7. **Rejection of defective materials:** - If the materials are found defective at the time of receipt, the same shall be rejected and the suppliers have to replace the same at their cost.
8. **LD Clause:** Our Standard LD clause shall be applicable for delay in delivery of materials (full or part) "In case you fail to deliver the materials within the contractual delivery period due to reason attributed to you, then the Corporation shall right to recover from your sum towards Liquidated Damage @1/2% (half percent) value of the undelivered portion of supply for each calendar week or part thereof delay from schedule delivery date. The total recovery from you on account of this, however, not exceeds 15% (fifteen percent) of the value of undelivered portion of supply. However, LD Clause will not be imposed if you fail to deliver the materials within the schedule of delivery period due to Force Majeure conditions, which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquake, storms, floods, explosion or fire not cause by your negligence, lightning, act of God, act of public etc.
9. **Paying Authority:** The Sr. Manager (Fin), F & A Wing, AGBP, NEEPCO Ltd., P.O. Bokuloni Chariali, Dist. Dibrugarh, Assam. PIN: 786 191.
10. **Consignee:** The Sr. Manager (E/M), MM Wing, AGBP, NEEPCO Ltd., P.O. Bokuloni Chariali, Dist. Dibrugarh, Assam. PIN: 786 191.

Kindly acknowledge the receipt of the order.
Thanking you.

Yours faithfully

 Sr. Manager (E/M),
 Plant Electrical Maintenance Wing
 AGBP, NEEPCO LTD.

Memo. No. NEEPCO/AGBP/PEM/O&M-6/2017-18/581-84

Date: 09/03/2018

Copy to:

1. The Head of Project, AGBP, NEEPCO Ltd., Bokuloni, for kind information please. This is as per Finance Concurrence vide No. NEEPCO/AGBP/F&A/2834 Dtd. 16/02/2018 and approval conveyed vide U.O. No. NEEPCO/HOP/2248 Dated 20/02/2018.
2. The Sr. Manager (Fin), F & A Wing, AGBP, NEEPCO Ltd., Bokuloni. A copy of Approval from Competent Authority is enclosed herewith for kind reference please.
3. The Sr. Manager (E/M), Vigilance Wing, AGBP, NEEPCO Ltd., Bokuloni. A copy of Approval from Competent Authority is enclosed herewith for kind reference please.
4. The Sr. Manager (E/M), MM Wing, AGBP, NEEPCO Ltd., Bokuloni, for kind information please.


Sr. Manager (E/M),
Plant Electrical Maintenance Wing
AGBP, NEEPCO LTD

o/c

Ref: NEEPCO/AGBP/PEM/O&M-02/18-19/11-19/ 623

dt: 28/03/19

To
M/s SCOPET&M PVT LTD,
402, Aorus Chamber, Annex-A, S.S. Amrutwar Marg
Worli, Mumbai-400013
Kind Attention: Ajay Agarwal, General Manager- Marketing

1 Sub: Detailed Purchase Order for "Supply, installation and Commissioning of External GPS system for Time synchronisation of RTU" at AGBP, NEEPCO Ltd., Bokuloni Chariali, Dibrugarh, Assam.

Ref:

1. Our enquiry. NEEPCO/AGBP/PEM/O&M-02/18-19/454 Dtd. 20.12.2018
2. Your offer vide. QPAF-AS-AS-01-B001-R01 dtd. 28-12-2018
3. Our letter for clarifications vide NEEPCO/AGBP/PEM/O&M-02/18-19/510 dtd. 09/01/2019.
4. Your clarifications vide Ref: LPAF-AS-AS01-R03 dated. 11-01-2019.
5. Your offer vide Ref: QPAF-AS-AS01-B001-R03 dated. 11-01-2019
6. Our email for clarifications dated 18/01/2019
7. Your clarifications vide Ref: LPAF-AS-AS01-R03-R01 dated. 19-01-2019
8. Your revised offer vide Ref: QPAF-AS-AS01-B001-R04 dated. 19-01-2019.
9. Our email for clarifications dated 27/03/2019
10. Your Confirmation email dated 27/03/2019

Dear Sirs,

With reference to the above, the corporation is pleased to issue the detailed Purchase Order for "Supply, installation and Commissioning of External GPS system for Time synchronisation of RTU" per following terms and conditions:

TERMS AND CONDITIONS:

1. Scope of supply: - The scope of supply will include supply and delivery of items as per the Bill of Materials (BOM) as mentioned below:-

Bill of Materials (BOM)

External GPS system for Time synchronisation of Existing Vizianag RTU at AGBP, NEEPCO Ltd.				
Sl. No.	QMS. REQUISIT	UNIT	QOM	QTY
1	GPS System as per specifications	Single Regulator	No.	1
2	External switch for 6KJ 40	Regulator	No.	1
3	Power supply for Ethernet Switch	Regulator	No.	1
4	Patch Cord Cables	Kit/Regulator	Kit	70

2. Scope of Work: The scope of work will include supply and commissioning of External GPS system and Time synchronise the RTU. You are requested to commission the GPS system at the earliest after delivery of the materials at site.

3. **PRICE:** The Prices is Ex-Works (in INR) and shall remain "FIRM" till completion of delivery of the materials (for materials) and till completion of commissioning (for works). The prices are Exclusive of Taxes and duties, freight and insurance.

a. **Supply:**

Sl No	Item	Qty	Unit Ex-works Price (in INR)	Total Ex-works Price (in INR)
1	Supply of External GPS system for time synchronisation of Existing Vizlmax RTU at AGBP, NEEPCO Ltd.	01	185620.00	185620.00
(Rupees One Lakh Eighty Five Thousand Six Hundred Twenty) only				

b. **Services:**

Sl	Service	Qty	Unit Lump Sum Service Charge (Rs.)	Total Lump Sum Service Charge (Rs.)
1	Installation and Commissioning of GPS System (Completion in all aspects)	01	49,500.00	49,500.00
(Rupees Forty Nine Thousand Five Hundred) only				

- c. **Freight & Transit Insurance:** - Materials have to transport through reputed transporter/courier service. Freight and insurance charges shall be paid extra at actual against submission of documentary evidence and restricted @3% of Invoice value.
4. **Taxes and Duties:** All applicable taxes and duties shall be paid extra at actual at the time of execution as per Govt. prevailing norms. (Present rate of GST @ 18% for supply and service). GST shall be applicable subject to submission of GST details.
5. **E-WAY bill (Road Permit):** E-way bill may be generated by the supplier. *Our (Assam Gas Based Power Plant) GSTIN and PAN is '18AAACN9991J3ZP' and '55AACN9991'. No responsibility shall be taken for issuance of E-way bill by the purchaser.*
6. **Terms of Payment:**
- a. **For Supply**
90% (Ninety percent) payment shall be released after receipt of the materials at AGBP site in full and good condition and against submission of the following dispatch documents:
- Tax Invoice in triplicate with GST details.
 - Packing list.
 - Carton No.
 - Insurance Warehouse Certificate.
 - Bank account details for a- payment (as per format enclosed)
- Remaining 10% with all taxes and duties will be released against submission of work completion report/MOM of Commissioning.
- b. **For Works**
100% payment with taxes applicable will be released on successful Commissioning completion against submission of:
- Bill in triplicate.
 - Work completion report/MOM of Commissioning.
7. **Delivery:** The materials shall be delivered within 12 (Twelve) weeks of from the date of confirmed purchase order at Assam Gas Based Power Plant site, NEEPCO Ltd., P.O Bokuloni Chariali, District Dibrugarh, Assam-786191.
8. **Guarantee/Warranty:** The numerical relays will be guaranteed for a period of 120 (one hundred and twenty) months from the date of commissioning or 120 (one hundred and twenty) months from the date of supply, whichever is earlier. The supplier will submit the manufacturer's warranty certificate of all the numerical relays along with the material/invoice.
9. **Testing and Inspection:** The GPS System will undergo all the required tests as per the relevant IS codes. The supplier will submit the Test certificate of all the GPS system.
10. **Accommodation:** NEEPCO will provide accommodation to the commissioning Engineers Team at site (Guest House) free of cost. However, the food will be on chargeable basis as per the standard rate.

11. **Liquidated damage:** In case you fail to deliver the materials within the contractual delivery period due to reason attributed to you, then the Corporation shall reserve the right to recover from your sum towards liquidated damages @ 1/4% (one fourth percent) value of the undelivered portion of the supply for each calendar week or part thereof delay from the scheduled delivery date. The total recovery from you on account of this shall, however, not exceed 5% (five percent) of the value of the undelivered portion of supply. However the LD clause will not be imposed if you fail to deliver the materials within the scheduled delivery period due to Force Majeure conditions which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquakes, monns, floods, explosion or fire not caused by your negligence, lightning, act of God, public enemy which is of such nature as to delay, curtail or prevent timely action by either party.
12. **Consignee:** Senior Manager (E/M), Material Management Wing, AGBP, NEEPCO Ltd., P.O. Bokuloni Chariali, District Dibrugadh, Assam-786191.
13. **Rejection of defective materials:** If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall have to replace the same at their cost.
14. **Paying authority:** The Senior Manager (F), F&A Wing, AGBP, NEEPCO Ltd., P.O Bokuloni Chariali, District Dibrugadh, Assam-786191.

Kindly acknowledge receipt of this order and confirm your acceptance thereof.

Thanking you,

Yours faithfully,

Senior Manager (E/M)
Plant Electrical Maintenance
AGBP, NEEPCO Ltd.


N.L.O

Memo no. NEEPCO/AGBP/PEM/D&M-02/18-19/ 629-630

dated 28/03/19

Copy to:

1. The Head of Project, AGBP, NEEPCO Ltd., for favour of kind information, please. This is as per concurrence of Project Finance vide NEEPCO, AGBP/F&A/947 dated 29/01/19 and subsequent approval vide U.O no NEEPCO/HOP/2103 dated 11/02/2019. Further this is issued as per joint discussion with C&I Wing on 27.03.2019.
2. The Senior Manager (E/M), C&I Wing, AGBP, NEEPCO Ltd., for favour of kind information, please.
3. The Senior Manager (E/M), C/o The DGM (E/M), AGBP, NEEPCO Ltd., for favour of kind information, please.
4. The Senior Manager (F), F&A Wing, AGBP, NEEPCO Ltd., for information, please. A photocopy of the approval note is enclosed herewith.
5. The Senior Manager (E/M), MMW, AGBP, NEEPCO Ltd., for information, please.
6. The Sr. Manager (E/M), Vigilance, AGBP, NEEPCO Ltd. for information, please. A photocopy of the approval note is enclosed herewith.
7. Q&M-02 File


Senior Manager (E/M)
Plant Electrical Maintenance
AGBP, NEEPCO Ltd.

REF: NEEPCO/AGBP/PEM/O&M-07/18-19/432. dtd.14/12/2018

To,

M/s CONSUL NEGOWATT POWER SOLUTIONS PVT LIMITED
No. 4/329-A, OLD MAHABALIPURAM ROAD, KOTTIVAKKAM
SHOLINGNALLUR
CHENNAI, TAMILNADU-600041. (Kind Attn:Mrityunjy Chakraborty)

Sub: Detailed Order for "Design, Manufacturing, Supply, Retrofitting, Testing and Commissioning of 2 x 100KVA, 1 phase, 230V, 110V UPS system (Model: FALCON1000), 535Ah Plante Lead acid Battery Bank, One set of 5KVA UPS system etc. to AGBP, NEEPCO Ltd." for replacement of old existing UPS system and Battery Banks on buy back basis.

Ref.:

1. Our NIT No. NEEPCO/AGBP/PEM/O&M-07/18-19/02 dtd.11/06/2018 (Tender ID: 37341).
2. Our letter for clarifications vide NEEPCO/AGBP/PEM/O&M-07/18-19/233 dtd. 05/09/2018
3. Your clarifications vide Ref: Consul/NC/18-19/02 dtd.10/09/2018
4. NEEPCO/AGBP/PEM/O&M-07/18-19/305 dtd.10/10/2018.
5. NEEPCO/AGBP/PEM/O&M-07/18-19/369 dtd.03/11/2018.
6. NEEPCO/AGBP/PEM/O&M-07/18-19/379 dtd.05/11/2018.
7. NEEPCO/AGBP/PEM/O&M-07/18-19/382 dtd.06/11/2018 and subsequent correspondence by our authorized service provider via email dtd.6/11/2018 for participation in e-reverse auction.
8. Confirmation & submission of declaration form for participation in e-RA via email dtd.12/11/2018.
9. Confirmation of Final Price in e-reverse auction vide Offer No: 126882 dtd.13/11/2018 via email.
10. Our email for clarification of GST on Transit insurance via email dtd.03/12/2018.
11. Your clarification and confirmations of GST on Transit insurance via email dtd. 03/12/2018.
12. Our LOI No. NEEPCO/AGBP/PEM/O&M-07/18-19/421 dated. 04/12/2018.
13. Your acknowledgement of LOI via e-mail dated 04/12/2018.

Sir,

With reference to above, the Corporation is pleased to issue this Detailed Order for "Design, Manufacturing, Supply, Retrofitting, Testing and Commissioning of 2 x 100KVA, 1 phase, 230V, 110V UPS system (Model: FALCON1000), 535Ah Plante Lead acid battery bank, 5KVA UPS system etc. to AGBP, NEEPCO Ltd. Bokuloni, Dibrugarh, Assam (Pin: 786191)" for replacement of old existing 2 x 100KVA, 1 phase, 230V UPS system on buy back basis as per following terms & conditions.

1.0 SCOPE OF CONTRACT: The Scope of works to be executed of this tender shall be as follows:

- 1.1 Design, Engineering, Manufacture, Inspection and Testing at Manufacturer's works before despatch, Packing & Forwarding, Supply, Transportation to site, Insurance from the source of supply till commissioning, Material Handling, Loading and unloading, Storage at Site, Retrofitting/Installation, Testing and Commissioning of 2 x 100KVA, 1 phase, 230V, 110V UPS system (Model: FALCON1000) with Parallel Redundant 12 Pulse thyristorised based Rectifier, IGBT based Inverters, In-built Output Isolation Transformer along with in-built static and maintenance Bypass, Plante lead acid Battery Bank battery bank, touch screen display, list of Mandatory Spares etc. as per agreed terms & conditions of NIT for replacement of old existing 2 x 100KVA, 1 phase, 230V, 110V UPS system and common Battery Bank. The new UPS shall have Common Battery Bank (Model: YHP13 335P, 180 cell) and shall have sufficient amp-hours capacity to supply 100% full load current for 60minutes.
- 1.2 The new UPS shall be as per requirement of Technical Specifications, Guaranteed Technical Particulars (GTP) as detailed in annexure-D and as per agreed terms & conditions whatever required in all respects to complete works successfully.
- 1.3 One complete set of 5KVA UPS system having 2 (two) no 110V AC uninterrupted power supply source for GBS (GC#1/2 and GC#3/4) along with 12V SMF (sealed maintenance free) battery bank with accessories in complete having 36mints backup. The scope also include 2(two) no static switch of adequate rating as per IEC 62310-1, IREE446 (Model: Ho: nb:il 1000S/2000S) for 110V AC power changeover from the 5KVA UPS to GTC's source as bypass supply and vice versa.

- 1.4 **Load End Power Supply Distribution /ACDB:** To provide power supply distribution boxes for sub-distribution of main UPS/ Utility feeder(s). These shall include necessary change over circuitry (if applicable), switch-fuse units, MCB, terminal blocks etc. suitable for the application. The supply distribution boxes shall be installed and utmost care should be taken to minimize interruption of critical load. Details planning of works need to be confirmed. The details of the AC distribution board, number of feeders etc. of the 2x100% and 25% spare feeders (minimum one each rating) with fuses for each rating shall be provided as per annexure-B.
- 1.5 **Annual Maintenance Contracts:** To ensure a complete preventive and full service maintenance contracts for a periods of 5(five) years for both the UPS system and battery system. The preventive maintenance service will have to be performed by factory trained Customer Engineers. The Annual Maintenance Contracts will be effective from the date of expiry of Warranty/guarantee periods.
- 1.6 Disposal through buyback of the existing old tubular/rubber lead acid battery bank (450Ah, cell 180 no/set) and old existing 2 x 100KVA, 1 phase, 230V, 110V UPS system of AGBP, NEEPCO Ltd. (Dismantling of the old batteries in the battery bank and disposal as per statutory guide lines. Collection of the old batteries from Power Station site and draining of acid as required from the old batteries shall be in the Scope of the contractor.
- 1.7 The supplier shall arrange for coverage of insurance policy viz transit insurance till delivery at site, storage at project site, erection, testing and commissioning of the supplied equipment's shall be covered under the scope of contract.
- 1.8 **Mandatory Spares/Accessories:** To provide the following mandatory spares including fuses of equivalent ratings for each items and suitable for the equipment's to be supplied.
- All cards /PCBs 1(one) number for each ratings and fuse of 10% of each ratings, SCR block for rectifier 2nos all ratings, IGBT block for Inverter 1no each rating.
 - Accessories and fittings (as per schedule of technical requirements). The list of mandatory spares, Accessories and fittings shall be as detailed in the Annexure-C
- 1.9 In case of requirement of FRLS (Fire resistance /redundant low smoke) Aluminum cable of adequate size between new battery bank and UPS during commissioning works, NEEPCO reserves the right to take the decision for procurement same which shall be decided in time. In case of procurement, the unit price of cable shall be as per L-1 rate for this particulars item which has already agreed. However, separate order shall be issued for this particulars item if felt necessary.
- 1.10 **Quality Assurance:** The Manufacturer shall ensure the Quality Assurance plan to be adopted a) at their Factory/ Works during manufacturing and at Work Site during execution.
- 1.11 **Availability of Spares:** To ensure availability of spares through the life of the equipment's to be supplied under the scope of contract and to ensure to provide within shortest possible time after call.
- 1.12 To provide documentation, demonstration/onsite training and testing to equipment at site to accrue technical knowledge, smooth operation and maintenance the new equipment.
- 1.13 **Unit Start-Up & Site Testing:** The manufacturer's authorized/field service personnel shall have to provide site testing if requested. Site testing consists of a complete test of the UPS system and the associated accessories supplied by the manufacturer. A partial battery discharge test shall have to be provided as part of the standard start-up procedure. The test results will be documented, signed, and dated for future reference.
- 1.14 **Manufacturer's Field Service:** To ensure the appropriate technical support resources to match escalating customer needs. Technical support service should be ensured in the NE Region and to provide within 24hrs in case of emergency.
- 1.15 **Training at site:** The supplier shall have to provide insitu training to O&M personnel of the plant for operation and maintenance of supplied equipment.

Prices: The Price are on FOR AGBP, NEEPCO, Bokuloni basis. Total Basic Price for Supply, Commissioning and AMC shall be for an amount Rs. 1,02,88,750.00/- [Rupees one crore two lakhs eighty eight thousand seven hundred fifty] only and Total Price shall be Rs. 1, 19, 19,357.00 [Rupees one crore nineteen lakhs nineteen thousand three hundred fifty seven] only including all charges towards Freight & transit insurance, GST, Buy back, GST on buy back etc. as detailed in Annexure-A. However, Freight charges shall be paid at actual basis subjected to submission of documentary evidence.

The prices shall remain FIRM till successful completion of works. The supplier shall arrange for coverage of insurance policy viz transit insurance till delivery at site, storage at project site, erection, testing and commissioning of the supplied equipment's shall be covered under the scope of contract and take full responsibility during transit and comply with necessary safety measures as called for relevant Act/Regulations.

- 2.1 Taxes and Duties:** The above mentioned price is inclusive of GST. However, the GST shall be paid at actual as per GST rule at the time of execution and subject to submission of GST registration, payment details against HSN code and GST invoice with all information details as per GST Rule. If any changes will come on GST, the same shall be regulated accordingly. Our GSTIN and PAN is '18AAACN9991J3ZP' and 'AAACN9991'.

3.0 Terms of Payment:

- 3.1 For Supply:** 100% of F.O.R/F.O.B. at AGBP along with applicable taxes & duties for Supply items shall be paid within 30 days after receipt of materials in full and good condition at site subject to submission of BG @10% of the total Contract Price (excluding AMC price) valid for the period of 90 days from date of expiry of guarantee/warranty period.

- 3.2 For Retrofitting/Installation, Testing and Commissioning:** For Retrofitting/Installation, Testing and Commissioning: 100% charges for Erection, Testing and Commissioning along with 100% service taxes shall be paid within 30 days after successful commissioning of works as detailed in "Scope of Contract" against submission of following documents:

- i. GST Bill/ GST Invoice in triplicate,
- ii. Guarantee/ warranty certificate,
- iii. Bank account details for e-payment.
- iv. Submission of test certificates & relevant drawings (For Supply: i-iv)
- v. Submission of job completion certificate. (For Installation, Testing and commissioning: i, v)

Installation/Retrofitting, Testing and Commissioning may be done in phase manner depending on clearance for availing shutdown of Units. Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time. However, during commissioning period, free accommodation shall be provided to the service engineer/commissioning engineer at our Guest House but food on chargeable basis.

- 3.3 Annual Maintenance Charge:** 100% payment shall be made quarterly basis after successful completion of job every quarter on pro rata basis based on agreed annual maintenance cost subject to submission of a bank guarantee @10% of annual maintenance cost for each concern years or renewal/extension of BG for succeeding years. The AMC shall be valid for a period of 5 (five) years to be commenced from the date of expiry of warranty/ guarantee period.

3.4 Security Deposit:

- a) **For Supply, Installation/Retrofitting, Testing and Commissioning:** The successful bidder shall have to submit Bank Guarantee in lieu of Security Deposit @10% of the Contract Price valid for a period of 90 days from the date of expiry of Guarantee/warranty periods as per our prescribed format as enclosed (Annexure-SD). The Security Deposit shall have to submit within a period of 30 days from the date issue of Contract Order
- b) **Security Deposit for AMC:** The successful bidder shall have to submit Bank Guarantee in lieu of Security Deposit @10% of annual maintenance cost for each concern years valid for 90 days from date of expiry of total maintenance contract periods or renewal/extension of BG for succeeding year wise valid for 90 days from date of expiry of AMC periods to be commenced from the date of expiry of warranty/ guarantee period.

The Security Deposit shall have to submit within a period of 30 days from the date issue of Material Contract. 1258

- 4.0 **Delivery Period:** The materials shall be delivered at site within 4(four) months from the date of approval of drawing.
- 5.0 **Commissioning Period:** The entire works are to complete within 5(five) months from the date of approval of drawing. However Installation, Testing and Commissioning periods may be extend depending on clearance for availing shutdown of Units. Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time.
- 6.0 **Guarantee/Warranty:** The materials supplied shall be warranted / guaranteed as per manufacturer's norms or for a period of 18 months from the date of despatch or 12 months from the date of successful commission whichever is earlier against manufacturing defect/ defective workmanship. The successful bidder shall supply the materials to the satisfaction of the Engineer-in charge. Defective materials shall be replaced/ rectified by the supplier at free of cost immediately on intimation from this end.
- 7.0 **Liquidity Damage:** Time is the essence of the Contract. If the performance of the Contract is delayed due to the reason attributed to the Contractor, the Purchaser shall without prejudice to his right to recover damages for breach of the Contract:-
 - i) Reduce the Contract price by 1/2 % (half percent) per week or part thereof of delay in completion of time subjected to maximum of 10% of the contract price.
 - ii) Execute or authorize the execution of work departmentally or through any other agency without any notice to the Contractor at the risk and cost of the Contractor. The decision of the Purchaser shall be final and binding upon the Contractor. However, the above action shall be taken without cancelling the contract in respect of work not yet due to execution. Or
 - iii) Cancel the entire Contract on or portion thereof and if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest for execution through other agency.
 - iv) Where action is taken under sub-clause (ii) or (iii) above to failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. But the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be in the entire discretion of the Purchaser. It is not be necessary for the Purchaser to serve a notice of such execution of the Contractor.
- 8.0 **Submission of Drawing:** The contractor shall submit the Drawing, Documentation and BOM within 2(weeks) from the date of awarding the contract for approval of the purchaser. The contractor shall furnish general layout diagram to accommodate the batteries with necessary fitting and fixings in the existing battery room at AGBP Power House.
- 9.0 **Operational Manual:** The Manufacturer/Bidder/contractor shall have to provide 5 (five) sets of Operation and Maintenance Manuals of specified UPS of good quality in bidding conditions along with equipment. The Manuals shall clearly include/indicate the installation methods, installation drawings, instructions a functional description of the equipment with block diagrams, safety precautions, illustrations, step by step operating procedures, and routine maintenance guidelines.
- 10.0 **Factory Testing:** Before shipment, the manufacturer fully and completely test the system as per standard to assure compliance with the specification.
- 11.0 **Pre-dispatch Inspection and Testing:** Testing of the materials as per relevant standard shall be carried at contractor's works. The tests shall be performed in presence of the Corporation's representative. For deputiation of an authorised representative for inspection and to witness such tests advance intimation at least 20 days ago prior to the tests shall be given to the Corporation. The test certificates are to be forwarded for approval of the purchaser.
- 12.0 **Dispatch clearance:** No materials shall be dispatched without intimation to the authorized representative or otherwise given dispatch clearance by the purchaser in writing to the Supplier.

Description of items and schedule of Prices in respect of Manufacturer (L1):M/S:Consul Newatt Power Solutions Pvt Ltd													
S/No	Description of Items (For Supply)	Quantity (No./Mtr) (a)	Est./Unit Price (Rs.) (x2)	Total Price (Rs.) (x1 x x2 = x3)	GST @ 18% (b)	Freight Charges (d)	Trans Insurance etc. (e)	GST on Freight Charges/Service charges (x)	Gross Total Price (Rs.) (x3+x4+x5+x6+x7)	Buy Back (f)	GST on Buy Back (g)	Total Price on Buy Back (f+g = 0)	Net Price (A-B+C)
1	Doc. Design, Engineering, Manufacturing, Inspection and Testing at Manufacturer's Supply, Transportation in van, to reach to the site of supply. ... Storage of 1000VA, 1 phase, 230V, 110V UPS system etc. as per Bill of Material (BOM) attached in lot	4	8518750	8016750	1551012	60000	7450	13282	33243307	250000	45000	305000	8063397
1.1	One complete set of SRVA UPS system having 2 (two) or 110V AC output rated power supply source for GIS (CC41/2 and CC43/4) along with 12V SMF ... in complete set as stated in the BOM ... complete set in lot.	1	150000	150000	27000	0	0	0	177000	0	0	0	177000
2	ACDR: Order, Manufacturing and supply of distribution boxes for sub-distribution of from UPS/ PDU's feeders etc. along with 2400 open tenders ... as stated in the BOM ... complete set in lot	3	1200000	1200000	216000	0	0	0	1416000	0	0	0	1416000
Sub Total for Supply (C)			9986750	9986750	1757615	60000	2400	11212	11857997	250000	45000	295000	11562997
(D)	For Retesting /Installation, testing & commissioning	Quantity (No./Mtr) (a)	Est./Unit Price (Rs.) (x2)	Total Price (Rs.) (x1 x x2 = x3)	GST @ 18%	Freight Charges (d)	Trans Insurance etc. (e)	GST on Service charges (x)	Gross Total Price (Rs.) (x3+x4+x5+x6+x7)	Buy Back (f)	GST on Buy Back (g)	Total Price on Buy Back (f+g = 0)	Net Price (A1-B1+C1)
4	Retesting/Installation, Testing and Commissioning of 2 x 1000VA, 1 phase, 230V, 110V UPS system along with Battery Bank ... as stated in the BOM ... complete set in lot	1	80000	80000	0	0	0	14400	94400	0	0	0	94400
5	One complete set of SRVA UPS system ... by GIS (CC41/2 and CC43/4) along with 12V SMF etc. battery bank as stated in the BOM ... complete set in lot	1	2000	2000	0	0	0	360	2360	0	0	0	2360
6	ACDR: Retesting/Installation, Testing and Commissioning of distribution boxes ... etc. as stated in the BOM ... complete set in lot	1	20000	20000	0	0	0	360	23600	0	0	0	23600
Sub Total for Retesting, testing & commissioning (D)			102000	102000	0	0	0	18000	120360	0	0	0	120360
(E)	Annual Maintenance Contract for periods of 1 (one) year to be commenced after expiry of warranty/guarantee periods.	Quantity (Unit/Per) (a)	Est./Unit Price (Rs.) (x2)	Total Price (Rs.) (x1 x x2 = x3)	GST @ 18%	Freight Charges (d)	Trans Insurance etc. (e)	GST on Service charges (x)	Gross Total Price (Rs.) (x3+x4+x5+x6+x7)	Buy Back (f)	GST on Buy Back (g)	Total Price on Buy Back (f+g = 0)	Net Price (A2-B2+C2)
7.1	AMC for 1 st year (01) ... complete for 1st year	1	40000	40000	0	0	0	7200	47200	0	0	0	47200
7.2	AMC for 2 nd year (02) ... complete for 2nd year	1	40000	40000	0	0	0	7200	47200	0	0	0	47200
7.3	AMC for 3 rd year (03) ... complete for 3rd year	1	40000	40000	0	0	0	7200	47200	0	0	0	47200
7.4	AMC for 4 th year (04) ... complete for 4th year	1	40000	40000	0	0	0	7200	47200	0	0	0	47200
7.5	AMC for 5 th year (05) ... complete for 5th year	1	40000	40000	0	0	0	7200	47200	0	0	0	47200
Sub Total for Annual Maintenance Contract (E)			120000	120000	0	0	0	21600	141600	0	0	0	141600
GRAND TOTAL (RS)=C+D+E.=(Rupees one crore nineteen lakhs nineteen thousand three hundred fifty seven) only.												11919357	



 (Girishanku Baidya)
 Sr. Manager (E/M), PEM
 AQSP, NEEPCO LTD., Bokulani

- 13.0 **E-way Bill (Road Permit):** E-way bill (Road Permit) may please be generated by the supplier. Our GSTIN NO is '18AAACN9991J3ZP'.
- 14.0 **Consignee:** The all materials as per schedule of items along with necessary accessories for completing the job shall be delivered FOR AGBP site at the address i.e. Sr. Manager (E/M), MMW, AGBP/NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, Pin - 786191.
- 15.0 **Paying authority:** The Sr. Manager (F), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam.
- 16.0 **Court of competent jurisdiction:** Any legal action taken or proceeding initiated or any of the terms of the agreement shall be only in the jurisdiction of local court of this Power Station area in Dibrugarh, Assam.
- 17.0 **The Bidders shall obtain all risk insurance policies adequately covering the total risk of transportation of the materials and equipment to be supplied by him under the Contract, and will obtain Storage-cum-Erection policy for the materials and equipment to be erected by him under the Contract, in the joint names of the Purchaser and the Contractor, and to be kept valid till the plant and equipment is taken over by the Owner. It may so happen that, for erection works, the Contractor will have to take insurance coverage for the materials and equipment supplied by the Owner. In such case, the Contractor shall take insurance coverage for these materials and equipment also in which case the premium paid by the Contractor for Owner's materials and equipment shall be reimbursed to the Contractor against submission of documentary evidence. The Contractor shall, at his own cost, obtain Workmen's Compensation Insurance, Comprehensive Automobile Insurance, Comprehensive General Liability Insurance Policy and Fire Insurance.**
- 18.0 **All the terms and conditions, technical specifications which are not indicated here shall be governed as per Bid documents and agreed terms and conditions. Further, any other necessary item/protective devices/equipment and accessories whether specifically mentioned herein or not, but necessary for completeness and satisfactory performance of the UPS system shall be provided.**
- 19.0 **The issuance of this order, will not relieve the Manufacturer/Bidder/Party from the responsibility of Scope of Contract whatever required in all respect to complete the works successfully.**

You are requested to kindly acknowledge the receipt of this order and conveyance your acceptance.


Encl: Annexure-A (Price Schedule)/Annexure-B (ACDB)
Annexure-C (List of Mandatory Spares & Accessories)/Annexure-D (GTY)
Annexure-SD (Model Form of Bank Guarantee)

Yours faithfully,


Dinabandhu Baishya
Sr. Manager (E/M), PEM,
AGBP, NEEPCO LTD, Bokuloni

NID: Memo No. NEEPCO/AGBP/PEM/O&M-07/18-19/433-438 dt. 14/12/2018

1. The HOP, AGBP, NEEPCO Ltd, Bokuloni for kind information please. This is issued as per Branch concurrence vide UD No: NEEPCO/F&A/764 dt.27/11/2018 and subsequent approval accorded vide UO No: NEEPCO/HOP/1731 dt.03/12/2018.
2. The Sr. Manager (E/M), O/O the DGM (E/M), O&AWC, AGBP, Bokuloni- for kind information please.
3. The Sr. Manager (F & A), AGBP, Bokuloni- for kind information please. Photo copy of approval is attached for kind information please.
4. The Sr. Manager (E/M), MMW, AGBP, Bokuloni- for kind information please.
5. The Sr. Manager (E/M), Vigilance, AGBP, Bokuloni - for kind information. Photo copy of approval is attached for kind information please.
6. Office record file O&M-07.


Dinabandhu Baishya
Sr. Manager (E/M), PEM,
AGBP, NEEPCO LTD, Bokuloni

Supply order FILE



© - 8001-2000
©-14001-2004
AS - 10001-1989

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

असम गैस आधारित शक्ति संयंत्र

बकुलनि, जिला- डिब्रुगढ़, असम, पिन - 786 199

North Eastern

(A Govt. of India Enterprise)

www.neepco.gov.in

ASSAM GAS BASED POWER PLANT

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 194

Ph. 0374-2825216, EPABX 2825207/2825423/2825208 FAX : 0374-2825348/2825217

E-mail : agbp.bokuloni@gmail.com

Ref: NEEPCO/AGBP/PEM/O&M-12/18-19/ 187.

dt: 19/5/18

To

M/s Everlite Engineering Industries
Everlite House, Laipuli
P.O. Panitola
Assam-786183
FAX 0374-2310126; Phone: 03742318564/2316579
Email: EVERASSAM1@GMAIL.COM; vsingh_viru@rediffmail.com

Subj: Detailed Purchase Order (No. 39NB1067 dated 10/08/2018) for "Design, Re- Engineering, Supply, Retrofitting, Testing and Commissioning of GE T&D India Ltd make numerical relays"-at AGBP, NEEPCO Ltd., Bokuloni Chariali, Dibrugarh, Assam.

- Ref:
1. Enquiry vide letter no. NEEPCO/AGBP/ PEM/O&M-12/18-19/61 dated 21/05/2018
 2. Offer vide letter no. NEEPCO/AGBPP/RELAY RETRO/6.6 KV & 415V/18-19 dt. 12-06-2018
 3. Request for clarifications to M/s G E T & D India Ltd. Kolkata vide letter no. NEEPCO/AGBP/PEM/O&M-12/18-19/127 dated 05/07/2018.
 4. Clarifications received vide No.NBBPCO/AGBPP/Relay Retro/6.6 KV & 415 V/Clarification Dated 09/07/2018.
 5. Request for clarifications via email dated 01/08/2018.
 6. Clarifications receipt via email dated. 01/08/2018.
 7. Our LOI No. NEEPCO/AGBP/ PEM/O&M-12/18-19/161 dated 01/08/2018.

Dear Sirs,

With reference to the above, the corporation is pleased to issue the detailed Purchase Order (No. 39NB1067 dated 10/08/2018) for "Design, Re-Engineering, Supply, Retrofitting, testing and commissioning" as per following terms and conditions:

PRICE:

Supply:

Sl No	Item	Qty	Unit Ex-works Price (Chennai) (in Rs.)	Total Ex-works Price (Chennai) (in Rs)
1	GE (formerly Alstom) make Numerical Protection relay, Type: MiCOM P241 with 8DI/8DO on IEC61850 protocol. Aux. 110-250 V DC for 550 KW motor. (For 04 No for Cooling Water Pump Motor at 6.6 KV & 3 No. For EP Motor at 415 V)	07	80,000.00	5,60,000.00
2	GE (formerly Alstom) make Numerical Protection relay, Type: MiCOM P 94VB with 8DI/8DO on IEC61850 protocol. Aux. 24-250 V DC (For 6.6 KV BUS PT.)	02	76,000.00	1,52,000.00
3	GE (formerly Alstom) make Numerical Protection relay, Type: MiCOM P14NB with 8DI/8DO on IEC61850 Protocol. (For 1 no. 6.6 KV Bus Coupler, 1 no. Incomer A (OCA - OCC), 1 no. Incomer B (OCB - OCC) and 2 no. Transformer Feeder (ODN&QDZ))	05	72,000.00	3,60,000.00
Total				10,72,000.00

(Rupees Ten Lakh Seventy Two Thousand) only

Regd. Office : Brookland Compound, Lower New Colony, Shillong - 793 003

Ph - 8142132268/1 2521 11 FAX - 2226217

A. Services:

Sl	Service	Qty	Unit Lump Sum Service Charge (Rs.)	Total Lump Sum Service Charge (Rs.)
1	Retrofitting, Testing and Commissioning, Engineering drawing for P241 relays	07	40,000.00	2,80,000.00
2	Retrofitting, Testing and Commissioning, Engineering drawing for P94VB relays	02	40,000.00	80,000.00
3	Retrofitting, Testing and Commissioning, Engineering drawing for P14NB relays	05	40,000.00	2,00,000.00
			Sub total	5,60,000.00
				(Rupees Five Lakh Sixty thousand) only

TERMS AND CONDITIONS:

1. **Scope of supply:** - The scope will include Design, Manufacturing and Routine Test as per relevant standard (at manufacturer's works), packing and forwarding, supply and delivery of items as quoted in the offer.
Supply of required wiring materials (i.e. wires, ferrules, lugs, Terminal blocks) and blanking plates for retrofitting and wiring of protective scheme during site activities as quoted in the offer.
All the existing auxiliary relays will be retained in the protective scheme. However, if any auxiliary relay(s) is/ are found to be defective at the time of commissioning, same shall be replaced/ repaired on chargeable basis, which shall be regularized after completion of the commissioning.
2. **Scope of Work** - The scope of work will include
 - a. Design and re-engineering for the protection scheme.
 - b. Removal of existing protection schemes.
 - c. Mounting and wiring of new protection scheme.
 - d. Testing and Commissioning of new protection schemes. All the protection logits shall be made operative as per the scheme requirement.
 - e. To provide training on protection schemes offered during commissioning.
 - f. Supply of required wiring materials and Blanking Plates for Mounting and Wiring of Protective scheme during commissioning.
 - g. Supply and commissioning of cables outside to the protection panels are not included in the scope of work.
 - h. All auxiliary relays/Trip relays of the existing protection schemes will remain as earlier. If auxiliary relays found defective, same will be replaced/ repaired by the Firm on chargeable basis.
3. **Technical specification and Drawing:** On receipt of this order and prior to commencement of commissioning activities, a copy each of all the drawings, technical specifications and schemes shall be submitted to this office for reference. You are also requested to submit modified final drawing if any modification is required during commissioning, (indicating the modifications).
- 3.1 **Prices:** The prices is Ex-Works (Cheennai) and shall remain "FIRM" till completion of delivery of the materials (for materials) and till completion of commissioning (for works). The prices are Exclusive of Taxes and duties, freight and insurance.
- 3.2 **Freight & Transit insurance:** - Materials have to transport through reputed transporter/courier service. Freight charges shall be paid extra as actual against submission of documentary evidence and restricted @2% of basic price. The transit insurance shall be arranged by NEEPCO under NEEPCO's Marine Open Policy & the Firm has to intimate to the undersigned's Consignee before dispatch for issuance of Transit Insurance and Road Permit.
- 3.3 **Taxes and Duties:** All activities shall be done upto at least at the time of execution in the form of invoice. The firm shall be responsible for the payment of GST and other applicable taxes and duties. The firm shall be responsible for the submission of GST details. Our (Assam Gas Based Power Plant) GSTIN and PAN is '18A5ACN9991J3ZP' and 'AAACN9991'.

4. Terms of Payment:

a. For Supply

100% (one hundred percent) payment against supply of the materials along with taxes and duties at actual shall be released within 30 days on receipt of the materials at AGBT site in full and good condition and against submission of the following dispatch documents:

- a) Bill in triplicate,
- b) Packing list,
- c) Consignment note/Challan,
- d) Guarantee /Warranty Certificate,
- e) Bank account details for e- payment (as per format enclosed),
- f) Test Certificate,

b. For Works

100% payment with taxes applicable will be released on successful Commissioning completion of each relays (part payment) against submission of:

- a) Bill in triplicate,
- b) Work completion report.

Work Completion will include completion of all 05(five) points mentioned in terms and Condition sl. no. 2 above (2a through 2e).

Work completion report will include:

- a) Report of commissioning,
- b) Final drawings of all the schemes commissioned,
- c) Final logic diagrams (PSL) of all the schemes commissioned,
- d) Complete list of relay setting values at the time of commissioning,
- e) List of all programmable inputs and/ or outputs used indicating usage,
- f) AND any other relevant document(s) if any.

5. **Security Deposit/Bank Guarantee:** The supplier have to be submitted Performance Bank Guarantee cum security deposit @ 10% of ex-work material value in prescribed format from a reputed and registered bank having a validity of 90 days after expiry of the guarantee period within 20 days from issue of the purchase order on fulfilment of all the terms and conditions.
6. **Delivery:** The materials shall be delivered within 8 (Eight) to 10 (Ten) weeks of receipt of technically and commercially clear order at Assam Gas Based Power Plant site, NEEPCO Ltd., P.O Bokuloni Chariali, District Dibrugarh, Assam-786191. However, effort should be given to shorten the delivery period.
7. **Guarantee/Warranty:** The numerical relays will be guaranteed for a period of 12(twelve) months from the date of commissioning or 18(eighteen) months from the date of supply, whichever is earlier. The supplier will submit the Guarantee/Warranty certificate of all the numerical relays along with the material/invoice.
8. **Testing and Inspection:** The numerical relays will undergo all the required tests as per the relevant IS codes. The supplier will submit the Test certificate of all the numerical relays along with the material/invoice.
9. **Retrofitting and Commissioning:** Retrofitting and commissioning of the numerical relays at site will be carried out as mentioned in the offer of your principal M/s GE T & D India Ltd., Kolkata and as per the rates mentioned above. For this no separate order shall be issued. The supplier will coordinate with their principal M/s GE T & D India Ltd., Kolkata for retrofitting and commissioning of the numerical relays and completion of the job on time. Kindly note that retrofitting and commissioning of the numerical relays will be done in a phased manner as per site conditions.
You will be intimated at least 15 (fifteen) days advance of the commencement of commissioning for your necessary arrangement.
10. **Accommodation:** NEEPCO will provide accommodation to the commissioning Engineer/Team at site (Guest House) free of cost. However, the food shall be on chargeable basis as per our standard rate.
11. **Liquidated damage:** In case you fail to deliver the materials within the contractual delivery period due to reason attributed to you, then the Corporation shall reserve the right to recover from your sum towards liquidated damages @ 1% (one per cent) value of the undelivered portion of the work for each calendar week or part thereof delay beyond scheduled delivery time. The total recovery from liquidated account of this shall, however, not exceed 5% (five per cent) of the contract value.

percent) of the value of the undelivered portion of supply. However the LD clause will not be imposed if you fail to deliver the materials within the scheduled delivery period due to Force Majeure conditions which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquakes, storms, floods, explosion or fire not caused by your negligence, lightning, act of God, public enemy which is of such nature as to delay, curtail or prevent timely action by either party.

- 12. Consignee: Senior Manager (E/M), Material Management Wing, AGBP, NEEPCO Ltd., P.O. Bokuloni Chariali, District Dibrugarh, Assam-786191.
- 13. Rejection of defective materials: If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall have to replace the same at their cost.
- 14. Paying authority: The Senior Manager (F), F&A Wing, AGBP, NEEPCO Ltd., P.O Bokuloni Chariali, District Dibrugarh, Assam-786191.

Kindly acknowledge receipt of this order and confirm your acceptance thereof.
Thanking you,

Yours faithfully,


 Senior Manager (E/M)
 Plant Electrical Maintenance
 AGBP, NEEPCO Ltd.

Memo no. NEEPCO/AGBP/PEM/DM-12/18-19/ 1-2, 8.

dated 13/8/18

Copy to:

- 1. M/s G E T & D India Ltd, Kolkata,
DLFT Park, Premises No. 8
Major Arterial Road, Block 'AF', Tower C, 8th floor
New Town Rajarhat, Kolkata-700 156
Fax: 033-400 97043


 Senior Manager (E/M)
 Plant Electrical Maintenance
 AGBP, NEEPCO Ltd.

N/A

Memo no. NEEPCO/AGBP/PEM/DM-12/18-19/ 189-194

dated 13/8/18

Copy to:

- 1. The Head of Project, AGBP, NEEPCO Ltd., for favour of kind information, please. This is as per concurrence of Project Finance received from NEEPCO-AGBP/PEM/DM-12/18-19 dated 07/08/18 and approval received from competent authority with L-1740-NEEPCO/COMPT/PEM/DM/0708/2018
- 2. The Sr. Manager (E/M), AGBP, NEEPCO Ltd., for favour of kind information, please.
- 3. The Senior Manager (F&A Wing, AGBP, NEEPCO Ltd., for information, please. A photocopy of its approval will be enclosed herewith.
- 4. The Senior Manager (E/M), E&M, AGBP, NEEPCO Ltd., for information, please.
- 5. The Sr. Manager (E/M), AGBP, NEEPCO Ltd. for information, please. A photocopy of the approval note is enclosed herewith.
- 6. E&M-12/18


 Senior Manager (E/M)
 Plant Electrical Maintenance
 AGBP, NEEPCO Ltd.



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

Dial 1219 for Complaints on Electric

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड (भारत सरकार का संस्थान)



NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

Ph. 0374-2825216, EPABX 2825207/2825423/2825208 FAX : 0374-2825349/2825217

E-mail: agbp.bokuloni@gmail.com

Ref. No.NEEPCO/AGBP/PEM/O&M-01/2019-20/355

Date.
dtd. 12/09/2019

To,

M/S ABB India Limited.
Power Grid High Voltage Service, Maneja Works,
Vadodara, Gujarat-390013

Email: ajay.k.dubey@in.abb.com; Mobile no: +919724334061

Sub: Detailed Order for Design, Manufacturing, Supply, Retrofitting, Testing and Commissioning of **8(eight)** no 245KV SF6 Spring Operated Mechanism Circuit Breaker as per Breaker Standard IEC 62271-100 by dismantling old existing BHEL make 245KV SF6 CB including Mandatory Spare Parts and AMC.

- Ref. No. 1. NEEPCO/AGBP/PEM/O&M-01/2018-19/06 dtd. 13/02/2019 (Tender ID: 2019_NEEPC_21736_1).
2. NEEPCO/AGBP/PEM/O&M-01/2018-19/609 dtd. 15/03/2019 (Corrigendum-1).
3. NEEPCO/AGBP/PEM/O&M-01/2018-19/631 dtd. 29/03/2019 (Corrigendum-2).
4. NEEPCO/AGBP/PEM/O&M-01/2019-20/16 dtd. 23/04/2019 (Corrigendum-3).
5. NEEPCO/AGBP/PEM/O&M-01/2019-20/57 dtd. 14/05/2019 (Corrigendum-4).
5. Your Offer against the tender.
6. Request for Clarifications vide NEEPCO/AGBP/PEM/O&M-01/2019-20/156 dtd. 06/07/2019 & email dtd. 06/07/2019
7. Your clarifications vide Ref.: PGHV-S/NEEPCO/1 dtd. 15/7/2019.
8. NEEPCO/AGBP/PEM/O&M-01/19-20/304 dtd. 01/8/2019 for intimation on evaluation report of tech-com bid & opening of price bid.
9. NEEPCO/AGBP/PEM/O&M-01/2019-20/314 dtd. 07/08/2019 for intimation of e-RA.
10. Auction Corrigendum Details of Govt. eProcurement system dtd. 08/08/2019
11. Auction Hall History and Tender Cum Auction Details of Govt. eProcurement system dtd. 09/08/2019
12. Confirmation of Final Price in Reverse Auction of Bid ID-85040 dtd. 19/4/2019 via email dtd. 09/08/2019.
13. LOI vide NEEPCO/AGBP/PEM/O&M-01/2019-20/339 dtd. 29/08/2019.
14. Your acknowledgement & acceptance of LOI via email dtd. 07/09/2019 & dtd. 12/09/2019

Sir,

With reference to above, the Corporation is pleased to issue this Detailed Order for Design, Manufacturing, Supply, Retrofitting, Testing and Commissioning of 8(eight) no 245KV SF6 Spring Operated Mechanism Circuit Breaker as per Breaker Standard IEC 62271-100 by dismantling old existing BHEL make 245KV SF6 CB including Mandatory Spare Parts and AMC Mandatory Spare Parts required for 5 years of normal operation of the Circuit Breaker and Annual maintenance Contract (AMC) of each equipment for AGBP, NEEPCO Ltd. as per following terms and conditions.

- Scope of Contract:** Design, Engineering, Manufacture, Inspection and Testing at Manufacturer's works before dispatch of 245 KV SF6 (Spring operated mechanism) CB, Packing & Forwarding, Supply, Transportation to site, Insurance from the source of supply till commissioning, Material Handling, Loading and unloading, Storage at Site, Dismantling of old existing BHEL make 245 KV SF6 (Hydraulic operated) Circuit Breaker, Retrofitting/Erection, Testing and Commissioning of new 8(eight) no 245 KV SF6 Spring Operated Circuit Breaker at AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam as per required technical specifications & scope of contract as detailed in **Annexure-B & C**.

2. **Prices:** The Prices are FOR AGBP, NEEPCO, Bokuloni basis. Total Basic Price for Supply, Dismantling, Retrofitting/Installation, Testing, Commissioning, Mandatory spares and AMC shall be for an amount Rs.1,50,20,133.00 (Rupees one crore fifty lakh twenty thousand one hundred thirty three) and Total Price for same shall be Rs 1,83,11,218.00 (Rupees one crore eighty three lakh eleven thousand two hundreds eighteen) only inclusive of all applicable taxes (GST), duties, freight & transit insurance, levies etc. as detailed in **Annexure-A (Schedule of Price)**. However, freight charges shall be paid at actual basis subjected to submission of documentary evidences. The prices shall remain FIRM for the entire period of Contract.
- 2.1 **Insurance coverage:** The supplier shall arrange for coverage of insurance policy viz transit insurance till delivery at site, storage at project site, erection, testing and commissioning of the supplied equipment's shall be covered under the scope of contract and take full responsibility during transit and comply with necessary safety measures as called for relevant Act/Regulations. The price is also inclusive of insurance coverage for manpower to be engaged during dismantling/retrofitting, testing and commissioning works at our site. Kindly ensure the insurance coverage before starting pre-commissioning activities.
- 2.2 **Taxes and Duties:** The above mentioned price is inclusive of GST. However, the GST shall be applicable as per GST rule at the time of execution subject to submission of GST registration, HSN code and payment details. Kindly submit GST invoice with all information details as per GST rule.
- 3.0 **Special Condition of Contract/works:** Supply, Dismantling, Retrofitting/Erection, Testing and Commissioning works shall be done only **1(one) complete set of 245 KV SF6 CB in the 1st phase**. After successful and satisfactory testing and commissioning SF6 CB in the 1st phase, approval of drawing/manufacturing clearance shall be given for the balance complete 7(seven) set of SF6 CB.
- 3.1 **Mandatory Spare Parts:** The supplier has to provide the Mandatory Spare Parts required for 5 years of normal operation of the Circuit Breaker. The Price is inclusive as detailed in **Annexure-A (Price Schedule)**.
- 3.2 **Availability of Spares:** Spares for offered 245KV SF6 CB shall have available for 25-30 years based on agreed term & conditions and Manufacturer's undertaking.
- 3.3 **Annual Maintenance Contract:** The supplier need to complete preventive and full service maintenance contracts of each equipment for a period of 5 (five) years from the date of date of expiry of Warrantee/Guarantee periods of the equipment's or the concern equipment (as applicable) as detailed under scope of works for AMC in **Annexure-C**.
- 3.4 **Field Service:** The supplier had to ensure the appropriate technical support service consisting of factory trained Customer Engineers dedicated to the start-up, maintenance and repair of equipment. In case of breakdown of equipment's or urgency, the supplier shall be ensured to provide Technical support service within 48 hrs from the time of intimation during contract periods.
- 4.0 **TIME OF COMPLETION & SPECIAL CONDITION OF CONTRACT:**
- 4.1 **Delivery Period (1st phase):** In the 1st phase, **1(one) complete set of equipment/material** shall be delivered at site within 3 months from the date of approval of drawing/manufacturing clearance or mutually agreed terms and conditions. Effort should be given to minimize the delivery periods.
- 4.2 **Dismantling, Retrofitting, Testing and Commissioning Period (1st phase):** The works for the 1st set shall be completed within 4 months from the date of approval of drawing/manufacturing clearance or mutually agreed terms & conditions.
- 4.3 After successful and satisfactory dismantling, retrofitting, testing and commissioning of 1(one) set of SF6 CB in the 1st phase, Manufacturing clearance and subsequent order shall be issued for balance contract.
- 4.4 **Delivery Period (For 2nd phase):** After successful and satisfactory testing and commissioning SF6 CB in the 1st phase, the balance complete 7(seven) set of SF6 CB shall be delivered within 8-10 months from the date of approval of drawing/manufacturing clearance or mutually agreed terms and conditions. Effort should be given to minimize the delivery periods.
- 4.5 **Dismantling, Retrofitting, Testing and Commissioning Period (2nd phase):** The balance complete works for 7(seven) set of SF6 CB shall be completed within 14-15 months from the date of next approval of drawing/manufacturing clearance for balance equipment. However Dismantling, Retrofitting/Erection, Testing and Commissioning for balance works which shall be done in phase manner depending on clearance for availing shutdown of Units or mutually agreed terms and conditions. Prior intimation shall be

given in due time and effort will be given from our end to avail the shutdown in a shortest possible time. Effort should be given to minimize the periods.

- 4.6 **Accommodation:** Free accommodation shall be provided (food on chargeable basis) at our Guest House to the commissioning engineer/ Servicing team during commissioning & service periods.
- 5.0 **Contract Performance Guarantee/Security Deposit for Supply, Installation/Retrofitting, Testing and Commissioning:** The supplier shall have to submit Contract Performance Guarantee (CPG)/Bank Guarantee in lieu of Security Deposit @10% of the Contract Price/ Contract Price for each complete set of equipment (as applicable) valid for a period of 90 days from the date of expiry of Guarantee/warranty periods as per our prescribed format as enclosed (Annexure-CPG/SD). The CPG/Security Deposit shall have to submit within a period of 30 days from the date issue of Contract Order.
- 5.1 **CPG/Security Deposit for AMC:** The supplier shall have to submit Contract Performance Guarantee (CPG)/ Bank Guarantee (BG) in lieu of Security Deposit @10% of annual maintenance cost for each concern years valid for 90 days from date of expiry of maintenance contract periods or renewal/extension of BG for succeeding years/year wise having validity for 90 days from date of expiry of of AMC periods. The AMC contract periods to be commenced from the date of expiry of warranty/guarantee period. The Security Deposit shall have to submit within a period of 30 days from the date issue of Maintenance Contract.

6.0 Payment Terms (For Supply):

(i) 100%(one hundred percent) of Ex Works Price along with all applicable taxes and duties shall be paid within 30 days after receipt of materials in full and good condition at site subject to submission of Contract Performance Guarantee (CPG)/Bank Guarantee (BG) in lieu of Security Deposit @10% of the Contract Price Contract/ Price for each complete set of equipment (as applicable) having validity for the period of 90 days from date of expiry of guarantee/warranty period and production of the following documents to the consignee:-

- (a) Contractor's detailed Invoice.
- (b) Detailed packing list
- (c) Test certificate and / or duly approved inspection certificate, or proof of waiver of inspection / tests.
- (d) Despatch clearance
- (e) Documentary evidence against payment of Taxes and Duties.
- (f) Guarantee/ warranty certificate,
- (g) Bank account details for e-payment.

(ii) Considering the execution of works in phase manner and depending on clearance for availing shutdown of Units, provision for Part payment for part delivery against each complete set of SF 6 CB shall be allowed if felt necessary by the purchaser.

6.1 Payment Terms (For Dismantling, Erection/Retrofitting, Testing and Commissioning):

i) 100%(one hundred percent) of the Contract sum for erection, testing and commissioning along with Price adjustment amount (if any) and 100% taxes and duties shall be paid on pro rata basis against successful completion of works/equipment.

ii) Considering the execution of works in phase manner and depending on clearance for availing shutdown of Units, provision for Part payment for part delivery against each complete set of SF 6 CB shall be allowed if felt necessary by the purchaser.

- 6.2 **Payment Terms (For Annual Maintenance Charge):** 100% payment along with taxes and duties shall be paid quarterly basis after successful completion of job every quarter on pro rata basis and based on agreed annual maintenance cost subject to submission of Contract Performance Guarantee (CPG)/ Bank Guarantee (BG) in lieu of Security Deposit @10% of annual maintenance cost for each concern years or renewal/extension of same for succeeding years as stated above.

- 7.0 **Guarantee/Warranty:** The materials supplied shall be warranted / guaranteed as per manufacturer's norms or for a period of 18 months from the date of despatch or 12 months from the date of successful commission whichever is earlier against manufacturing defect/ defective workmanship. The supplier shall supply the materials to the satisfaction of the Engineer-in charge. Defective materials shall be replaced/ rectified by the supplier at free of cost immediately on intimation from this end.

- 8.0 Liquidity Damage:** Time is the essence of the Contract. If the performance of the Contract is delayed due to the reason attributed to the Contractor, the Purchaser shall without prejudice to his right to recover damages for breach of the Contract:-
- i) Reduce the Contract price by 1/2 % (half percent) per week or part thereof of delay in completion of time subjected to maximum of 10% of the contract price.
 - ii) Execute or authorize the execution of work departmentally or through any other agency without any notice to the Contractor at the risk and cost of the Contractor. The decision of the Purchaser shall be final and binding upon the Contractor. However, the above action shall be taken without cancelling the contract in respect of work not yet due to execution. Or
 - iii) Cancel the entire Contract on or portion thereof and if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest for execution through other agency.
 - iv) Where action is taken under sub-clause (ii) or (iii) above to failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. But the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be in the entire discretion of the Purchaser. It is not necessary for the Purchaser to serve a notice of such execution of the Contractor.
- 9.0 Drawing & Documentation:** After placement of L.O.A and Detailed Order, five Copies of various Drawings, data and write up shall be submitted to the DGM (E/M), PEM, AGBP, NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, PIN – 786191 for approval as well as reference as applicable. In all drawings, manuals etc. reference no. of LOA and Detailed Order shall be indicated. The supplier shall, if necessary, modify the drawings and resubmit the modified drawings for purchaser's approval within two weeks from the date of comments.
- 10.0 Operational & Maintenance Manual:** The supplier shall have to provide 5 (five) sets of Operation and Maintenance Manuals in binding form, data sheets for each rating of specified Circuit Breaker along with equipment. The Manuals shall clearly include & indicate the installation methods, installation drawings, instructions a functional description of the equipment with block diagrams, safety precautions, illustrations, step by step operating procedures, and routine maintenance guidelines.
- 11.0 Factory Testing:** Before shipment, the manufacturer fully and completely tests the Circuit Breaker as per standard to assure compliance with the specification.
- 12.0 TESTS AT FACTORY AND TEST CERTIFICATES**
All Acceptance tests shall be carried out at manufacturer's works in presence of the AGBP, NEEPCO as per relevant IS & IEC. In addition to above, all routine tests are also to be carried out on the breakers as per relevant IS & IEC. The contractor shall give at least 15 (fifteen) days advance notice intimating the actual date of inspection and details of all tests that are to be carried out from the date when the tests will be carried out.
Routine tests report of each breaker is to be submitted along with inspection offer. Acceptance test report shall be furnished in Three (3) copies to the DGM (E/M), PEM, AGBP, NEEPCO, Bokuloni, Dibrugarh - 786191.
- 13.0 Dispatch clearance:** No materials shall be dispatched without inspection or his authorized representative or otherwise given dispatch clearance by the purchaser in writing to the Supplier.
- 14.0 E-way Bill (Road Permit):** E-way bill (Road Permit) may please be generated by the supplier. Our GSTIN NO is '18AAACN9991J3ZP'. No any responsibility will be taken for issuance of E-way bill by the purchaser.
- 15.0 Consignee:** The materials with accessories shall be delivered FOR AGBP site at the address i.e. DGM (E/M), MMW; AGBP, NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, PIN – 786191.
- 16.0 Paying Authority:** The DGM (Fin), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam.
- 17.0 Training of Personnel:** The supplier shall undertake to train in installation, operation and maintenance; engineering personnel selected and sent by the Purchaser and the principal consultant at the works of the Contractor or at installations using similar equipment shall be free of cost. The period and nature of training for the individual personnel shall be agreed upon mutually between the Contractor and the purchaser. The engineering personnel shall be given special training in the shops, where the equipment will be manufactured and/or in their collaborators works where possible, in any other plant where equipment manufactured by the Contractor or his collaborator is under installation or test, to enable those personnel become familiar with the equipment, being supplied by the Contractor. The supplier shall also make necessary arrangements for the trainees to get trained on simulators. The exact format of training course shall be mutually discussed and finally subject to approval by the Purchaser.



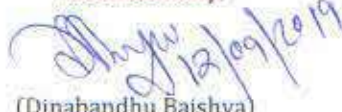
- 17.1 To and fro rail / road/ air fare of the trainees between the place of posting of the trainees and the place of training shall be borne by the purchaser. Local transport during the training period, lodging and boarding expenses and other incidental expenses shall be borne by the supplier during the entire period of training. The number of trainees in each group shall be decided in mutual consultation with the supplier in due course of time.
- 17.2 In addition to above the supplier shall also arrange training at site for the Purchaser's engineers to accrue technical knowledge, smooth operation and maintenance the new equipment. The supplier shall have no liability towards traveling and of boarding, lodging expenses of trainees during this training. The liability shall be restricted to providing training and training material.
- 18.0 **Jurisdiction of Court:**
The Contract shall be governed by the laws of India for the time being in force and shall be subjected to the jurisdiction of the High Court of judicature at Guwahati High Court, Assam.
- 19.0 **Signing of Contract / Agreement:**
After issue of the Letter of Intent and on receipt of its unconditional acceptance, the Owner shall issue detailed work order. On acceptance of the detailed work order and acceptance of Contract Performance Guarantee/SD submitted by the successful bidder, the Owner shall prepare the Contract Agreement on Non-Judicial Stamped Paper and the successful bidder will be informed for signing of the Contract Agreement on a notified date. Signing of the Contract Agreement will be done in the office of the Office of the Senior Manager (E/M), PEM, AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam.
- 20.0 All the terms and conditions, technical specifications which are not indicated here shall be governed as per Bid documents and agreed terms and conditions. Further, any other necessary item/protective devices/equipment and accessories whether specifically mentioned herein or not, but necessary for completeness and satisfactory performance of the 245KV SF6 CB and accessories shall be provided.

You are requested to kindly acknowledge the receipt of this Detailed Order and conveyance your acceptance.

Enclosed:

- (i) Annexure- A (Price Schedule)
- (ii) Annexure- B (Guaranteed Technical Particulars)
- (iii) Annexure-C (Technical Specification).
- (iv) Annexure-D (Model Forms of BG for SD/CPG).

Yours faithfully,


(Dinabandhu Baishya)
Dy. GM (E/M), PEM,
AGBP, NEEPCO, Bokuloni
Dist.: Dibrugarh, Assam.

Schedule of Price

Name of Manufacturer: M/S ABB India Limited, Power Grid High Voltage Service, Vadodara, Gujarat-390013

Sl. No.	Description of Item (For Supply)-I	Quantity (Unit/ Set) (q)	Set/Unit Price (Rs.) (a)	Total Price (Rs.) (q x a=1)	Applicable GST (@ of a) = (b)	Freight Charges (c)	Trans. Insurance (d)	GST on FC/TL/service (e)	Grand Total (Rs.) (a1+b+c+d+e=A)
1 (I)	245 KV, 2800 Amps. continuous current, 40kA short circuit Breaking current, Triple pole outdoor type, SF6 circuit Breaker suitable for high speed Single / Three phase rapid auto reclosing features for Line Circuit Breaker (1no) and three phase gang operated for generator breaker (7nos) (as applicable) complete with SF6 Gas (+20% extra), mounting structure, control cubicle, terminal connectors suitable for Zebra conductor, auxiliaries etc. as specified in NIB..... complete (7+1+8) Sets	8	1500000.00	12000000.00	2160000.00	497040.00		89612.64	14747460.64
2	Mandatory Spare Parts required for 5 years of normal operation of the Circuit Breaker as per detailed given below. Itemized prices of the spares to be given.... 1 complete Set								
2.1	Complete set of CB complete with pole column (support insulator stack) and interrupter but without support structure and operating mechanism...set.	1	341080.00	341080.00	61394.40				402474.40
2.2	Relays, power contactors, limit switches, push buttons, timers and resistors for electrical control circuit as per approved schematic (consisting of one no. each of all item) Set	1	45915.00	45915.00	8264.70				54179.70
2.3	Rubber Gaskets, O rings and seals for SF ₆ Gas.... Set	1	39355.00	39355.00	7083.90				46438.90
2.4	Molecular filter for SF ₆ CB.....Nos	1	4591.00	4591.00	826.38				5417.38
2.5	Density Monitor for SF ₆ Gas.....Nos. (Integral part and with additional 1 no as spares)	1	65592.00	65592.00	11806.56				77398.56
2.6	Closing coil assembly.....Nos.	1	3280.00	3280.00	590.40				3870.40
2.7	Trip coil assembly.....Nos	1	3280.00	3280.00	590.40				3870.40
2.8	Terminal pads.....Nos	1	6559.00	6559.00	1180.62				7739.62
2.9	Terminal connectors of each type.	1	9445.00	9445.00	1700.10				11145.10
2.10	Auxiliary switch assembly consisting of 24 nos. of reversible type contacts...Set.	1	9183.00	9183.00	1652.94				10835.94
2.11	Auxiliary / multiplied contacts with 9 NO + 9NC as spare in addition to the auxiliary contacts required for breaker's own operational requirements..... Set	1	9183.00	9183.00	1652.94				10835.94
2.12	Special contacts for use with trip coils and automatic reclosing operation at least 2 (two) nos. of spare potential free contacts for a) Local/Remote switch position; b) Gas pressure normal; c) Gas pressure low; d) Breaker lockout signal, etc. shall be provided., Complete Set. (Integral part of Limit Switch & Density Monitor. and with additional 1 no as spares for 5 years of normal operation of the Circuit Breakers)	1	0.00	0.00	0.00				0.00
2.13	Operations counter... Nos.	1	6559.00	6559.00	1180.62				7739.62
2.14	SF ₆ Gas 20% of total gas required for 8 CBs. The unit shall vary depending on standard capacity.....50kg/1 SF6 Gas cylinder	1	78711.00	78711.00	14167.98				92878.98
2.15	Pressure switches (For SF ₆ circuit).... Set (Integral part for ABB make LTB24SE1 with FSA1 CB.)	1	0.00	0.00	0.00				0.00
2.16	All type of coupling (for SF6 gas) including 1 set of SF6 Gas Leakage detector...Set (1 of each type). (Integral part for ABB make LTB24SE1 with FSA1 CB.)	1	0.00	0.00	0.00				0.00
2.17	Any other recommended spares, if not listed above but required for successful operation & servicing during AMC periods shall be provided. The list of the same spares shall be submitted in tech-commercial bid and the Price shall be included in the Price bid....set. (2sets of Closing coil & Tripping coils & 3nos Spring Charging motors as spares).	1	39355.00	39355.00	7083.90				46438.90
Price for Supply (A)				12662088.00	2279175.84	497848.00	0.00	89612.64	15528724.48
II Service: Retrofitting /Installation, testing & commissioning									
4	Dismantling, Retrofitting /Installation, testing & commissioning of 8 no SF6 CB with accessories as stated in the NIB (sl.no:1 above).	8	185298.00	1482384.00	266829.12				1749213.12
Price for Dismantling, Retrofitting /Installation, testing & commissioning (B)				1482384.00	266829.12				1749213.12
S(III) AMC for period of 5 (five) years effective from the date of expiry of warranty/guarantee periods or concern equipment's as stated in NIB									
5.1	AMC for 1 st year	1	175132.00	175132.00	31523.76				206655.76
5.2	AMC for 2 nd year	1	175132.00	175132.00	31523.76				206655.76
5.3	AMC for 3 rd year	1	175132.00	175132.00	31523.76				206655.76
5.4	AMC for 4 th year	1	175132.00	175132.00	31523.76				206655.76
5.5	AMC for 5 th year	1	175133.00	175133.00	31523.94				206656.94
Total Price for AMC (C)				875661.00	157618.98	0.00	0.00	0.00	1033279.98
Grand Total Price (A+B+C)				15020133.00	2703623.94	497848.00	0.00	89612.64	18311217.58
(Rupees one crore eighty three lakhs eleven thousand two hundred eighteen)									18311218

Note: Schedule of items and Technical Specifications shall be as per agreed terms & conditions of NIT and subsequent clarifications.



NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Govt. of India Enterprise)

OFFICE OF THE DGM (E/M), PEM
ASSAM GAS BASED POWER PLANT
BOKULONI - 786191, Dist. Dibrugarh, Assam
Phone: (0374) 2825215, Fax: (0374) 2825349/2825217

Ref: NEEPCO/AGBP/PEMOS&M-01/2020-2021/136

Dated: 03/08/2020

To,

M/S Minimac Systems Pvt. Ltd,
Gate no. 68, Plot no.11,
Jyoti Nagar, Pune-412114

Kind attention to Mr. Anshuman Agarwal, Email to tenders@minimac.com, Phone: +915550700

Sub: Detailed Order for "Design, Engineering, Manufacturing, Supply, Testing and Commissioning of Transformer Filtration Plant of capacity 6000LPH, 1200LPH and 2KL Transformer Oil Storage tank" to AGBP, NEEPCO Ltd.

Ref:

- i) Our NIT No: NEEPCO/AGBP/PEMOS&M-01/19-20/02 dated. 22.01.2020 (Tender ID: 2020_NEEPC_40886_1).
- ii) Your Offer & Bid Form-A dtd.24/02/2020.
- iii) Our letter vide NEEPCO/AGBP/PEMOS&M-01/2019-20/06 dated. 31/03/2020 for clarifications.
- iv) NEEPCO/AGBP/PEMOS&M-01/2020-21/49 dated. 28/05/2020.
- v) Your clarifications via email dtd.28/5/2020.
- vi) Our Email dated 10/06/2020.
- vii) Your clarifications via email dtd.12/06/2020.
- viii) NEEPCO/AGBP/PEMOS&M-01/20-21/58 dtd. 19/06/2020
- ix) NEEPCO/AGBP/PEMOS&M-01/20-21/73 dtd. 23/06/2020 for information of e-RA.
- x) Auction Details, Auction Hall History of Govt. eProcurement system dtd. 27/06/2020.
- xi) Final Price Confirmation against Reverse Auction conveyed via email dtd.29/06/2020.
- xii) LOI vide NEEPCO/AGBP/PEMOS&M-01/2020-21/114 dated. 21/07/2020.
- xiii) Your acknowledgement & acceptance of LOI via email dated. 28/07/2020.

Sir,

With reference to above, the Corporation is pleased to issue this Detailed Order for "Design, Engineering, Manufacturing, Supply, Testing and Commissioning of Transformer Filtration Plant of capacity 6000LPH, 1200LPH and 2KL Transformer Oil Storage tank" to AGBP, NEEPCO Ltd. as per following terms and conditions.

1. SCOPE OF WORKS: Design, Engineering, Manufacturing, Inspection and Testing at Manufacturer's works before dispatch, Packing & Forwarding, Supply, Transportation to site, Insurance from the source of supply till commissioning, Material Handling, Loading and unloading, Storage at Site, Testing and Commissioning of followings for our MHBHEL make Transformer at AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam, Pin.786191.
 - 1.1 1(One) complete set of Transformer filtration plant of capacity 6000LPH (Model: M80) having high vacuum 2(two) stage oil filtration provided with thermostat controlled oil heaters and vacuum proof house with independent vacuum pumping system conforming to IS: 6034:1989 (Reaffirmed 2005) or latest revision complete with Consumable Spares & Accessories as specified in NIT.
 - 1.2 1(One) complete set of Transformer filtration plant of capacity 1200LPH (Model: M12) provided with thermostat controlled oil heaters and vacuum proof house with independent vacuum pumping system conforming to IS: 6034:1989 (Reaffirmed 2005) or latest revision.
 - 1.3 1(One) complete set of Single Chamber Skid Mounted Type Transformer Oil Storage Tank (Model: M20) of capacity 2 KL with silica gel breather and as per relevant IS/IEC/International standards.
 - 1.4 Consumable Spares & Accessories: The scope also includes the Consumable Spares & Accessories required for the main equipment i.e. 6000LPH, 1200LPH & 2 KL Transformer Oil Storage Tank complete in all respect as detailed in Annexure-C (Technical Specifications & Schedule of Requirement).

Page 1|4

- 1.5 **Field Service:** The bidder had to ensure the appropriate technical support service consisting of factory trained / Certified Engineers dedicated to the start-up, maintenance and repair of equipment. In case of breakdown of equipment's or urgency, the bidder shall be ensured to provide Technical support service within 48 hrs from the time of intimation during contract periods.
2. **Delivery Periods/Completion Time:** 04 (four) months from the date of issue of Letter of intent (zero date).
3. **Service Life Period & Availability of Spares:** Service Life periods & Availability of Spares of the offered equipment which shall be at least 15-20 years or as per CEA latest guidelines from the date of issue of this LOI based on agreed term & conditions.
4. The supplied equipment shall be as per relevant IEC Standards/International Standards or latest revision. Supplier shall be compelled and fulfil the required technical specifications as detailed in Annexure-C (Technical Specifications & Schedule of Requirement).
5. **Contract Performance Guarantee/Security Deposit:** The successful bidder shall have to submit Contract Performance Guarantee (CPG) Bank Guarantee in lieu of Security Deposit @10% of the Contract Price/Contract Price for each complete set of equipment (as applicable) valid for a period of 90 days from the date of expiry of Guarantee/warranty periods as per our prescribed format as enclosed (Annexure-CPG/SD). The CPG/Security Deposit shall have to submit within a period of 30 days from the date issue of Contract Order.
6. **PAYMENT TERMS:-**
- (i) 100%(one hundred percent) of Ex Works Price along with all applicable taxes and duties shall be paid within 30 days after receipt of materials in full and good condition at site subject to submission of Contract Performance Guarantee (CPG)/Bank Guarantee (BG) in lieu of Security Deposit @10% of the Contract Price/Contract Price for each complete set of equipment(as applicable)having validity for the period of 90 days from date of expiry of guarantee/warranty period and production of the following documents to the consignee:-
- Contractor's detailed invoice.
 - Detailed packing list
 - Test certificate and / or duly approved inspection certificate, or proof of waiver of inspection / tests.
 - Despatch clearance
 - Documentary evidence against payment of Taxes and Duties.
 - Guarantee/ warranty certificate.
 - Bank account details for e-payment.
- (ii) Provision for Part payment for part delivery against each complete set of equipment shall be allowed.
7. **Security Deposit:** 10% of contract value shall be deducted as Security Deposit from the supplier or the supplier shall have to submit Bank Guarantee in lieu of Security Deposit @10% of the Contract Price valid for a period of 90 days from the date of expiry of Guarantee/warranty periods as per our prescribed format as enclosed (Annexure-SD). The Security Deposit shall have to submit within a period of 30 days from the date issue of Contract Order.
8. **Guarantee/Warranty:** The materials supplied shall be warranted / guaranteed as per manufacturer's norms or for a period of 18 months from the date of despatch or 12 months from the date of successful commission whichever is earlier against manufacturing defect/ defective workmanship. The contractor shall supply the materials to the satisfaction of the Engineer-in-charge. Defective materials shall be replaced/ rectified by the supplier at free of cost immediately on intimation from this end.
9. **Prices Basis:** The Prices are FOR AGBP, NEEPCO, Bokuloni basis. Total Basic Price for "Design, Engineering, Manufacturing, Supply, Testing and Commissioning of Transformer Filtration Plant of capacity 6000LPH, 1200LPH and 20L Transformer Oil Storage tank" shall be for an amount Rs. 25,13,814.00 (Rupees Twenty-Five Lakh Thirteen Thousand Eight Hundred Fourteen) and Total Price for same shall be Rs 29,65,300.00 (Rupees Twenty-Nine Lakh Sixty-Six Thousand Three Hundred) only inclusive of all applicable taxes (GST), duties, freight & transit insurance, levies etc. as detailed in Annexure-A (Schedule of Price). The prices shall remain FIRM for the entire period of Contract.
10. **Insurance coverage:** The supplier shall arrange for coverage of insurance policy viz transit insurance till delivery at site, storage at project site, testing and commissioning of the supplied equipment's shall be covered under the scope of contract and take full responsibility during transit and comply with necessary safety measures as called for relevant Act/Regulations.
11. **Taxes and Duties:** The above mentioned price is inclusive of all applicable (GST) taxes and duties. However, the GST shall be applicable as per GST rule at the time of execution subject to submission of GST registration, HSN code and payment details. Kindly submit GST invoice with all information details as per GST rule.

12. **Liquidity Damage:** This is the essence of the Contract. If the performance of the Contract is delayed due to the reason attributed to the Contractor, the Purchaser shall without prejudice to his right to recover damages for breach of the Contract.

- i. Reduce the Contract price by 1/2 % (half percent) per week or part thereof of delay in completion of time subjected to maximum of 10% of the contract price
- i. Execute or authorize the execution of work departmentally or through any other agency without any notice to the Contractor at the risk and cost of the Contractor. The decision of the Purchaser shall be final and binding upon the Contractor. However, the above action shall be taken without canceling the contract in respect of work not yet due to execution. Or
- ii. Cancel the entire Contract or portion thereof and if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest for execution through other agency.

Where action is taken under sub-clause (i) or (ii) above to failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. But the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be in the entire discretion of the Purchaser. It is not necessary for the Purchaser to serve a notice of such execution of the Contractor.

13. **Pre dispatch Inspection and Testing:** Testing shall be carried at manufacturer's/ contractor's works as per relevant IS & IEC. The tests shall be performed in presence of the Corporation's representative. For deputation of an authorized representative for inspection and to witness such tests, the contractor shall give at least 15 (fifteen) days advance notice to the Corporation intimating the actual date of inspection and details of all tests that are to be carried out from the date when the tests will be carried out. The entire cost of tests that are to be carried out as per relevant IS shall be treated as included in the quoted price.
14. **Dispatch clearance:** No materials shall be dispatched without inspection or his authorized representative or otherwise given dispatch clearance by the purchaser in writing to the Supplier.
15. **Training:** Contractor shall arrange to demonstrate training at site for the Purchaser's engineers to accrue technical knowledge, smooth operation and maintenance the new equipment. The Contractor shall have no liability towards traveling and of boarding, lodging expenses of trainees during this training. The liability shall be restricted to providing training and training material.
16. **Instruction Manual:** The contractor shall provide 5(five) set of Instructional manual containing details of the plant operation and maintenance along with all relevant drawings. The manuals shall clearly indicate the procedures of installation, Operation & Maintenance, safety, healthiness check-up, tests to be carried out etc. in details.
17. **Training of Personnel:** Contractor shall arrange to demonstrate training at site for the Purchaser's engineers to accrue technical knowledge, smooth operation and maintenance the new equipment. The Contractor shall have no liability towards traveling and of boarding, lodging expenses of trainees during this training. The liability shall be restricted to providing training and training material.
18. **E-way Bill (Road Permit):** E-way bill (Road Permit) may please be generated by the supplier. Our GSTIN NO is '18AAACR9991J32P'. No any responsibility will be taken for issuance of E-way bill by the purchaser.
19. **Consignee:** The materials with accessories shall be delivered FOR AGBP site at the address i.e. DGM (E/M), MMW, AGBP, NEEPCO Ltd, Bokuloni, Dist:- Dibrugarh, Assam, PIN - 786191.
20. **Paying Authority:** The DGM (Fn), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam.
21. **Jurisdiction of Court:** The Contract shall be governed by the laws of India for the time being in force and shall be subjected to the jurisdiction of the High Court of judicature at Guwahati High Court, Assam.
22. **Signing of Contract / Agreement:** After issue of the Letter of Intent and on receipt of its unconditional acceptance, the Owner shall issue detailed work order. On acceptance of the detailed work order and acceptance of Contract Performance Guarantee/SD submitted by the supplier, the Owner shall prepare the Contract Agreement on Non-Judicial Stamped Paper and the successful supplier will be informed for signing of the Contract Agreement on a notified date. Signing of the Contract Agreement will be done in the office of the Office of the DGM (E/M), PEM, AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam.

and agreed terms and conditions. Further, any other necessary item/protective devices/equipment and accessories whether specifically mentioned herein or not, but necessary for completeness and satisfactory performance of the Filter Machine and accessories shall be provided.

You are requested to kindly acknowledge the receipt of this Detailed Order and conveyance your acceptance.

Enclosed:

- (i) Annexure- A (Price Schedule)
- (ii) Annexure- B (Guaranteed Technical Particulars)
- (iii) Annexure- C (Technical Specification & Schedule of Requirement).
- (iv) Annexure- D (Model Forms of BG for SD/CPG).


Yours faithfully,

(Dinabandhu Basishya)
Deputy General Manager (EM)
Plant Electrical Maintenance,
AGBP, NEEPCO LTD., Dibrugarh, Assam.

NO: Memo No. NEEPCO/AGBP/PEM/O&M-01/2020-2021/13742

dt. 03/08/2020

1. The CGM (EM) & HOP, AGBP, NEEPCO Ltd, Bokuloni for kind information please. This is issued as per finance concurrence vide U.O. No: NEEPCO, AGBP/FS&A/175 dt. 20/07/2020 and subsequent approval accorded vide U.O. No: NEEPCO/HOP/528 dt. 21/07/2020.
 2. The DGM (EM), O/O the GM (EM), O&AWC, AGBP, Bokuloni- for kind information please.
 3. The DGM (F & A), AGBP, Bokuloni- for kind information please. Photo copy of approval is enclosed. The expenditures shall be booked under the additional capitalization and shall be booked against MSME (Micro).
 4. The DGM (EM), MMN, AGBP, Bokuloni- for kind information please. The expenditures shall be booked against MSME (Micro).
 5. The DGM (EM), Vigilance, AGBP, Bokuloni - for kind information. Photo copy of Photo copy of approval is enclosed.
 6. Office record file O&M-01.
- ✓ Work order file.


(Dinabandhu Basishya)
Deputy General Manager (EM)
Plant Electrical Maintenance,
AGBP, NEEPCO LTD., Dibrugarh, Assam.

ANNEXURE-A

PRICE SCHEDULE

Make: M/s Minimac Systems Pvt. Ltd

Sl. No.	Description of Item	Basic Price (A1) (Rs.)	GST @18% (A2) (Rs.)	Total Price (A1+A2=A) (Rs.)
		(a)	(b)	(a)
		Rs.	Rs.	Rs.
1	1(One) number Transformer filtration plant of capacity 6000LPH having high vacuum 2(two) stage oil filtration provided with thermostat controlled oil heaters and vacuum proof house with independent vacuum pumping system conforming to IS: 6034:1989 (Reaffirmed 2005) or latest revision complete with Consumable Spares & Accessories as specified in NIT.	15,20,703.00	2,73,727.00	17,94,430.00
2	1 (One) number Transformer filtration plant of capacity 1200LPH provided with thermostat controlled oil heaters and vacuum proof house with independent vacuum pumping system conforming to IS: 6034:1989 (Reaffirmed 2005) or latest revision complete with Consumable Spares & Accessories as specified in NIT.	3,60,528.00	64,895.00	4,25,423.00
3	1 (One) number Single Chamber Skid Mounted Type Transformer Oil Storage Tank of capacity 2 KL with silica gel breather and as per relevant IS/IEC/international standards.	6,32,583.00	1,13,885.00	7,46,448.00
	Grand Total Price for above. (A+B+C)	Rs. 25,13,814.00	Rs. 4,52,487.00	Rs. 29,66,300.00
Rupees Twenty Nine Lakh Sixty Six Thousand Three Hundreds only				

[Handwritten Signature]
20/08/2023

GUARANTEED TECHNICAL PARTICULARS (GTP)

Sl. No.	Descriptions of Particulars for Required Technical Data	
A	General	
1	Name of Manufacturer	Mnimac
1.1	Country Of origin	India
1.2	Manufacturer's type of designation/Type	Mobile Type
1.2.1	Model	M50M12/M20
1.2.2	Rated Capacity	6000 LPH & 1200LPH & 2KL
1.2.3	Service/Class : Indoor/Outdoor	Outdoor
1.2.4	Weight	KL(approx.):3000kg; 1.2KL:1000kg and 2KL Tank:425kg
	Dimension	180*290*220/90*160*165/ 120*200*200
	Full Load Power Consumption for Motor & Heat Exchanger	125 KW for 6 KLPH & 24 KW for 1.2 KLPH
1.3	Mounting:	Four Pneumatic Tyre Trolley with Towing arrangement for both 6 KLPH and 1.2 KLPH
1.4	Characteristics of oil for 6000 LPH.	Before filtration/After filtration
1.4.1	Break Down Voltage (BDV)	<30-20 KV >80 KV
1.4.2	Moisture Contents	100 PPM-50PPM / <5 PPM-3PPM
1.4.3	Gas Content	10% By Volume / < 0.1% By Volume
1.4.4	Suspended Particles	Many Microns/ <1 micron or better
1.5	Characteristics of oil for 1200LPH	
1.5.1	Break Down Voltage (BDV)	<30-20 KV / >70 KV
1.5.2	Moisture Contents	100 PPM-50PPM / <5 PPM-3PPM
1.5.3	Gas Content	10% By Volume/ <0.1% By Volume
1.5.4	Suspended Particles	Many Microns (<1 micron or better)
2	OIL INLET PUMP	
2.1	Make and quantity	Rotadel/Duro
2.2	Type	Positive Displacement
2.3	Motor make and type	CROMPTON
2.4	Type	3 PHASE , 50 Hz, 440V (having energy efficient motor)
2.5	Drive	Couple Drive
2.7	Minimum suction head	>5 Mtrs.
2.8	Type of Starter	DOL
3	HEATERS	
3.1	Type of Heaters	Refactory type
	Heater Element	Nichrome wire filament, inserted in Ceramic Formers
3.2	Selector Switch	Yes
3.3	Pressure safety valve, Drain Valve and Thermostatic Control	Shall be provided relevant to IS/IEC standard.

Shyamsunder

3.4	Interlocking Arrangement	Interlocking Arrangement for Heaters. Heater could not be activated unless Inlet Pump is running. If inlet pump trips due to short circuit, overload, high oil pressure, high level, etc then heaters would also trip etc
3.5	Digital Temperature controller or safety thermostat heater	Shall be provided relevant to IS/IEC standard.
4 FILTRATION SYSTEM IN DOUBLE STAGE		
A	PRIMARY FILLER/MAGNETIC STRAINER	Magnetic Strainer
A.1	CARTRIDGE FILTER	Reputed
	Type	Non Hygroscopic cellular
A.2	Rating	Better than 1 mm
B	BAG FILTER/COARSE	
B.1	Make & Material	Rotolol/Cuno/HHV/relevant Indian/International Standards.
B.3	Rating.	Better than 20 micron
C	MICROFINE FILTER	
C.1	Type of filtering medium	Preferably Cartridge Filter
C.2	Rating	Suspended Particle =1 Micron
C.4	Make	Rotolol/Cuno/HHV
C.5	Non Return valve	Yes. Shall be incorporated as per relevant IS/IEC standard.
C.6	Float Switches	Yes. Shall be incorporated to prevent excess rise of oil level as per relevant IS/IEC standard.
5 DEGASSING COLUMN DOUBLE STAGE		
5.1	Material	Mild Steel
5.2	Number of stage	Two Stage
5.3	Means adopted to increase The surface area in the tank.	IS/IEC standard
5.4	Suitable level indicator provided to the tank	Sight Glass with illuminating lamp.
6.0 (a)	VACUUM PUMP FOR FIRST STAGE (VACUUM SYSTEM- FOR DEGASSING)	
6.1	Make & Type	Oil sealed Rotary type vacuum pump of make: REPUTED/HHV.
6.2	Pumping Speed	For 8 KLPH-Not less than 200 m ³ /hr. For 1.2 KLPH-Not less than 40 m ³ /hr.
6.3	Motor Type	TEFC Type & energy efficient motor:Root Pump.
b	ROOTS PUMP FOR SECOND STAGE	
6.1	Make	TUTHIL-KINNEY / EOY
6.2	Pumping Speed/Model	Not less than 500 m ³ /hr for 6 KLPH, Vacuum Pump for 1.2 KL filter machine should be capable of creating high vacuum in the transformer tank as specified.
6.3	Motor Type	TEFC Type & preferably energy efficient motor.
7	VACUUM PUMPING SYSTEM (FOR EVACUATION SYSTEM)	
	Mounting	On Same Skid of filter Machine
7.1	VACUUM PUMP	Oil sealed Rotary type vacuum pump.



ISO: 9001 – 2015
ISO: 14001 – 2015
OHSMS: 45001 – 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(मिनी रत्ना, श्रेणी 1, भारत सरकार का उद्यम)

North Eastern Electric Power Corporation Limited,
(Mini Ratna Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख

Assam Gas Based Power Plant,

डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)



No. NEEPCO/AGBP/PEM/O&M-01/2021-22/125

Dated:03/07/2021

To

M/S ABB Power Products and Systems India Limited
Power Grid High Voltage Service, Maneja Works, Maneja
Vadodara-390013, Gujarat. (GST Number: 24AARCA9513E1ZN)
E mail: <dave.virag@hitachi-powergrid.com>, <ajit.p.pawar@hitachi-powergrid.com>

Sub: Detailed Order for "Design, Engineering, Manufacturing, Supply, Retrofitting/erection, Testing and Commissioning of Spring-Operated mechanism 245KV SF₆ Circuit Breaker as per Breaker standard IEC 62271-100 by dismantling old existing BHEL makes 245 KV SF₆ Circuit Breakers including mandatory spares and AMC.

Ref. No. 1. Our Letter Ref. No. NEEPCO/AGBP/PEM/O&M-01/2020-21/476 dtd. 03/03/2021.

2. Your email dtd. 21/04/2021.

3. Your Offer vide your Letter Ref. No. PGHV-5/NEEPCO/1 Date 06/05/2021.

4. Our e-mail dtd. 15/05/2021 requesting for clarifications.

5. Your clarifications vide no. PGHV-S/NEEPCO/2 Date 03/06/2021 and e-mail dtd. 06th & 7th June, 2021.

6. Our e-mail dtd. 15/06/2021 requesting for clarifications.

7. Your clarifications conveyed via email dtd. 18/06/2021.

8. Your email dtd.29/06/2021

Dear Sirs,

With reference to above, the Corporation is pleased to issue this Detailed Order for "Design, Manufacturing, Supply of 3 sets (Manufacturer's type: LTB245E1) as per Breaker Standard IEC 62271-100, Retrofitting, Testing and Commissioning of new 245KV SF₆ Spring Operated Mechanism Circuit Breaker" by dismantling old existing BHEL make 245KV SF₆ CB at AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam (Pin:786191) as per following terms and conditions.

1. **Scope of Contract:** Design, Engineering, Manufacture, Inspection and Testing at Manufacturer's works before dispatch, Packing & Forwarding, Supply of 3 (three) sets 245 KV SF₆ Spring operated mechanism CB (2 sets for L1& L2 feeders and 1 complete set as spares) as per Breaker Standard IEC 62271-100, Transportation to site, Insurance from the source of supply till commissioning, Material Handling, Loading and unloading, Storage at Site, Dismantling of old existing BHEL make 245 KV SF₆ (Hydraulic operated) Circuit Breaker, Retrofitting, Testing and Commissioning of new 245 KV SF₆ CB as per required technical specifications & scope of contract in line with Order No. NEEPCO/AGBP/PEM/O&M-01/2019-20/355 dtd.12/09/2019 and subsequent agreed terms & conditions.

1.1 The scope includes (one) complete set three phase Circuit Breaker as spare including interrupter, with one master & two slave cubical (without support structure), Mandatory Spare Parts required for normal

(Handwritten Signature)
03/07/2021

operation and Annual maintenance Contract (AMC) for 5 years as detailed in Annexure-A (Price Schedule).

- 1.2 Amongst 3 sets of 245KV SF6 CB, 2 sets CB shall preferably for feeders (L1-Kath-New Moriani & L2-Kath-Moriani) and 1 complete set as spare.
 - 1.3 The spares set of CB including operating mechanism shall be interchangeable amongst the new ABB make 245KV SF6 CB.
 - 1.4 The Circuit breaker for feeder-(L1-Kath-New Moriani) shall be capable of switching ON/OFF shunt reactor (as applicable) without exceeding over voltage limits mentioned elsewhere. Circuit breakers used for reactor switching duties (as applicable) shall be tested for inductive load switching as per IEC-62271-110.
 - 1.5 The technical specifications, Guaranteed Technical Particulars (GTP) shall be shall be governed as per Bid documents against Order No: NEEPCO/AGBP/PEM/O&M-01/2019-20/355 dtd.12/09/2019 and subsequent agreed terms and conditions during retrofitting works based on technical suitability as already executed.
2. **Prices:** The Prices are FOR AGBP, NEEPCO, Bokuloni basis. Total Basic Price for Supply, Dismantling, Retrofitting/Installation, Testing, Commissioning, Mandatory spares and AMC shall be for an amount Rs.49,97,189.00 (Rupees forty-nine lakh ninety seven thousand one hundred eighty nine) and Total Price for same shall be Rs.64,74,883.00 (Rupees sixty-four lakh seventy-four thousand eight hundred eighty three) only inclusive of all applicable taxes (GST), duties, freight & transit insurance, levies etc. as detailed in Annexure-A (Schedule of Price). However, freight charges shall be paid at actual basis subjected to submission of documentary evidences. The prices shall remain FIRM for the entire period of Contract.
 - 2.1 **Insurance coverage:** The supplier shall arrange for coverage of insurance policy viz transit insurance till delivery at site, storage at project site, erection, testing and commissioning of the supplied equipment's shall be covered under the scope of contract and take full responsibility during transit and comply with necessary safety measures as called for relevant Act/Regulations. The price is also inclusive of insurance coverage for manpower to be engaged during dismantling/retrofitting, testing and commissioning works at our site. Kindly ensure the insurance coverage before starting pre-commissioning activities.
 - 2.2 **Taxes and Duties:** The above-mentioned price is inclusive of GST. However, the GST shall be applicable as per GST rule at the time of execution subject to submission of GST registration, HSN code and payment details. Kindly submit GST Invoice with all information details as per GST rule.
 - 3.0 **Delivery Period:** Within 5-6 months from the date of approval of drawing/manufacturing clearance. However, effort shall be given to deliver in 3-4 months from the date of approval of drawing/manufacturing clearance considering necessity of works.
 - 4.0 **Dismantling, Retrofitting, Testing and Commissioning Period:** The works shall be completed within 15 days per CB or mutually agreed conditions depending on availability of shutdown in series. However, effort shall be given to complete the retrofitting works in minimum time if NEEPCO can able to avail the shutdown in series. Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time.
 - 5.0 **Annual Maintenance Contract:** The supplier needs to complete preventive and full-service maintenance contracts of each equipment for a period of 5 (five) years from the date of date of expiry of Warrantee/Guarantee periods of the equipment's or the concern equipment (as applicable) in line with earlier order.



6.0 **Recommended Spare Parts:** The supplier has to provide the Recommended Spare Parts as detailed in Annexure-A (Price Schedule).

7.0 **Field Service:** The supplier had to ensure the appropriate technical support service consisting of factory trained Customer Engineers dedicated to the start-up, maintenance and repair of equipment. In case of breakdown of equipment's or urgency, the supplier shall be ensured to provide Technical support service within 48 hrs from the time of intimation during contract periods.

7.1 **Accommodation:** Free accommodation shall be provided (food on chargeable basis) at our Guest House to the commissioning engineer/Service team during commissioning & service periods.

8.0 **Contract Performance Guarantee/Security Deposit for Supply, Installation/Retrofitting, Testing and Commissioning:** In line with the Office Memorandum vide No: DPE/7(4)/2017-Fin.(Part-I), dtd.19/11/2020 GOI, Ministry of Heavy Industries & Public Enterprises, The supplier shall have to submit Contract Performance Guarantee (CPG)/Bank Guarantee in lieu of Security Deposit @3% of the Contract Price/ Contract Price valid for a period of 90 days from the date of expiry of Guarantee/warranty periods as per our prescribed format as enclosed (Annexure-CPG/SD). The CPG/Security Deposit shall have to submit within a period of 30 days from the date issue of Contract Order or an amount of 3% of the contact value shall be deducted from the bill and shall be released after expiry of warranty/guarantee periods.

9.0 **Payment Terms (For Supply):**

(i) 100% (one hundred percent) of Ex Works Price along with all applicable taxes and duties shall be paid within 30 days after receipt of materials in full and good condition at site subject to submission of the following documents to the consignee: -

- (a) Contractor's detailed Invoice.
- (b) Detailed packing list.
- (c) Test certificate and / or duly approved inspection certificate, or proof of waiver of inspection / tests.
- (d) Dispatch clearance
- (e) Documentary evidence against payment of Taxes and Duties.
- (f) Guarantee/ warranty certificate,
- (g) Bank account details for e-payment.

ii) Considering the execution of works and depending on clearance for availing shutdown of Units, provision for Part payment for part delivery against each complete set of SF 6 CB shall be allowed if felt necessary by the purchaser.

9.1 **Payment Terms (For Dismantling, Erection/Retrofitting, Testing and Commissioning):**

i) 100% (one hundred percent) of the Contract sum for erection, testing and commissioning along with Price adjustment amount (if any) and 100% taxes and duties shall be paid on pro rata basis against successful completion of works/equipment.

ii) Considering the execution of works in phase manner and depending on clearance for availing shutdown of Units, provision for Part payment for part delivery against each complete set of SF 6 CB shall be allowed if felt necessary by the purchaser.

9.2 **Payment Terms (For Annual Maintenance Charge):** 100% payment along with taxes and duties shall be paid quarterly basis after successful completion of job every quarter on pro rata basis and based on agreed annual maintenance cost subject to submission of Contract Performance Guarantee (CPG)/ Bank Guarantee (BG) in lieu of Security Deposit @3% of annual maintenance cost for each concern years or renewal/extension of same for succeeding years as stated above.

[Handwritten signature]
20/07/2021

- 10.0 **Guarantee/Warranty:** The materials supplied shall be warranted / guaranteed as per manufacturer's norms or for a period of 18 months from the date of despatch or 12 months from the date of successful commission whichever is earlier against manufacturing defect/ defective workmanship. The supplier shall supply the materials to the satisfaction of the Engineer-in-charge. Defective materials shall be replaced/ rectified by the supplier at free of cost immediately on intimation from this end.
- 11.0 **Liquidity Damage:** Time is the essence of the Contract. If the performance of the Contract is delayed due to the reason attributed to the Contractor, the Purchaser shall without prejudice to his right to recover damages for breach of the Contract: -
- i) Reduce the Contract price by 1/2 % (half percent) per week or part thereof of delay in completion of time subjected to maximum of 10% of the contract price.
 - ii) Execute or authorize the execution of work departmentally or through any other agency without any notice to the Contractor at the risk and cost of the Contractor. The decision of the Purchaser shall be final and binding upon the Contractor. However, the above action shall be taken without cancelling the contract in respect of work not yet due to execution. Or
 - iii) Cancel the entire Contract on or portion thereof and if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest for execution through other agency.
 - iv) Where action is taken under sub-clause (ii) or (iii) above to failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. But the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be in the entire discretion of the Purchaser. It is not necessary for the Purchaser to serve a notice of such execution of the Contractor.
- 12.0 **Operational & Maintenance Manual:** The supplier shall have to provide 5 (five) sets of Operation and Maintenance Manuals in binding form, data sheets for each rating of-specified Circuit Breaker along with equipment. The Manuals shall clearly include & indicate the installation methods, installation drawings, instructions a functional description of the equipment with block diagrams, safety precautions, illustrations, step by step operating procedures, and routine maintenance guidelines.
- 13.0 **Factory Testing:** Before shipment, the manufacturer fully and completely tests the Circuit Breaker as per standard to assure compliance with the specification.
- 14.0 **TESTS AT FACTORY AND TEST CERTIFICATES**
 All Acceptance tests shall be carried out at manufacturer's works in presence of the AGBP, NEEPCO as per relevant IS & IEC. In addition to above, all routine tests are also to be carried out on the breakers as per relevant IS & IEC. The contractor shall give at least 15 (fifteen) days-advance notice intimating the actual date of inspection and details of all tests that are to be carried out from the date when the tests will be carried out.
 Routine tests report of each breaker is to be submitted along with inspection offer. Acceptance test report shall be furnished in Three (3) copies to the DGM (E/M), PEM, AGBP, NEEPCO, Bokuloni, Dibrugarh -786191.
- 15.0 **Dispatch clearance:** No materials shall be dispatched without inspection or his authorized representative or otherwise given dispatch clearance by the purchaser in writing to the Supplier.
- 16.0 **E-way Bill (Road Permit):** E-way bill (Road Permit) may please be generated by the supplier. Our GSTIN NO is '18AAACN9991J3ZP'. No any responsibility will be taken for issuance of E-way bill by the purchaser.
- 17.0 **Consignee:** The materials with accessories shall be delivered FOR AGBP site at the address i.e. DGM (E/M), MMW; AGBP, NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, PIN - 786191.

18.D Paying Authority: The DGM (Fin), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam.

19.D All the terms and conditions, technical specifications which are not indicated here shall be governed as per Bid documents against Order No: NEEPCO/AGBP/PEM/O&M-01/2019-20/355 dtd.12/09/2019 and subsequent agreed terms & conditions. Further, any other necessary item/protective devices/equipment and accessories whether specifically mentioned herein or not, but necessary for completeness and satisfactory performance of the CB shall be provided.

You are requested to kindly acknowledge the receipt of this Detailed Order and conveyance your acceptance.

Enclosed:

(i) Annexure- A (Price Schedule) & Forms of BG for SD/CPG).

Yours faithfully,

(Dinabandhu Baishya)
Dy. GM (E/M), PEM,
AGBP, NEEPCO, Bokuloni
Dist.: Dibrugarh, Assam.

NID: Memo No. NEEPCO/AGBP/PEM/O&M-01/2021-22/126-131 dtd. 03/07/2021.

1. The GM (E/M) & HOP, AGBP, NEEPCO Ltd, Bokuloni for kind information please. This is issued as per finance concurrence conveyed vide FLM ID No.018 dtd. 02/07/2021 and subsequent approvals accorded vide FLM ID No. 019 dtd.02/07/2021.
2. The DGM (F & A), AGBP, NEEPCO Ltd., Bokuloni for kind information please. Photo copy of approval is enclosed.
3. The DGM (E/M), Vigilance, AGBP, Bokuloni for kind information please. Photo copy of approval is enclosed.
4. The DGM (E/M), MMW, AGBP, NEEPCO Ltd., Bokuloni for kind information please.
5. The DGM (E/M), O & A W C, AGBP, NEEPCO Ltd., Bokuloni for kind information please.
6. Office records file O&M-01.

(Dinabandhu Baishya)
Dy. GM (E/M), PEM,
AGBP, NEEPCO, Bokuloni
Dist.: Dibrugarh, Assam.

Schedule of Price Schedule									
Name of Manufacturer/Bidder: M/S ABB Power Products and Systems India Limited									
Sl. No.	Description of item (For Supply)-I	Quantity/ Unit/Set (q)	Set/Unit Price (Rs.) (a)	Total Price (Rs.) (q x a = a1)	Applicable GST (@ of a1) = (b)	Freight Charges (c)	Tran. Insurance (d)	GST on FC/TL/service (e)	Grand Total (Rs.) (a1+b+c+d+e+A)
1 (i)	245 KV, 2000 Amps. continuous current, 40kA for 3sec short circuit Breaking current, Triple pole outdoor type, SF6 circuit Breaker suitable for high speed Single phase rapid auto reclosing features complete with SF6 Gas, mounting structure, control cubicle, terminal connectors suitable for Zebra conductor, auxiliaries etc. as specified in NIB.....complete (2) Sets	2	15,00,000	30,00,000	5,40,000	4,90,000		88,200	41,18,200
2	SF ₆ Gas 20% of total gas required for 2 CBs. The unit shall vary depending on standard capacity.....09 kg/1 SF6 Gas cylinder	1	19,678	19,678	3,542				23,220
2.1	Complete Three Phase CB (STC: 40KA) pole column (support insulator stack) and interrupter with one Master & two Slave cubicles but without support structure, without platform and without any accessories	1	11,68,000	11,68,000	2,10,240				13,78,240
2.2	Recommended Spares Complete set consisting 12 nos tripping coil, Closing closing coil 6 nos, spring charging motor 3 nos and density monitor 1 no etc	1	2,20,000	2,20,000	39,600				2,59,600
Price for Supply (A)				44,97,678	7,93,382	4,90,000		88,200	57,79,260
4	Service: Retrofitting /installation, testing & commissioning								
4	Dismantling, Retrofitting /installation, testing & commissioning of 2 no SF6 CB with accessories as stated in the NIB (sl.no:1 above)	2	1,85,298	3,70,596	66,707				4,37,303
Price for Dismantling, Retrofitting /installation, testing & commissioning (B)				3,70,596	66,707				4,37,303
5(iii)	AMC for periods of 5(five) years effective from the date of expiry of warranty/guarantee periods or concern equipment's as stated in NIB								
5.1	AMC for 1 st year	1	43,783	43,783	7,881				51,664
5.2	AMC for 2 nd year	1	43,783	43,783	7,881				51,664
5.3	AMC for 3 rd year	1	43,783	43,783	7,881				51,664
5.4	AMC for 4 th year	1	43,783	43,783	7,881				51,664
5.5	AMC for 5 th year	1	43,783	43,783	7,881				51,664
5.5	Total AMC Charges (C)			2,18,915	39,405				51,664
Grand Total Price (A+B+C)				49,97,169	8,99,494	4,90,000		88,200	64,74,863


 Deputy General Manager (E/M)
 Chief Electrical Maintenance Complex
 Rajiv Gandhi International Airport
 GATE NO. 10, Sec-1, New Delhi-110029



ISO: 9001 – 2015
ISO: 14001 – 2015
OHSMS: 45001 – 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(मिनी रत्ना, श्रेणी १, भारत सरकार का उद्यम)

North Eastern Electric Power Corporation Limited,
(Mini Ratna Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख

Assam Gas Based Power Plant

डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)



NEEPCO/AGBP/PEM/O&M-01/2020-21/373 dtd. 30/12/2020

To,
M/S ABB Power Products and Systems India Limited
Power Grid High Voltage Service, Maneja Works, Maneja
Vadodara-390013, Gujarat. (GST Number: 24AARCA9513E1ZN)

Kind attention to Mr. Virag Dave/A.Dubey

Email: dave.virag@in.abb.com; ajay.k.dubey@in.abb.com; Mobile no: +919724334061

Sub: Repeat Order for “Design, Manufacturing, Supply, Retrofitting, Testing and Commissioning of 4(four) sets of 245KV SF6 Spring Operated Mechanism Circuit Breaker as per Breaker Standard IEC 62271-100 by dismantling old existing BHEL make 245KV SF6 CB at AGBP, NEEPCO LTD., Bokuloni.

Ref.:

1. NEEPCO/AGBP/PEM/O&M-01/2018-19/06 dtd. 13/02/2019 (Tender ID: 2019_NEEPC_21736_1).
2. Detailed Order vide No: NEEPCO/AGBP/PEM/O&M-01/2019-20/355 dtd. 12/09/2019.
3. Manufacturing clearance for 2nd phase (7set CB) conveyed via email dtd.16/09/2020.
4. Request for confirmation of repeat order vide NEEPCO/AGBP/PEM/O&M-01/2020-21/229 dtd. 25/09/2020 & email dtd. 19/11/2020 & 7/12/2020.
5. Your confirmation conveyed via email dtd.20/11/2020 & 08/12/2020.
6. Waive of Inspection for testing vide NEEPCO/AGBP/PEM/O&M-01/2020-21/321 dtd. 27/11/2020.
7. Your email dtd.15/12/2020 for dispatch of materials for 2nd phase.
8. Our email dtd. 22/12/2020 for retrofitting works in 2nd phase.
9. Your confirmation for retrofitting works of CB in 2nd phase via email dtd. 28/12/2020.

With reference to above, the Corporation is pleased to issue this Repeat Order for “Design, Engineering, Manufacturing, Supply, Retrofitting/erection, Testing and Commissioning 4(four) sets **(2sets for GTGs and 2sets for Station Transformer)** of 245KV SF₆ Circuit Breaker (Spring Operated) as per Breaker Standard IEC 62271-100” by dismantling old existing Hydraulic Operated SF₆ Circuit Breaker and Annual maintenance Contract (AMC) for 5(five) years **in line with the order No: NEEPCO/AGBP/PEM/O&M-01/2019-20/355 dtd.12/09/2019.**

1. **Scope of Contract:** Design, Engineering, Manufacture, Inspection and Testing at Manufacturer’s works before dispatch of 245 KV SF₆ (Spring operated mechanism) CB, Packing & Forwarding, Supply, Transportation to site, Insurance from the source of supply till commissioning, Material Handling, Loading and unloading, Storage at Site, Dismantling of old existing BHEL make 245 KV SF₆ (Hydraulic operated) Circuit Breaker, Retrofitting/Erection, Testing and Commissioning of new 4(four) sets **(2sets for GTGs and 2sets for Station Transformer)** of 245 KV SF₆ Spring Operated Circuit Breaker at AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam as per required technical specifications & scope of contract as detailed in Annexure-B & C of the order No: NEEPCO/AGBP/PEM/O&M-01/2019-20/355 dtd.12/09/2019.
2. **Prices:** The Prices are FOR AGBP, NEEPCO, Bokuloni basis. Total Basic Price for Supply, Dismantling, Retrofitting/Installation, Testing, Commissioning and AMC shall be for an amount Rs.72, 18, 378.00 (Rupees seventy two lakh eighteen thousand three hundred seventy eight) and Total Price for same shall be Rs.88, 11,416.00 (Rupees eighty eight lakhs eleven thousand four hundred sixteen) only inclusive of all applicable taxes (GST), duties, freight & transit insurance, levies etc. as detailed in Annexure-A (Schedule of Price). *However, freight charges shall be paid at actual basis subjected to submission of documentary evidences.* The prices shall remain FIRM for the entire period of Contract.

- 2.1 **Insurance coverage:** The supplier shall arrange for coverage of insurance policy viz transit insurance till delivery at site, storage at project site, erection, testing and commissioning of the supplied equipment's shall be covered under the scope of contract and take full responsibility during transit and comply with necessary safety measures as called for relevant Act/Regulations. *The price is also inclusive of insurance coverage for manpower to be engaged during dismantling/retrofitting, testing and commissioning works at our site. Kindly ensure the insurance coverage before starting pre-commissioning activities.*
- 2.2 **Taxes and Duties:** The above mentioned price is inclusive of GST. However, the GST shall be applicable as per GST rule at the time of execution subject to submission of GST registration, HSN code and payment details. Kindly submit GST Invoice with all information details as per GST rule.
- 3.0 **Annual Maintenance Contract:** The supplier need to complete preventive and full service maintenance contracts of each equipment for a period of 5 (five) years from the date of date of expiry of Warrantee/Guarantee periods of the equipment's or the concern equipment (as applicable) as detailed under scope of works for AMC in Annexure-C of the order No: NEEPCO/AGBP/PEM/O&M-01/2019-20/355 dtd.12/09/2019.
- 4.0 **Delivery Period:** 4(four) complete set of equipment/material within 6 months from the date of approval of drawing/manufacturing clearance. However, the party shall try to deliver in 4-5 months from the date of approval of drawing/manufacturing clearance.
- 5.0 **Dismantling, Retrofitting, Testing and Commissioning Period:** The works for 4(four) set of SF6 CB shall be completed within 15 days per CB depending on availability of shutdown in series. Effort shall be given to complete the retrofitting works in minimum time if NEEPCO can able to avail the shutdown in series. *Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time.*
- 6.0 **Technical Specification, Guaranteed Technical Particulars** and all other terms & conditions including Contract Performance Guarantee/Security Deposit for Supply, Retrofitting, Testing and Commissioning; CPG/Security Deposit for AMC; Payment Terms; Guarantee/Warranty; Liquidity Damage; Tests at Factory and Test Certificates; Dispatch clearance; Operational & Maintenance Manual etc. shall be as per order No: NEEPCO/AGBP/PEM/O&M-01/2019-20/355 dtd.12/09/2019. Also, the terms and conditions which are not indicated here shall be governed as per Bid documents and agreed terms and conditions. Further, any other necessary item/protective devices/equipment and accessories whether specifically mentioned herein or not, but necessary for completeness and satisfactory performance of the 245KV SF6 CB and accessories shall be provided.
- 7.0 **E-way Bill (Road Permit):** E-way bill (Road Permit) may please be generated by the supplier. Our GSTIN NO is '18AAACN9991J3ZP'. No any responsibility will be taken for issuance of E-way bill by the purchaser.
- 8.0 **Consignee:** The materials with accessories shall be delivered FOR AGBP site at the address i.e. DGM (E/M), MMW; AGBP, NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, PIN – 786191.
- 9.0 **Paying Authority:** The DGM (Fin), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam.

You are requested to kindly acknowledge the receipt of this Detailed Order and conveyance your acceptance.

Enclosed:

- (i) Annexure- Price Schedule.

Yours faithfully,

(Dinabandhu Baishya)
Dy. GM (E/M), PEM,
AGBP, NEEPCO, Bokuloni
Dist.: Dibrugarh, Assam.

Schedule of Price Schedule									
Name of Manufacturer/Bidder/M/S: ABB Power Products & Systems India Limited									
Sl. No.	Description of item (For Supply) (i)	Quantity (Units/Set) (q)	Set/Unit Price (Rs.) (a)	Total Price (Rs.) (q x a) (1)	Applicable GST (a) x (b)	Freight Charges (d)	Trans Insurance (e)	GST on FC/TT/Service (f)	Grand Total (Rs.) (a1+b+c+d+e+f)
1 (I)	245 KV, 2000 Amps. continuous current, 40kA short-circuit breaking current, Triple pole outdoor type, SF6 circuit Breaker suitable for high speed Single phase rapid auto reclosing features for Line-Circuit Breaker and single phase rapid auto reclosing features for generator breaker (as applicable) complete with SF6 Gas, mounting structure, control cabinet, terminal connectors suitable for Zebra conductor, auxiliaries etc. as specified in SIB. complete 4(four) Sets (2sets for GTGs and 2sets for Station Transformer).	4	1500,000	6,000,000	1,000,000	240,924		44,000	7,375,730
2.14	SF6 Gas 20% of total gas required for 4 set CBs. The unit shall vary depending on standard capacity... 21 kg/1 SF6 Gas cylinder.	1	39,354	39,354	7,084				46,439
Price for Supply (A)				6,039,356	1,007,084	240,924		44,000	7,428,170
II Service: Retrofitting /Installation, testing & commissioning									
4	Dismantling, Retrofitting /Installation, testing & commissioning of complete 4(four) Sets (2sets for GTGs and 2sets for Station Transformer) SF6 CB with accessories as stated in the NIB (also:1 above).	4	185,298	741,192	133,415				874,607
Price for Dismantling, Retrofitting /Installation, testing & commissioning (B)				741,192	133,415				874,607
3 (III) AMC for periods of 5 (five) year effective from the date of expiry of warranty/guarantee periods or concern equipment's as stated in NIB									
5.1	AMC for 1 st year	1	87,566	87,566	15,762				103,328
5.2	AMC for 2 nd year	1	87,566	87,566	15,762				103,328
5.3	AMC for 3 rd year	1	87,566	87,566	15,762				103,328
5.4	AMC for 4 th year	1	87,566	87,566	15,762				103,328
5.5	AMC for 5 th year	1	87,566	87,566	15,762				103,328
5.5	Total AMC Charges			437,834	78,009				516,339
Grand Total Price (A+B+C)				7,210,374	1,299,380	240,924		44,000	8,811,416
{ Rupees Eighty Eight lakh eleven thousand four hundred and sixteen only }									
Note: Schedule of Items shall be as per agreed terms & conditions against clarifications.									


 23/01/2020
 उप महा प्रबंधक (वि.मं.)
 Deputy General Manager (E/M)
 प्लांट इलेक्ट्रिकल मटेनेंस कॉम्प्लेक्स,
 प्लांट Electrical Maintenance Complex,
 गन्नीबोपी, नोपको, बोकुलानी,
 MP NPPCO, Bokulani



ISO: 9001 - 2015
ISO: 14001 - 2015
OHSMS: 45001 - 2018

नॉर्थ ईस्टर्न इलैक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(मिनी रत्ना, श्रेणी १, भारत सरकार का उद्यम)

North Eastern Electric Power Corporation Limited,

(Mini Ratna Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख

Assam Gas Based Power Plant,

डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)



No. NEEPCO/AGBP/PEM/O&M-D1/2021-22/302

Dated: 18/11/2021

To

M/s GLOCAN
Manav Kalyan Namghar Road
Tinsukia, Assam - 786 125

Kind Attn: Mr. P. K. Agarwal M. No. 9706076203
E. Mail : gloconpk@rediffmail.com

Sub: Work Order for Overhauling/Serviceing of 8 Nos. 2 MVA-6.6/0.433 KV, CG makes Transformers installed at AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam.

Ref:

1. Our Letter Ref. No. NEEPCO/AGBP/PEM/O&M-01/2021-22/87 Dated 10/06/2021.
2. Offer Ref. No. 20210618 Rev 00 Dtd. 24/06/2021 from CG Power Industrial Solution Ltd., Malanpur, MP.
3. Our Letter Ref. No. NEEPCO/AGBP/PEM/O&M-01/2021-22/174 Dated 29/07/2021.
4. Revised Offer Ref. No. 20210618 Rev 01 Dtd. 05/08/2021 from CG Power Industrial Solution Ltd., Malanpur, MP.
5. Revised Offer Ref. No. 20210618 Rev 02 Dtd. 14/09/2021 from CG Power Industrial Solution Ltd., Malanpur, MP.

Dear Sirs,

With reference to the above, the corporation is pleased to place this order for Overhauling/Serviceing of 8 Nos. 2 MVA-6.6/0.433 KV, CG makes Transformers installed at AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam. The schedule of rates, scope of work and the terms and conditions of the work order are as mentioned below:

1. Schedule of Rate

Sl. No.	Description	No. of Transformers	Rate (Rs.)	Amount (Rs.)
1	To conduct complete Low voltage testing as per annexure-1 before starting overhauling/serviceing/dismantling works of Transformer.	8	20,000.00	1,60,000.000
2	Overhauling/serviceing of 2MVA-6.6/0.433Kv CGL makes transformers as per the scope of works.	8	95,000.00	7,60,000.00
3	To conduct complete Low voltage testing after overhauling/serviceing works of transformers.	8	20,000.00	1,60,000.00

(Handwritten Signature)

2. Scope of Works:

- 1) To conduct complete Low Voltage Testing (as per Annexure-1) on Transformer in presence of Inspection Officer before starting overhauling/servicing/dismantling works of Transformer.
- 2) Complete draining of existing old Transformer Oil in separate oil storage tank.
- 3) Complete dismantling of all accessories of Transformer (i.e. Radiator, Conservator, bushing etc.) and Protection Device (if required). If any leakage is found in Radiator at the time of oil filling, then same leakage needs to attend.
- 4) Replacement of complete gasket of the transformer including top cover.
- 5) Complete assembly of accessories after cleaning and replacement of gasket.
- 6) Filtration of drain oil in separate storage tank.
- 7) Attending complete oil leakage in transformer.
- 8) Checking of tap changer contact, bushing & clamp tightness, internal inspection.
- 9) Oil filtration of transformer using filtration machine.
- 10) Filling the oil and filtration of complete transformer using filtration machine.
- 11) Cleaning and checking the complete transformer protection device by physical tripping through breaker.
- 12) Commissioning of transformer after checking and completing pre-commissioning checks as per CGL (the OEM).
- 13) Testing/Replacement of protection equipment (i.e. Buchholz Relay, WTI, DTI, MOG, PRD etc.)
- 14) To Conduct complete low voltage testing as per Annexure – 1.

'Part A' (Vendor's Scope)

1. Closed tarpaulin shed near transformer for keep working area moisture free.
2. Strip heater, halogen lamp for heating from external if required.
3. Cleaning materials like waste clothes etc.
4. Low voltage testing team with all testing equipment.
5. Charging clearance.
6. Expert team for complete overhauling activity and gasket replacement.
7. Submission of complete report of overhauling with clear MOM.

'Part B' (Customer i.e NEEPCO's Scope):

1. Supply of spares like Gasket, Nitrile, Hardware, Oil as required.
2. To provide free working space and space for equipment near Transformer.
3. Gate pass for Service Team, Equipment, tools & tackles.
4. Any Special safety equipment i.e special PPE, Scarf fold.
5. Any type of work permit.
6. Water near working area.
7. Power supply for filter machine & testing equipment.
8. Oil storage tank/fresh empty drum.
9. Required Hydra/crane.
10. Transformer Oil Filter machine.

3. Terms and Conditions:

- a) **Service Charge:** The Service charges for overhauling/servicing of 2 MVA, 6.6 KV/0.415 KV CG makes Transformer will be as per 'Schedule of Rate' as mentioned in Clause No. 1.


[Handwritten signature]
15/11/2024

- b) **Taxes:** GST will be applicable as per GST Rule subject to submission of GST Registration number and payment of GST as per SAC Code (SAC Code is 9987). Present rate of GST is 18%. TCS/TDS @0.1% (if applicable as per new government tax rule) will be applicable. However, if any changes will come on government tax rule during execution of work /submission of work bill, the same shall be regularized accordingly.
- c) **Work Duration:** Work duration will be 15-20 days after getting the commercially cleared Work Order. Advance intimation of 7 days will be given for mobilization of team & equipment.
- d) **Payment Terms:** "100% payment will be released through E-payment after completion of the work against submission of bill in triplicate and job completion report". However, there will be a scope of part payment on pro rata basis against successful completion of works/equipment, if any Transformer cannot be serviced due to non-availability of shutdown".
- e) **Warranty Periods:** Warranty of overhauling works at site will be applicable for only oil leakage from the area of gasket that replaced. The warranty will be applicable for the duration of 12 months from the date of work completion /commissioning whichever is earlier.
- f) **Accommodation and Local Transportation:** NEEPCO will provide free accommodation at Guest House at site and local conveyance from nearest Air Port/Railway Station to site and back. However, food shall be on chargeable basis and shall be paid at actual by the Contractor/Party.
- g) **MOM** between CGL and NEEPCO shall be drawn after completion of the work.
- h) **Paying Authority:** GM(F), F & A Wing, AGBP, NEEPCO Ltd., Bokuloni, Dist: Dibrugarh, Assam.

Kindly acknowledge the receipt of this Work Order and convey your acceptance at the earliest please.

Thanking you,

Yours faithfully,


(Dinabandhu Baishya)
DGM (E/M), PEM
AGBP, NEEPCO Ltd.

CC: The Executive (After Sales Services)
CG Power and Industrial Solution Limited
Distribution Transformer Division (T2)
Plot No. T1-T5, MPAKVN Industrial Area,
Dist: Bhand, Malanpur -477 116, Madhya Pradesh.

Attn: MR. DEEPAK UPADHAY, M. No. 09713522648.
E-mail ID: deepak.upadhyay@cgglobal.com


(Dinabandhu Baishya)
DGM (E/M), PEM
AGBP, NEEPCO Ltd.

Annexure - 1**List of Test Before and After Overhauling:**

1. Ratio Test (at all taps).
2. Magnetizing Current (at all taps).
3. Magnetic balance test.
4. Vector group.
5. IR & PI Test (Main Transformer), Insulation Resistance – Between Core, frame and tank (if connection provided externally).
6. Oil BDV.

Alhijw
18/11/2024

नार्थ ईस्टर्न इलेक्ट्रिक पावर कार्पोरेशन
(मिनी रिला, श्रेणी १, भारत सरकार)

North Eastern Electric Power Corporation Limited

(Mini Rated Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख

Assam Gas Based Power Plant

डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)

ISO 9001 - 2015
ISO 14001 - 2015
OHMS 45001 - 2018

Ref: NE/PC/AGBP/PE/MS&M/12/21-22/190

Date: 11/08/2021

To:

M/s Everline Engineering Industries

Everline House, Laitpur

P.O: Panola

Assam-786187

FAX: 0371-2310796 Phone: 0371-2318564/2318579

Email: everlineengg@gmail.com, everlineengg@yahoo.com

Sub: Detailed Purchase Order for Supply, Refinishing, Testing and Commissioning of GE, I&D India Ltd make relay for AGBP, NE/PC/OT/td, Bokalem Charak, Dibrugarh, Assam.

Ref:

1. Enquiry vide letter no. NE/PC/AGBP/PE/MS&M/12/21-22/190 dated 08/08/2021
2. Offer vide offer no. NE/PC/AGBP/PE/MS&M/12/21-22/190 dated 23/02/2021 & 11/08/2021
3. Request for clarifications vide letter no. NE/PC/AGBP/PE/MS&M/12/21-22/192 dated 01/07/2021.
4. Clarifications received vide no. NE/PC/AGBP/PE/MS&M/12/21-22/193 dated 13/07/2021.

Dear Sirs,

With reference to the above, the corporation is pleased to issue the detailed Purchase Order for "Supply, Refinishing, testing and commissioning" as per following terms and conditions.

Supply:

Sr.	Item	Qty	Unit Ex-works Price (In Rs.)	Total Ex-works Price (In Rs.)
1	GE I&D India make Numerical Protection relay, Type: MDCM PLINE PLS3400 CE on PCB1850 protocol.	17	70000.00	1190000.00
2	GE I&D India make numerical Protection relay, Type: MDCM PLINE PLS3400 CE on PCB1850 protocol.	10	70000.00	700000.00
3	GE I&D India make Protection relay, Type: M93M1L, 220V DC.	09	9600.00	86400.00
4	GE I&D India make Protection relay, Type: VFD120S163002, 220V DC.	05	7200.00	36000.00
5	GE I&D India make Protection relay, Type: VFD120S163002, 220V DC.	04	4000.00	16000.00
			Total	1996400.00

(Sup. in Nufteen Lakhs Only Five Thousand Six Hundred Only)

Services:

Sr. No.	Service	Qty.	Unit Lump Sum Service Charge (Rs.)	Total Lump Sum Service Charge (Rs.)
1	Re-wiring, Testing and Commissioning of CTIN relays	11	40,000.00	5,60,000.00
2	Re-wiring, Testing and Commissioning of PSWB relays	400	40,000.00	5,20,000.00
3	Re-wiring, Testing and Commissioning of MVABB relays	06	8,000.00	1,20,000.00
Sub total				9,28,000.00
(Ninety Two Lakh Twenty Eight Thousand only)				

TERMS AND CONDITIONS:

1. **Price:** The Price is Fix-Works of human and shall remain “FIRM” till completion of delivery of the material for materials and till completion of commissioning (for works). The prices are inclusive of Taxes and Duties, freight and insurance.

1.1 **Taxes and Duties:** All applicable taxes and duties shall be paid extra at actual at the time of execution as per Govt. prevailing norms. (Present rate of GST @ 18% for supply and service. ITC @ 0.1% GST shall be applicable subject to submission of GST details. *Our system Gov Based Power Plant GSTIN and P. CIN is '181110N9991132P' and '1110N9991'*

1.2 **Freight & Transit Insurance** - Materials have to transport through reputed transportation and services. Freight charges shall be paid extra at actual against submission of documentary evidence and deducted @ 2% of Unit price, the invoice amount shall be *increased by 2% to cover M.P.P. Co's. Rate for their policy or the equivalent to inform to the contractor. Insurance policy report to be submitted to Transit Insurance and Royal P. Co.*

2. **Scope of supply:** - The scope will include Design, Manufacturing and R/wiring. Just as per relevant schedule for manufacturer's works, packing and forwarding, supply and delivery of items as quoted in the offer.

Supply of required wiring materials (i.e. wires, terminals, lugs, Terminal blocks) and Blanking plates for r/wiring and wiring of protective scheme during site activities as quoted in the offer.

All the existing auxiliary relays will be retained in the protective scheme. However, if any auxiliary relay(s) is/are found to be defective at the time of commissioning, same shall be replaced repaired on chargeable basis, which shall be regularized after completion of the commissioning.

3. **Scope of Work:** - The scope of work will include
- Design and re-engineering for the protection scheme
 - Removal of existing protection schemes.
 - Mounting and wiring of new protection scheme.
 - Testing and Commissioning of new protection schemes. All the protection logics shall be made operative as per the scheme requirement.
 - Supply of required wiring materials and Blanking Plates for Mounting and Wiring of Protective scheme during site activities.
 - Supply and termination of cables outside to the protection panels are not included in the scope of work.

- g. All auxiliary relays/Crip relays of the existing protection schemes will remain as earlier. If auxiliary relays found defective, it will be replaced/ repaired by the Firm on chargeable basis.
- Work completion report** should include
- Report of general testing
 - Final drawings of all the schemes commissioned,
 - Final logic diagram/PSI for all the schemes commissioned.
 - Complete list of relay setting values at the time of commissioning.
 - List of all programmed inputs and/or outputs used indicating usage and
 - Any other relevant information if any.
4. **Technical specification and Drawing:** You are requested to submit modified final drawing if any modification is required during commissioning indicating the modification(s).
5. **Terms of Payment:**
- For Supply**
100% (one hundred percent) payment against supply of the materials along with taxes and duties at actual shall be released within 30 days on receipt of the materials at AQBP site in full and good condition and against submission of the following dispatch documents:
 - Bill in triplicate
 - Test Inspection Certificate,
 - Consignment note Challan,
 - Guarantee/Warranty Certificate,
 - Bank account details for es pay ment (as per format enclosed).
 - For Works**
100% (one hundred) percent payment with taxes applicable will be released on successful commissioning completion of each relay (start payment) against submission of
 - Bill in triplicate,
 - Work completion report.
6. **Retooling and Commissioning:** Retooling and commissioning of the numerical relays at site will be carried out as mentioned in the offer of your principal M/s GE- T & D India Ltd, Kolkata and as per the rates mentioned above. For this, no separate order will be issued. The supplier will coordinate with their principal M/s GE- T & D India Ltd, Kolkata for retooling and commissioning of the numerical relays and completion of the job on time. Kindly note that retooling and commissioning of the numerical relays will be done in a phased manner as per the enclosure.
- You will be intimated at least 15 (fifteen) days advance of the commencement of commissioning for your necessary arrangement.
7. **Security Deposit/Bank Guarantee:** The supplier have to submit Performance Bank Guarantee (as security deposit) @ 3% of ex-work material value in prescribed format from a reputed and registered bank having a validity of 90 days after expiry of the guarantee period. The S/P/BG shall be submitted within 20 days from issue of the purchase order or nil/blanket of all the terms and conditions.
8. **Delivery:** The materials shall be delivered within 16 (Sixteen) or 20 (Twenty) weeks of receipt of technically and commercially clear order. However, effort should be given to shorten the delivery period.
9. **Guarantee/Warranty:** The numerical relays will be guaranteed for a period of 12 (twelve) months from the date of commissioning or 18 (eighteen) months from the date of supply.

whichever is earlier. The supplier will submit the Certificate/Warranty certificate of all the furnished relays along with the material invoice.

10. **Testing and Inspection:** The numerical relays will undergo all the required tests as per the relevant IS codes. The supplier will submit the Test certificate of all the numerical relays along with the material invoice.
11. **Accommodation:** NEETCO will provide accommodation to the commissioning Engineer Team in six roomed Bungalow of cost. However, the food shall be on chargeable basis.
12. **Liquidated damage:** In case you fail to deliver the materials within the contractual delivery period due to reasons attributed to you, then the Commission shall reserve the right to recover from your sum towards liquidated damages of 1 Percent from percent value of the undelivered portion of the supply for each calendar week or part thereof delay from the scheduled delivery date. The total recovery from you on account of this shall, however, not exceed 5% five percent of the value of the undelivered portion of supply. However the LD clause will not be imposed if you fail to deliver the materials within the scheduled delivery period due to force Majeure conditions which shall include without limitation, wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquakes, storms, flood, explosion or fire not caused by your negligence, lightning, act of God, public enemy which is of unforeseeable to delay, curtail or prevent timely action by either party.
13. **Rejection of defective materials:** If the materials found defective at the time of receipt, the same shall be rejected and the supplier shall have to replace the same at their cost.
14. **Consignee:** DGM (M), Material Management Wing, AGBP, NEETCO Ltd., PO Bokufori Chariali, Dibrugarh (Dibrugarh, Assam-786191).
15. **Paying authority:** The Senior Manager (E, E&A Wing, AGBP, NEETCO Ltd., PO Bokufori Chariali, Dibrugarh, Assam-786191).

Sincerely acknowledge receipt of this order and confirm your acceptance thereof.
Thanking you

Yours faithfully,

DGM (E-M), P/M
AGBP, NEETCO Ltd.

Memo no. NEETCO/AGBP-P/M/EXAM-02/2021-22 (19)

dated 21.05.2021

Copy to:

1. M/S G. J & D, work rd, Kollata,
PO (1) Post, Pradip, No. 3,
Major Arsenai Road, Block (M), Town-C, S^o Jyoti,
New Town Rajpur, Kollata, 06136,
Car. No. JG-201-27013

DGM (E-M), P/M
AGBP, NEETCO Ltd.

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कार्पोरेशन लिमिटेड

कोशी रोड, बेलो ६, चारम बाजार, गुवाहाटी



North Eastern Electric Power Corporation Limited,

(Mini Public Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. शयन भूखण्ड

Assam Gas Based Power Plant

बिबुला, असम, Dist. Dibrugarh (Assam)



REGD. NO. 111/2015
1993-140001-2015
UIN/15-45001-2015

No. NEEPCO/AGBP/PEM/O&M-01/2021-21/477 dtd 15/03/2021

To

M/S Bharat Heavy Electricals Limited.

Regional Operations Division, 1st Floor, Part B, House No 01,

Banphool Nagar Path, Belto a Basistha Road.

Near Household Bus Stop Opp. Rajdhani Apartment, Guwahati - 781000

Sub: Detailed Order for Design, Manufacturing, Shop testing and Supply of 1 No. 50 MVA, 11/234 KV, 3-ph Generator Transformer with first filling plus 10% extra top up oil, standard fitting & accessories to AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam.

Ref:

1. Enquiry letter no: NEEPCO/AGBP/PEM/O&M-1/20-21/121 dtd 23/07/2020
2. Your offer vide Ref. RE/GAU/0123/2020 dated 17/10/2020
3. Our email dtd 13/11/2020 requesting for clarification.
4. Your confirmation via email dtd 21/11/2020
5. Our email dtd 30/11/2020 & your email dtd 02/12/2020
6. Our email dtd 05/12/2020; 15/12/2020; 21/12/2020 & 26/12/2020.
7. Your Firm offer vide RE/GAU/0181/2020 dated 31/12/2020
8. Our email dtd 02/01/2021 requesting for clarification.
9. Your confirmation via email dtd 08/01/2021
10. Our email dtd 22/01/2021 requesting for clarification.
11. Your confirmation via email dtd 23/01/2021
12. Our email dtd 15/2/2021 requesting for RIP bushing.
13. Your confirmation via email dtd 16/2/2021
14. Our email dtd 17/2/2021 requesting for Tech-Commercial clarifications
15. Your confirmation conveyed via email dtd 19/2/2021.
16. Our email dtd 19/2/2021 requesting to accept payment terms in use with KaHEP
17. Your confirmation conveyed via email dtd 24/2/2021

Dear Srs.

With reference to above, the Corporation is pleased to issue this Detailed Order for Design, Manufacturing, Shop testing and Supply of 1 No. 50 MVA, 11/234 KV, 3-ph Generator Transformer for AGBP, NEEPCO Ltd. as per following terms and conditions

Terms & Conditions:

1. **Scope of Contract/Supply** Design, Engineering, Manufacturing, Assembly, Inspection, Shop testing, Packing & Forwarding, Supply, Transportation to site, Insurance before dispatch, Material Handling, Loading and unloading of 1 No. 50 MVA, 11/234 KV, 3-ph Generator Transformer with first filling plus 10% extra top up oil, standard fitting & accessories to AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam. The detailed Technical Specification of existing BHEL make Generator Transformer is enclosed as Annexure-A

[Handwritten signature]

- 1.1 This spec 50MVA, 11(2)24KV 3- ϕ Generator Transformer should be suitable for retrofitting and microprocessor amongst existing similar rating KV Class of BHEL make GT i.e. 5 units (2 GTGs+3STGs) at NGRM NEEPCO LTD.
 - 1.2 The Generator Transformer should design for Power frequency withstand voltage for HV Winding: 275KVp and Full wave lightning impulse withstand voltage for HV winding: 650KVp.
 - 1.3 The Generator Transformer shall be complete with all accessories and fittings etc. The equipment and materials shall conform as per IS. 2026.
 - 1.4 The 50MVA, 11(2)24KV Generator Transformer shall be subjected to type, routine and acceptance tests as per IEC 62271-102 or latest amendment (High Voltage switchgear and control gear-alternating current).
 - 1.5 The third-party testing charges of DGA by CPRI Bhopal if arises, shall be borne by NEEPCO.
 - 1.6 The Circuit Short Circuit Level shall be 50kA for 3 sec as per latest notice issued by CEA for Standardization of Short Circuit Level of High Voltage Equipment.
 - 1.7 The Generator Transformer shall be capable of remaining in operation at full load for ten (10) minutes after failure of fans without exceeding the winding hot spot temperature of 140 C.
 - 1.8 Data sheets and drawings shall be submitted to D&E Wing, NEEPCO, Guwahati for approval prior to start manufacturing.
2. Prices: The Price for Supply of 1 no. 50 MVA Generator Transformer with first filling plus 10% extra top up oil, standard fitting & accessories and charges for type test are as follows. The prices shall remain FIRM for the entire period of Contract.

Sl. No.	Material Description/Item	Qty (Nos/Set)	Ex-Works Price (Rs.)
1	Supply of 1 no. 50 MVA GT with first filling plus 10% extra top up oil, standard fitting & accessories and charges for type test	1	Rs. 3,65,00,000.00
2	Additional cost for RIP HV bushing	1	Rs. 45,00,000.00
	Sub Total		Rs. 4,10,00,000.00
3	Freight & transit insurance	1	Rs. 35,00,000.00
4	GST @ 18% on sl. nos. 1, 2 & 3 above		Rs. 80,10,000.00
5	Total Price		Rs. 5,25,10,000.00
	(Rupees five crore twenty-five lakh ten thousand only).		

2.1 Taxes and Duties: GST rate of 18% shall be applicable for Ex-Work Supply, F&I. However, actual rate of GST shall be applicable at the time of Supply as per GST rule and subject to submission of GST registration, HSN code and payment details. Our GST Registration is 18AA/ACN999tJ3ZP.

2.2 Insurance coverage: The supplier shall arrange for coverage of insurance policy viz transit insurance all delivery at site, the supplied equipment's shall be covered under the scope of contract, to take full responsibility during transit and to comply with necessary safety measures as called for relevant Act/Regulations.

3.0 Payment terms:

- 75% (Seventy five percent) of Ex Works Price along with 100% taxes & duties shall be paid on dispatch and production of the following documents to the consignee. -

- (a) Proof of dispatch (Cony receipt/railway receipt).
- (b) Contractor's detailed invoice,
- (c) Detailed packing list.
- (d) Test certificate and / or duly approved inspection certificate, or proof of waiver of inspection / tests,
- (e) Dispatch clearance certificate
- (f) Documentary evidence against payment of Taxes and Duties
- (g) Bank account details for a-payment.

- 3.1 15% (fifteen percent) of Ex-Works Price along with F&I on receipt of materials at site in full and good condition.
- 3.2 10% (ten percent) balance ex-works price shall be released within 90 days after the completion of warranty period. However, balance 10% ex-works price may also be released on submission of Bank Guarantee for equivalent amount, along with interest at the rate of 1.5% (one and half percent) above BPLR of State Bank of India, with validity to cover 90 days after completion of the Warranty Period.
- 4.0 Performance Bank Guarantee: P&G @3% shall be submitted by the supplier for a value equivalent to 3% (Three Percent) of the Total Contract Value with validity of 90 (Ninety) days beyond Warranty Period
- 5.0 Delivery: Ex-works delivery of the items within 12 months from the receipt of technically and commercially cleared order/drawing approval whichever is later.
- 5.0 Warranty/Defect Liability Period: The equipment shall be guaranteed for successful operation for a period of 12 (twelve) months from the date of commissioning or 18 (eighteen) months from date of receipt whichever is earlier.
- 7.0 Liquidity Damage: Liquidated damages for delay in delivery shall be 0.5% (Half Percent) of Total Contract Value per week or part thereof subject to maximum of 5% of the basic value of undelivered portion of main equipment.

8.0 Inspection and Testing:

8.1 The Engineer-in-charge and his duly authorized representative shall have, at all reasonable time, access to the Contractor's premises or works and shall have the power at all reasonable time, to inspect and examine the materials and workmanship of the plant/equipment during its manufacture, shop assembly and testing and if part of the plant is being manufactured in another premises, the Contractor shall obtain for the Engineer-in-charge and his duly authorized representatives, permission to inspect it as if the works were manufactured in the Contractor's own premises or works.

8.2 The Contractor shall give the Engineer-in-Charge / Inspector 15 (fifteen) days written notice of any material being ready for testing. The Engineer-in-Charge / Inspector, unless the inspection of the tests is in writing waived, shall attend such tests within 15 (fifteen) days of the date of which the equipment is notified by the Contractor as being ready for test / inspection, failing which the Contractor may proceed with the tests which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Engineer-in-charge duly certified copies of test results in quadruplicate, for approval of the Engineer-in-charge. However, waiver accorded by the Engineer will not absolve the Contractor towards the execution of the Contract in conformity with the Contract Agreement.

8.3 Factory Assembly and Test:

The transformer shall be completely tested before dispatch in accordance with the standards and with such other tests as may be necessary to ensure that the equipment is satisfactory and is in accordance with this specification. Test shall be carried out to evaluate the performance of the transformer and its auxiliaries generally as per the provisions of IS- 2026/ IEC 60076 (latest amendments) as detailed below.

Tests shall be performed in the presence of the purchaser and/or his authorized representative to as to be witnessed by him. Minimum 30 days' notice in advance shall be given to the purchaser to enable him to present during the tests. No material shall be shifted until the test reports are duly approved by the purchaser or his representative, in writing.

8.4 The following tests (Routine, Type, Special and Additional test) shall be carried out.

1) Routine Tests

Transformer routine tests shall include tests stated in latest issue of IS 2026/ IEC 60076. These tests shall also include but shall not be limited to the following and shall be done without any extra charges

- Measurement of winding resistance.
- Measurement of Voltage ratio on each tapping and check of voltage vector relationship.
- Measurement of impedance voltage at all tapings.
- Measurement of load loss
- Measurement of no-load loss and excitation current

- f) Measurement of Absorption index i.e. Insulation resistance for 15 seconds and 60 seconds (R60 seconds/R15 seconds) and polarisation index i.e. Insulation Resistance for 10 minutes and one minute (R10minutes/R1minute)
- g) Dielectric tests
 - i. Lightning Impulse Voltage Withstand Test
 - ii. Separate Source Withstand voltage Test
 - iii. Induced AC Overvoltage Withstand Test.

II) Type Test / Special Tests / Additional tests

The transformer shall be subjected to the following type tests, special tests and additional tests.

A. Type Test

- a) Temperature Rise Test

B. Special Tests

- a) Lightning Impulse test on neutral terminal.
- b) Measurement of acoustic noise level
- c) Measurement of the harmonics of the no-load current.
- d) Measurement of the power taken by fan and oil pump motors.
- e) Measurement of zero sequence impedance, if applicable

C. Additional tests

- a) Test with lightning impulse clipped on the tail.
- b) Magnetic circuit test. Each core shall be tested for 1 minute at 2 kV between all bolts, side plates and structural steel work immediately prior to the despatch of the transformer. The magnetic circuit shall be pressure tested for 1 minute at 2 kV AC between the core and the earth.
- c) Determination of capacitance and dissipation factor between winding to earth and between windings (Tan Delta)
- d) Determination of capacitance and dissipation factor for condenser type bushing (Tan Delta).
- e) Magnetic Balance Tests.
- f) Determination of transient Voltage Transfer Characteristics
- g) DGA of Oil of the transformer before and after Temperature Rise Test.
- h) Frequency Response Analysis (FRA) Test.
- i) Oil pressure test on completely assembled transformer
- j) Pressure relief device test.

D. Important Note for Tests

- a) The TAN DELTA measurement shall be as per IEEE Std C57.152-2013
- b) For C and TAN DELTA measurement, the equipment should be either DOBLE,OMICRON make.
- c) It is requested to furnish the temperature correction factor that BHEL will be using for correcting TAN DELTA measurement to 20 degrees Celsius
- d) Shall Allow third party testing of DGA by CPR4 Bhopal.

8.5 TESTS ON ASSOCIATED EQUIPMENT:

Bushings, bushing of current transformer, winding temperature indicating devices, dial thermometers, Buchholz relays, oil load tap changer, insulation oil and other associated equipment shall be routine tested by the contractor in accordance with relevant IS. If such equipment is purchased by the Contractor on a sub-contract, he shall have them tested to comply with these requirements and test certificates for both routine and type tests shall be furnished to the purchaser for acceptance.

8.6 TEST REPORTS

- a) After all tests have been completed, seven certified copies of each test report shall be furnished. The test report shall supply the following information:
 - i. Complete identification data including serial number of the transformer, equipment tested, calibrated oscilloscope of impulse test trace from part of the test report
 - ii. Method of application, where applied, duration and interpretation of results for each test. Quantities corrected to 75 ° C shall be given.
 - iii. Temperature and pressure data including ambient temperature and atmospheric pressure.

9) Routine test reports shall also furnish the following information

- i. Calculated values of regulation at unity, 0.9 and 0.8 power factor lagging
- ii. Calculated values of positive, negative and zero phase sequence impedance of three phase bank.
- iii. Calculated values of efficiency of transformer at 50, 75 and 100 percent of rated capacity with unity and 0.9 power factor lagging.

In case the contractor does not have the facility to carry out any of the tests and intends to carry out the same at some other agency, these testing agencies shall be got approved by the purchaser

The purchaser and/or his representative reserve the right to witness any or all tests.

8.7 In addition to above, all other factory tests shall be carried out in line with the order placed for 28.5 MVA Generator transformer for DHEP vide PO no. NEEPCO/QP/C&P/E/Trans/DHEP/Vol-III/134 dtd 23/04/2020 and subsequent letter No. NEEPCO/ED (C&M)/DHEP- 01/2020-21/140 Date: 10/02/2021.

8.8 Testing after assembly of the transformer at site: After the transformer assembled at site, it shall be tested in order to check that it has not been damaged during transportation and assembly to such an extent that its future operation will be at risk. The performance of the test, the testing method shall be as per relevant manufacturer standards.

9.9 E-way Bill (Road Permit). E-way bill (Road Permit) may please be generated by the supplier. Our GSTIN NO is 18AAACN8991J32P. No any responsibility will be taken for issuance of E-way bill by the purchaser.


10.9 Consignee: The materials with accessories shall be delivered FOR AGBP site at the address i.e. DGM (E/M), MMW, AGBP, NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, P.N – 735191.

11.9 Paying Authority: The DGM (Fin), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam

You are requested to kindly acknowledge the receipt of this Detailed Order and conveyance your acceptance

Enclosed:

- (i) Annexure- A (Existing Technical Specifications)
- (ii) Order copy of DHEP vide PO no - NEEPCO/QP/C&P/E/Trans/DHEP/Vol-III/134 dtd 23/04/2020 for testing and subsequent letter no NEEPCO/ED (C&M)/DHEP- 01/2020-21/140 Date: 10/02/2021


For & on behalf of
DGM (E/M) & Head of Project
DGM (E/M), PEMC, AGBP



North Eastern Electric Power Corporation Limited,

(Mini Ratna Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख

Assam Gas Based Power Plant

डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)

ISO: 9001 - 2015
ISO: 14001 - 2015
OHSMS: 45001 - 2018

No. NEEPCO/AGBP/PEM/2020-21/O&M-05/

Dated

To,

M/S Mitsubishi Corporation,
Power Systems International Office,
New Energy and Power Generation Division,
3-1, Marunouchi, 2-Chome, Chiyoda-Ku,
Tokyo - 100-8086, Japan.

Sub: NEEPCO/AGBP - Detailed Order for Technical Advisory Services for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2 (Model No. MW251B).

- Ref:
1. Our letter No. NEEPCO/AGBP/PEM/O&M-05/2019-20/353 Dated 05/09/2019
 2. Your Technical document submitted vide E-mail Dated 05/11/2019 (No. JEJQ-190454-W050).
 3. Our Letter Ref. No. NEEPCO/AGBP/PEM/O&M-05/2019-20/278 Dated 20/11/2019.
 4. Your offer No. JEJQ-190454-W050 submitted vide E-mail Dated 29/11/2019
 5. Our letter No. NEEPCO/AGBP/O&M-05/2019-20/410 Dated 18/12/2019
 6. Your revised offer No. JEJQ-190454-W050. Rev.A submitted vide E-mail Dated 27/12/2019
 7. Our E-mail Dated 23/01/2020.
 8. Your Revised Offer Ref. No. JEJQ-190454-W050 SP R1 Dtd. 27/01/2020 forwarded vide E-mail Dated 30/01/2020
 9. Our letter No. NEEPCO/AGBP/O&M-05/2019-20/487 Dated 31/01/2020
 10. Your letter No. XAF-NEEPCO-M4616X578-SP R2 Dated 05/02/2020 (Revised offer)
 11. Our letter No. NEEPCO/AGBP/PEM/O&M-05/2019-20/565 Dated 05/03/2020
 12. Your letter No. ENY/XA-F802 Dated 11/03/2020 received vide E-mail Dated 11/03/2020.
 13. Your Letter Ref. No. ENY/XA-F844 Dtd. September 17, 2020 against validity of

Dear Sir,

With reference to above, the Corporation is pleased to place this detailed order for Technical Advisory Services for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2 (Model No. MW251B) of Assam Gas Based Power Plant at your offered rates and as per the following terms and conditions.

1. Scope:

Mitsubishi Corporation shall provide NEEPCO AGBP with technical advisory services by deputing required Technical Advisors for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2 (Model No. MW251B).

i) Covered Equipment are as Follows:

- > Generator & Exciter,
- > 50 MVA Generator Transformer.
- > LV SWGR (415 V G/T Unit MCC/DB, 125 V DC Panel.

2. Price:

A. Technical Advisory Services Fees:

The estimated price for the above referred services is JPY 15,584,030.00 (Japanese Yen Fifteen Million Five Hundred Eighty Four Thousand Thirty) only excluding TDS. The above mentioned price is an estimated price which includes supervisory services fees for working days as well as journey periods, overtime fees, travel expenses (air fare) and lodging at New Delhi. The actual price payable shall be calculated based on the following rates:



Sl.	Item	Price (Japanese Yen)
i.	Normal working day rate (working hours shall be 8 hours or part thereof)	1,51,100 / man day
ii.	Overtime work hourly rate for any hours worked beyond 8 hours per day from Monday to Friday	24,500 / man hour
iii.	Normal work hourly rate for Saturday, Sunday & local holidays in India	24,500 / man-hour

The above rates for holidays shall be applicable for the New Year holidays in Japan (i.e. 29th December to 3rd January every year).

The above rates are net receivable amounts and do not include any kind of tax and duties levied in India which are to be paid at actuals by NEEPCO. LC shall be opened for an amount of JPY 18,700,836 which is 120% of the estimated amount of JPY 15,584,030 on receipt of confirmation of acceptance of this order.

B. Expenses:

a) Traveling expenses such as airfares (business class for international flights) are invoiced at actual cost.

b) Lodging is arranged and paid for by the Purchaser to the concerned party.

c) Telephone, Telefax and telex communications are invoiced at actual cost if such costs are paid and borne by the Supervisor(s) during the performance of their duties.

d) Any miscellaneous expenses including food and drink during the stay at site will be reimbursed at actuals against documentary evidence.

3. Terms of payment:

Payment shall be made in Japanese Yen by an irrevocable, confirmed and non-restricted Letter of Credit (LC) to be established for the estimated amount mentioned above in favour of Mitsubishi Corporation, Tokyo (Attn.: ENY/XA-F) confirmed by a first class bank of Japan, Europe or USA and which shall be payable against presentation of at sight draft accompanied by the following documents, without restriction on negotiating bank with sufficient validity to cover bank negotiation. LC opening charges, confirmation charges and other bank charges in India shall be borne and paid by NEEPCO and bank charges outside India (except LC confirmation charges) shall be borne by Mitsubishi Corporation.

- i) Mitsubishi Corporation's detailed invoice
- ii) Copies of air tickets
- iii) Hotel Invoices
- iv) Working time sheet duly signed by NEEPCO

4. Schedule of Inspection:

The date for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2 (Model No. MW251B) is scheduled tentatively in January, 2021. The exact date will be intimated in due course. Accordingly, your MHI TA must be available at site for commencement of the inspection activities during that period.

5. Documents:

Copies of documents shall be forwarded to the ordering authority with copies to the GM (Finance) Corporate Treasury, NEEPCO Ltd., Brook land Compound, Lower New Colony, Shillong – 793003 (Fax No. 0364 – 2228542).

6. Engineer –in- Charge:

DGM (E/M) PEM or any other Engineer authorized by Head of Project, AGBP.

Kindly acknowledge receipt and confirm acceptance of this order. The above mentioned LC will be opened within one and a half (1.5) Months on receipt of the confirmation of acceptance of this order but before dispatch of Technical Advisor.

Thanking you,

Yours faithfully,

For & on behalf of
CGM (E/M) & Head of Project
DGM (E/M), PEMC, AGBP
NEEPCO Ltd., Bokuloni
Dist: Dibrugarh, Assam (India)


NIO

Memo No. NEEPCO/AGBP/PEMC/2020-21/O&M-05/ 268-75

Dated 17/10/2020.

Copy to:

1. The Director (Tech), NEEPCO Ltd., Shillong - for kind perusal please. This has reference to his approval Dated 23/09/2020 conveyed vide E-mail Dated 23/09/2020 of ED (O&M).
2. The Executive Director (O&M), NEEPCO Ltd., Shillong - for kind perusal please.
3. The CGM & HOP, AGBP, NEEPCO Ltd., Bokuloni- for kind information please. This is per U.O. No. NEEPCO/HOP/865 Dtd. 26/09/2020.
4. The GM (Fin) CT, NEEPCO Ltd., Shillong, Enclosed a copy of the approval.
5. The DGM (Fin), AGBP, NEEPCO Ltd., Bokuloni, for information.
6. The DGM (Vigilance), AGBP, NEEPCO Ltd., Bokuloni, for information.
7. The DGM (E/M), MMW, AGBP, NEEPCO Ltd., Bokuloni, for information please.
8. The Coordinator, NEEPCO Ltd., DS-I, Maniktola Civic Centre, CIT Scheme No. VII M 1/16, VIP Road, P.O. Kankurgachi, Kolkata - 700 054 - for information please.


For & on behalf of
CGM (E/M) & Head of Project
DGM (E/M), PEMC, AGBP



ISO: 9001 – 2015
ISO: 14001 – 2015
OHSMS: 45001 – 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(मिनी रत्ना, श्रेणी १, भारत सरकार का उद्यम)

North Eastern Electric Power Corporation Limited,
(Mini Ratna Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख

Assam Gas Based Power Plant

डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)



Ref No.: NEEPCO/AGBP/PEM/O&M-01/2022-23/495

Dated 31/03/2022

To,

M/S Everlite Engineering Industries Limited
Tinsukia, Assam-786125.

Email: vseverlite@gmail.com

Copy to: M/S GE T&D India Limited, DLF IT Park, Premises No.8, Major Arterial Road, Block "AF", Tower-C, 8th Floor, New Town, Rajarhat, Kolkata- 700156. Email: debraj.mallick@ge.com

Sub: Detailed Order for "Design, engineering, manufacturing, supply, delivery, retrofitting/erection, testing and commissioning of 245KV Current Transformer by replacing old existing BHEL make 245KV CT" etc. to AGBPS, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam.

Ref:

1. Our NIT No: NEEPCO/AGBP/PEM/O&M-01/2021-22/2 dated 04/08/2021 (Tender ID: 2021_NEEPC_B4510_1).
2. NEEPCO/AGBP/PEM/O&M-01/2021-22/215 dated 4/09/2021 (Corrigendum-1 dated: 04/09/2021).
3. Your offer/letter vide EEIT&SR2115/NEEPCO-Bokuloni/21219 dated: 03/09/2021.
4. Letter of M/S GE T&D India Ltd. vide No: MAF/NEEPCO/245KV CT/ITR/09 dated 03/09/2021 & no: GE T&DIL/NEEPCO/245KV CT/ITR/12 dated 03/09/2021.
5. Our letter vides NEEPCO/AGBP/PEM/O&M-01/2021-22/343 & 342 dated. 23/12/2021.
6. Your clarifications and confirmations of bidders/manufacturers against our queries vide Ref: EVERLITE/NEEPCO/245KV CT/ITR/1221/10 dated 28/12/2021 & EEIT&SR2115/NEEPCO-Bokuloni/21219A dated 28/12/2021.
7. Notice vide NEEPCO/AGBP/PEM/O&M-01/2021-2022/396 dated. 16/2/2022.
8. Request for extension of validity of offer vide NEEPCO/AGBP/PEM/O&M-01/2021-22/424 dated. 05/3/2022.
9. Your letter vide EEIT&SR2115/NEEPCO-Bokuloni/2022/22045 dated 07/03/2022.
10. Our letter vide NEEPCO/AGBP/PEM/O&M-01/2021-22/441 dated. 14/03/2022.
11. Your letter vide EEIT&SR2115/NEEPCO-Bokuloni/22054 dated 15/03/2022.
12. LOI vide NEEPCO/AGBP/PEM/O&M-01/2021-2022/468 dated 23/03/2022.
13. Your acknowledgment and acceptances vide EEIT&SR2115/NEEPCO-Bokuloni/22072 dated 29/03/2022.

Sir,

With reference to above, the Corporation is pleased to issue this Detailed Order for "Design, engineering, manufacturing, supply, delivery, retrofitting/erection, testing and commissioning of 37 Nos. of new 245KV Current Transformer by replacing old existing BHEL make 245KV CT" etc. to AGBP, NEEPCO Ltd. as per terms and conditions mentioned below:

1. **SCOPE OF WORKS:** Design, Engineering, Manufacture, Inspection and Testing at Manufacturer's works before dispatch of 245 KV Current Transformers, Packing & Forwarding, Supply, delivery, Transportation to site, Insurance from the source of supply till commissioning, Material Handling, Loading and unloading, Storage at Site, dismantling of old existing BHEL make 245KV CT, Retrofitting/Erection, Testing and Commissioning of new Current Transformers (CT) in phase manner at AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam as per terms and conditions stipulated in this order.

- 2.1 **Prices:** The prices for entire scope of the works shall be as indicated in the Annexure-A (Schedule of Items and Prices). The Prices shall remain FIRM during the currency of this contract. Total Basic Price for Supply, Dismantling, Retrofitting/Installation, Testing, Commissioning including Mandatory spares shall be for an amount Rs. 1,32,29,476.75 (Rupees one crore thirty-two lakh twenty-nine thousand four hundred seventy-seven) and Total Price for same shall be Rs 1,73,31,064.43 (Rupees one crore seventy-three lakh thirty-one thousand sixty-four) only inclusive of all applicable taxes (GST), duties, freight & transit insurance, etc. as detailed in **Annexure-A (Schedule of Items and Prices)**.
- 2.2 **Insurance coverage:** The supplier shall arrange transit insurance for transportation of the materials till delivery at site, storage at project site, erection, testing and commissioning of the supplied equipment's. The said insurance shall be valid from the date of commencement up to the date of completion of works and shall further provide the defect liability period in respect of all liabilities of the contractor under the contract. In the event of any loss/damage it shall be the responsibility of the contractor to lodge the claim with insurer immediately after occurrence. If the contractor fails to settle the claim, the amount equivalent to the loss/damage shall be recovered from any amount due to the contractor.
- 2.2 **Taxes and Duties:** The prevailing rate of GST has been indicated in the Annexure-A (Schedule of Items and Prices). However, the GST shall be applicable as per GST rule at the time of execution subject to submission of GST registration, HSN code and payment details. Kindly submit GST Invoice with all information details as per GST rule.
- 2.3 **Mandatory Spare:** Mandatory spares as indicated in the Schedule of Items and Prices shall be supplied by the Supplier.
- 2.4 **Availability of Spares:** Spares for supplied/offered CT shall have available for 25-30 years based on agreed term & conditions and Manufacturer's undertaking.
- 2.5 **Field Service:** The supplier had to ensure the appropriate technical support service consisting of factory trained Customer Engineers dedicated to the start-up, maintenance and repair of equipment. In case of breakdown of equipment's or urgency, the supplier shall be ensured to provide Technical support service within 48 hrs from the time of intimation during contract periods.
- 3.0 TIME OF COMPLETION OF CONTRACT:**
- 3.1 **Delivery Period:** Complete set of equipment/material shall be delivered at site within **4 months** from the date of approval of drawing/manufacturing clearance or mutually agreed terms and conditions. Effort should be given by the supplier to minimize the delivery periods. The date of dispatched shall be considered as date of delivery.
- 3.2 **Dismantling, Retrofitting, Testing and Commissioning Period:** The works shall be completed within 7 days per Unit/sets of CT effective from the date of availing shutdown. However, Dismantling, Retrofitting/Erection, Testing and Commissioning works which shall be done in phase manner/unit wise depending on clearance for availing shutdown of Units or mutually agreed terms and conditions. Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time.
- 3.3 **Accommodation:** Free accommodation shall be provided (food on chargeable basis) at NEEPCO's Guest House to the commissioning engineer/Serviceing Team during commissioning & service periods.
- 4.0 **Contract Performance Guarantee/Security Deposit for Supply, Installation/Retrofitting, Testing and Commissioning:** In line with the Office Memorandum vide No: DPE/7(4)/2017-Fin.(Part-I), dtd.19/11/2020 GOI, Ministry of Heavy Industries & Public Enterprises, the successful bidder shall have to submit Contract Performance Guarantee (CPG)/ Bank Guarantee

in lieu of Security Deposit @ 3% of the value of the Contract valid for a period of 90 days from the date of expiry of Guarantee/warranty periods as per our prescribed format as enclosed (Annexure-CPG/SD). The CPG/Security Deposit shall have to submit within a period of 30 days from the date issue of Contract Order.

5.0 **PAYMENT TERMS (For Supply)**

- (i) 100% (one hundred percent) of Ex Works Price along with all applicable taxes and duties shall be paid within 30 days after receipt of materials in full and good condition at site subject to submission of Contract Performance Guarantee (CPG)/Bank Guarantee (BG) 3% of the value of Contract having validity for the period of 90 days from date of expiry of guarantee/warranty period and production of the following documents to the consignee:
 - (a) Contractor's detailed Invoice.
 - (b) Detailed packing list
 - (c) Test certificate and / or duly approved inspection certificate, or proof of waiver of inspection / tests.
 - (d) Despatch clearance.
 - (e) Documentary evidence against payment of Taxes and Duties.
 - (f) Guarantee/ warranty certificate,
 - (g) Bank account details for e-payment
- (ii) Considering the execution of works in phase manner and depending on clearance for availing shutdown of Units, provision for Part payment for part delivery against each complete set of CT shall be allowed if felt necessary by the purchaser.

5.1 **Payment Terms (For Dismantling, Erection/Retrofitting, Testing and Commissioning):**

- i) 100%(one hundred percent) of the Contract sum for erection, testing and commissioning along with Price adjustment amount (if any) and 100% taxes and duties shall be paid on pro rata basis against successful completion of works/equipment.
- ii) Considering the execution of works in phase manner and depending on clearance for availing shutdown of Units, provision for Part payment for part delivery against each complete set of CT shall be allowed if felt necessary by the purchaser.

6.0 **Guarantee/Warranty:** The materials supplied shall be warranted/guaranteed as per manufacturer's norms or for a period of 18 months from the date of despatch or 12 months from the date of successful commission whichever is earlier against manufacturing defect/ defective workmanship. Defective materials shall be replaced/ rectified by the supplier at free of cost immediately on intimation from this end.

7.0 **Liquidity Damage:** Time is the essence of the Contract. If the performance of the Contract is delayed due to the reason attributed to the Contractor, the Purchaser shall without prejudice to his right to recover damages for breach of the Contract:-

- i) Reduce the Contract price by 1/2 % (half percent) per week or part thereof of delay in completion of time subjected to maximum of 10% of the contract price.
- ii) Execute or authorize the execution of work departmentally or through any other agency without any notice to the Contractor at the risk and cost of the Contractor. The decision of the Purchaser shall be final and binding upon the Contractor. However, the above action shall be taken without cancelling the contract in respect of work not yet due to execution. Or
- iii) Cancel the entire Contract on or portion thereof and if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest for execution through other agency.
- iv) Where action is taken under sub-clause (ii) or (iii) above to failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. But the Contactor shall not be entitled to any gain on such execution and the manner and method

of such execution shall be in the entire discretion of the Purchaser. It is not necessary for the Purchaser to serve a notice of such execution of the Contractor.

- 8.0 Drawing & Documentation:** After placement of L.O.I and Detailed Order, five Copies of various Drawings, data and write up shall be submitted to the DGM (E/M), PEM, AGBP, NEEPCO Ltd, Bokuloni, Dist.: Dibrugarh, Assam, PIN - 786191 for approval as well as reference as applicable. In all drawings, manuals etc. reference no. of LOA and Detailed Order shall be indicated. The supplier shall, if necessary, modify the drawings and resubmit the modified drawings for purchaser's approval within two weeks from the date of comments.
- 9.0 Operational & Maintenance Manual:** The supplier shall have to provide 5 (five) sets of Operation and Maintenance Manuals in binding form, data sheets for each rating of-specified Circuit Breaker along with equipment. The Manuals shall clearly include & indicate the installation methods, installation drawings, instructions a functional description of the equipment with block diagrams, safety precautions, illustrations, step by step operating procedures, and routine maintenance guidelines.
- 10.0 Factory Testing:** Before shipment, the manufacturer fully and completely tests the Current Transformers as per relevant standard to assure compliance with the specification.
- 11.0 TESTS AT FACTORY AND TEST CERTIFICATES**
- All acceptance tests shall be carried out at manufacturer's works as per relevant IS & IEC in presence of the Corporation's representative. In addition to above, all routine tests are also to be carried out on the Current Transformers (CT) as per relevant IS & IEC. The contractor shall give at least 15 (fifteen) days advance notice intimating the actual date of inspection and details of all tests that are to be carried out from the date when the tests will be carried out. Routine tests report of each CT is to be submitted along with inspection offer. Acceptance test report shall be furnished in Three (3) copies to the *DGM (E/M), PEM, AGBP, NEEPCO, Bokuloni, Dibrugarh -786191.*
- 12.0 Dispatch clearance:** No materials shall be dispatched without inspection or otherwise given dispatch clearance by the purchaser in writing to the Supplier.
- 13.0 E-way Bill (Road Permit):** E-way bill (Road Permit) may please be generated by the supplier. Our GSTIN NO is '18AAACN9991J3ZP'. No any responsibility will be taken for issuance of E-way bill by the purchaser.
- 14.0 Consignee:** The materials with accessories shall be delivered FOR AGBP site at the address i.e. Dy. General Manager (E/M), MMW; AGBP/NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, PIN - 786191.
- 15.0 Paying Authority:** The GM (Fin), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam.
- 16.0 Jurisdiction of Court:** The Contract shall be governed by the laws of India for the time being in force and shall be subjected to the jurisdiction of the High Court of judicature at Guwahati High Court, Assam.
- 17.0 Signing of Contract / Agreement:** After issue of the Letter of Intent and on receipt of its unconditional acceptance, the Owner shall issue detailed work order. On acceptance of the detailed work order and acceptance of Contract Performance Guarantee/SD submitted by the successful bidder, the Owner shall prepare the Contract Agreement on Non-Judicial Stamped Paper and the successful bidder will be informed for signing of the Contract Agreement on a notified date. Signing of the Contract Agreement will be done in the office of the Office of the Dy. General Manager (E/M), PEM, AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam.
- 18.0** All the terms and conditions, technical specifications which are not indicated here shall be governed as per Bid documents and agreed terms and conditions. Further, any other necessary

item/protective devices/equipment and accessories whether specifically mentioned herein or not, but necessary for completeness and satisfactory performance of the 245KV CT shall be provided.

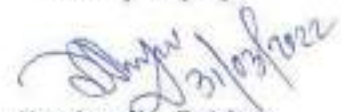
You are requested to kindly acknowledge the receipt of this Detailed Order and conveyance your acceptance.

Enclosed:

- (i) Annexure- A (Price Schedule)
- (ii) Annexure- B (Guaranteed Technical Particulars)
- (iii) Annexure- C (Technical Specification).
- (iv) Annexure- D (Model Forms of BG for SD/CPG).

Thanking you.

Yours faithfully,


 Dy. GM (E/M), PEM,
 AGBPS, NEEPCO, Bokuloni
 Dist.: Dibrugarh, Assam.

NIO: Memo No. NEEPCO/AGBP/PEM/O&M-01/2022-23/496-501

dated 31/03/2022

1. The CGM (E/M) & HOP, AGBP, NEEPCO Ltd, Bokuloni for kind information please. This is as per Concurrence of project Finance on Evaluation Report of Price Bid conveyed vide FLCM ID: 0033 dated 23.03.2022 (12:47:41 hrs) and subsequent approval accorded vide FLCM ID: 0034 dated 23.3.2022 (16:06:03hrs) against FLCM File Number: Note Sheet/EM/PEM/O&M-01/88/AGBP/09/08//2021.
2. The GM (E/M), C&I and O&AWC, AGBP, Bokuloni- for kind information please.
3. The GM (F & A), AGBP, Bokuloni- for kind information please. This is as per concurrence on Evaluation Report of Price Bid conveyed vide FLCM ID: 0033 dated 23.03.2022 (12:47:41 hrs) against FLCM File No. Note Sheet/EM/PEM/O&M-01/88/AGBP/09/08//2021. Copy of approval is enclosed for your references. The expenditures shall be booked under the additional capitalization.
4. The DGM (E/M), MMW, AGBP, Bokuloni- for kind information please. The expenditures shall be booked under the additional capitalization.
5. The DGM (E/M), Vigilance, AGBP, Bokuloni - for kind information.
6. Office record file O&M-01.


 Dy. Gen. Manager (E/M), PEM,
 AGBPS, NEEPCO, Bokuloni
 Dist.: Dibrugarh, Assam.

Schedule of Prices.

NTT No: NEEPCO/AGBP/PEM/O&M-01/2021-22/2 dated 04/08/2021 (Tender ID: 2021-NEEPCO-84510-1)

Name of Manufacturer/Bidder: M/S EverSite Engg. Industries (Manufacturer: GE T&D India Ltd.) (L1)

Sl. No.	Description of item (For Supply)-i	Quantity (Unit/Set) (q)	Set/Unit Price (Rs.) (a)	Total Price (Rs.) (q x a) (1)	Applicable GST (@ of a) (b)	Freight Charges & Transit Insurance etc. (c)	Other applicable taxes & duties/TCI etc. (d)	Grand Total (Rs.) (a+b+c+d=A)
1	Supply: Supply of 245 kV Current Transformer along with retrofitting Material (i.e. 1) Adapter frame to match new CT Base with existing structure. 2) Terminal Connectors for CT - Suitable for ACSR Zebra Conductor complete in all respect as specified in NIB. Current Transformer 150-150-150-800-800/1 - For Generator (3nos x Set=27 no).	27.00	338377.75	9136199.25	1644515.87	1242540.00	12023.26	₹ 1,20,35,278.38
4	Current Transformer (50-50-50-800-800/1) - For Station Transformer (3nos x	6.00	339377.75	2036266.50	365447.97	276120.00	2671.83	₹ 25,74,506.30
5	Supply: Mandatory Spare: Current Transformer complete in all respect including Terminal Connectors... Current Transformer (150-150-150-800-800/1) For Generator.	3.00	338377.75	1015133.25	182723.99	139060.00	1335.92	₹ 13,37,253.16
7	Current Transformer (50-50-50-800-800/1) - For Station Transformer.	1.00	338377.75	338377.75	60908.00	46020.00	445.31	₹ 4,45,751.06
	Total Price for Supply (A)	37.00	1353511.00	12519976.75	2251595.82	1702740.00	16476.32	₹ 1,64,92,788.89
B	Service: Dismantling of Existing Current Transformer and Installation, testing and commissioning of new 11 sets (3nos x 1 set=33nos) Complete in all respect.	33.00	21500.00	709500.00	127710.00	0	1065.54	₹ 8,38,275.54
	Total Price for Dismantling, Retrofitting /Installation, testing & commissioning (B)			709500.00	127710.00	0.00	1065.54	₹ 8,38,275.54
	Total Contract Price (A+B)			11229476.75	2381305.82	1702740.00	17541.86	₹ 1,73,31,964.43
Rupees one crore seventy three lakh thirty one thousand sixty four only								

Note: As per condition of bid, all Other applicable taxes & duties/TCI etc. are inclusive.



ISO: 9001 - 2015
ISO: 14001 - 2015
OHSMS: 45001 - 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(मिनी रत्ना, श्रेणी १, भारत सरकार का उद्यम)
North Eastern Electric Power Corporation Limited,
(Mini Ratna Category - I, Govt. of India Enterprise)
असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख
Assam Gas Based Power Plant
डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)

1310



Ref No.: NEEPCO/AGBP/PEM/O&M-01/2022-23/502

Dated 31/03/2022

To,

M/S HIVOLTTRANS ELECTRICALS PVT. LTD.
2202-03, GIDC, Industrial Estate, Halol-389350
Panchmahals, Gujarat,

Copy to: M/S Glucon, Tinsukia, Assam for Installation, Testing and Commissioning works

Sub: Detailed Order for "Design, engineering, manufacturing, supply, delivery, retrofitting/erection, testing and commissioning of 245KV Current Transformer by replacing old existing BHEL make 245KV CT" etc. to AGBPS, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam.

Ref:

1. Our NIT No: NEEPCO/AGBP/PEM/O&M-01/2021-22/2 dated 04/08/2021 (Tender ID: 2021_NEEPC_84510_1).
2. NEEPCO/AGBP/PEM/O&M-01/2021-22/215 dated 4/09/2021 (Corrigendum-1 dated:04/09/2021).
3. Your offer/letter vide HEPL/2530/NEEPCO/T-001/2021-22 dated:02/09/2021.
4. Our letter vides NEEPCO/AGBP/PEM/O&M-01/2021-22/344 & 345 dated. 23/12/2021.
5. Your clarifications vide HEPL/NEEPCO/AGBP/PEM/O&M-01/2021-22/345/231& 232/ dated 28/12/2021.
6. Notice vide NEEPCO/AGBP/PEM/O&M-01/2021-2022/396 dated. 16/2/2022.
7. Request for extension of validity of offer vide NEEPCO/AGBP/PEM/O&M-01/2021-22/425 dated. 05/3/2022
8. Your letter vide Ref: HEPL/2530/NEEPCO/T-001/235/2021-22 dated:07/03/2022.
9. Our letter vide NEEPCO/AGBP/PEM/O&M-01/2021-22/442 dated. 14/03/2022.
10. Your letter vide Ref: HEPL/NEEPCO/AGBP/PEM/O&M-01/2021-22/280 dated 15/03/2022.
11. Our email dated 21/03/2022.
12. Your letter vide Ref: HEPL/NEEPCO/AGBP/PEM/O&M-01/2021-22/293 dated 21/03/2022.
13. LOI vide No. NEEPCO/AGBP/PEM/O&M-01/2021-2022/460 dated 23/03/2022.
14. Your acknowledgement Vide No. HEPL/NEEPCO/AGBP/PEM/O&M-01/2021-22/294 dated 29/03/2022.

Sir,

With reference to above, the Corporation is pleased to issue this Detailed Order for "Design, engineering, manufacturing, supply, delivery retrofitting/erection, testing and commissioning of 11 Nos. of new 245KV Current Transformer as per IEC-61869-1&2 (latest version of instrument Transformer) by replacing old existing BHEL make 245KV CT" etc. to AGBP, NEEPCO Ltd. as per terms and conditions mentioned below:

1. **SCOPE OF WORKS:** Design, Engineering, Manufacture, Inspection and Testing at Manufacturer's works before dispatch of 245 KV Current Transformers, Packing & Forwarding, Supply, delivery Transportation to site, Insurance from the source of supply till commissioning, Material Handling, Loading and unloading, Storage at Site, dismantling of old existing BHEL make 245KV CT, Retrofitting/Erection, Testing and Commissioning of new Current Transformers (CT) in phase manner at AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam as per terms and conditions stipulated in this order.

- 2.1 **Prices:** The prices for entire scope of the works shall be as indicated in the Annexure-A (Schedule of Items and Prices). The Prices shall remain FIRM during the currency of this contract. Total

[Signature]

Basic Price for Supply, Dismantling, Retrofitting/Installation, Testing, Commissioning including Mandatory spares shall be for an amount Rs. 39,41,600 (Rupees thirty-nine lakh forty-one thousand six hundred) and Total Price for same shall be Rs 49,81,088.00 (Rupees forty-nine lakh eighty one thousand eighty-eight) only inclusive of all applicable taxes (GST), duties, freight & transit insurance, etc. as detailed in **Annexure-A (Schedule of Items and Prices)**.

- 2.2 **Insurance coverage:** The supplier shall arrange transit insurance for transportation of the materials till delivery at site, storage at project site, erection, testing and commissioning of the supplied equipment's. The said insurance shall be valid from the date of commencement up to the date of completion of works and shall further provide the defect liability period in respect of all liabilities of the contractor under the contract. In the event of any loss/damage it shall be the responsibility of the contractor to lodge the claim with insurer immediately after occurrence. If the contractor fails to settle the claim, the amount equivalent to the loss/damage shall be recovered from any amount due to the contractor.
- 2.2 The prevailing rate of GST has been indicated in the Annexure-A (Schedule of Items and Prices) However, the GST shall be applicable as per GST rule at the time of execution subject to submission of GST registration, HSN code and payment details. Kindly submit GST Invoice with all information details as per GST rule.
- 2.3 **Mandatory Spare:** Mandatory spares as indicated in the Schedule of Items and Prices shall be supplied by the Supplier.
- 2.4 **Availability of Spares:** Spares for supplied/offered CT shall have available for 25-30 years based on agreed term & conditions and Manufacturer's undertaking.
- 2.5 **Field Service:** The supplier had to ensure the appropriate technical support service consisting of factory trained Customer Engineers dedicated to the start-up, maintenance and repair of equipment. In case of breakdown of equipment's or urgency, the supplier shall be ensured to provide Technical support service within 48 hrs from the time of intimation during contract periods.
- 3.0 TIME OF COMPLETION OF CONTRACT:**
- 3.1 **Delivery Period:** Complete set of equipment/material shall be delivered at site within **12-16 weeks** from the date of receipt of drawing approval/manufacturing clearance or mutually agreed terms and conditions. Effort should be given by the supplier to minimize the delivery periods. The date of dispatched shall be considered as date of delivery.
- 3.2 **Dismantling, Retrofitting, Testing and Commissioning Period:** The works shall be completed within 7 days per Unit/sets of CT effective from the date of availing shutdown. However, Dismantling, Retrofitting/Erection, Testing and Commissioning works which shall be done in phase manner/unit wise depending on clearance for availing shutdown of Units or mutually agreed terms and conditions. Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time.
- 3.3 **Accommodation:** Free accommodation shall be provided (food on chargeable basis) at NEEPCO's Guest House to the commissioning engineer/Serviceing Team during commissioning & service periods.
- 4.0 **Contract Performance Guarantee/Security Deposit for Supply, Installation/Retrofitting, Testing and Commissioning:** In line with the Office Memorandum vide No: DPE/7(4)/2017-Fin.(Part-I), dtd.19/11/2020 GOI, Ministry of Heavy Industries & Public Enterprises, the successful bidder shall have to submit Contract Performance Guarantee (CPG)/ Bank Guarantee in lieu of Security Deposit @ 3% of the value of the Contract valid for a period of 90 days from the date of expiry of Guarantee/warranty periods as per our prescribed format as enclosed (Annexure-CPG/SD). The CPG/Security Deposit shall have to submit within a period of 30 days from the date issue of Contract Order.

5.0 PAYMENT TERMS (For Supply)

- (i) 100% (one hundred percent) of Ex Works Price along with all applicable taxes and duties shall be paid within 30 days after receipt of materials in full and good condition at site subject to submission of Contract Performance Guarantee (CPG)/Bank Guarantee (BG) 3% of the value of Contract having validity for the period of 90 days from date of expiry of guarantee/warranty period and production of the following documents to the consignee:
- Contractor's detailed invoice.
 - Detailed packing list
 - Test certificate and / or duly approved inspection certificate, or proof of waiver of inspection / tests.
 - Despatch clearance
 - Documentary evidence against payment of Taxes and Duties.
 - Guarantee/ warranty certificate,
 - Bank account details for e-payment
- (ii) Considering the execution of works in phase manner and depending on clearance for availing shutdown of Units, provision for Part payment for part delivery against each complete set of CT shall be allowed if felt necessary by the purchaser.

5.1 Payment Terms (For Dismantling, Erection/Retrofitting, Testing and Commissioning):

- 100%(one hundred percent) of the Contract sum for erection, testing and commissioning along with Price adjustment amount (if any) and 100% taxes and duties shall be paid on pro rata basis against successful completion of works/equipment.
- Considering the execution of works in phase manner and depending on clearance for availing shutdown of Units, provision for Part payment for part delivery against each complete set of CT shall be allowed if felt necessary by the purchaser.

6.0 Guarantee/Warranty: The materials supplied shall be warranted/guaranteed as per manufacturer's norms or for a period of 18 months from the date of despatch or 12 months from the date of successful commission whichever is earlier against manufacturing defect/ defective workmanship. Defective materials shall be replaced/ rectified by the supplier at free of cost immediately on intimation from this end.

7.0 Liquidity Damage: Time is the essence of the Contract. If the performance of the Contract is delayed due to the reason attributed to the Contractor, the Purchaser shall without prejudice to his right to recover damages for breach of the Contract:-

- Reduce the Contract price by 1/2 %(half percent) per week or part thereof of delay in completion of time subjected to maximum of 10% of the contract price.
- Execute or authorize the execution of work departmentally or through any other agency without any notice to the Contractor at the risk and cost of the Contractor. The decision of the Purchaser shall be final and binding upon the Contractor. However, the above action shall be taken without cancelling the contract in respect of work not yet due to execution. Or
- Cancel the entire Contract on or portion thereof and if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest for execution through other agency.
- Where action is taken under sub-clause (ii) or (iii) above to failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. But the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be in the entire discretion of the Purchaser. It is not necessary for the Purchaser to serve a notice of such execution of the Contractor.

8.0 Drawing & Documentation: After placement of L.O.I and Detailed Order, five Copies of various Drawings, data and write up shall be submitted to the DGM (E/M), PEM, AGBP, NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, PIN - 786191 for approval as well as reference as applicable.

In all drawings, manuals etc. reference no. of LOA and Detailed Order shall be indicated. The supplier shall, if necessary, modify the drawings and resubmit the modified drawings for purchaser's approval within two weeks from the date of comments.

- 9.0 **Operational & Maintenance Manual:** The supplier shall have to provide 5 (five) sets of Operation and Maintenance Manuals in binding form, data sheets for each rating of specified Circuit Breaker along with equipment. The Manuals shall clearly include & indicate the installation methods, installation drawings, instructions a functional description of the equipment with block diagrams, safety precautions, illustrations, step by step operating procedures, and routine maintenance guidelines.
- 10.0 **Factory Testing:** Before shipment, the manufacturer fully and completely tests the Current Transformers as per relevant standard to assure compliance with the specification.
- 11.0 TESTS AT FACTORY AND TEST CERTIFICATES**
- All acceptance tests shall be carried out at manufacturer's works as per relevant IS & IEC in presence of the Corporation's representative. In addition to above, all routine tests are also to be carried out on the Current Transformers (CT) as per relevant IS & IEC. The contractor shall give at least 15 (fifteen) days advance notice intimating the actual date of inspection and details of all tests that are to be carried out from the date when the tests will be carried out. Routine tests report of each CT is to be submitted along with inspection offer. Acceptance test report shall be furnished in Three (3) copies to the DGM (E/M), PEM, AGBP, NEEPCO, Bokuloni, Dibrugarh -786191.
- 12.0 **Dispatch clearance:** No materials shall be dispatched without inspection or otherwise given dispatch clearance by the purchaser in writing to the Supplier.
- 13.0 **E-way Bill (Road Permit):** E-way bill (Road Permit) may please be generated by the supplier. Our GSTIN NO is '18AAACN9991J3ZP'. No any responsibility will be taken for issuance of E-way bill by the purchaser.
- 14.0 **Consignee:** The materials with accessories shall be delivered FOR AGBP site at the address i.e. Dy. General Manager (E/M), MMW; AGBP/NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, PIN - 786191.
- 15.0 **Paying Authority:** The GM (Fin), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam.
- 16.0 **Jurisdiction of Court:** The Contract shall be governed by the laws of India for the time being in force and shall be subjected to the jurisdiction of the High Court of judicature at Guwahati High Court, Assam.
- 17.0 **Signing of Contract / Agreement:** After issue of the Letter of Intent and on receipt of its unconditional acceptance, the Owner shall issue detailed work order. On acceptance of the detailed work order and acceptance of Contract Performance Guarantee/SD submitted by the successful bidder, the Owner shall prepare the Contract Agreement on Non-Judicial Stamped Paper and the successful bidder will be informed for signing of the Contract Agreement on a notified date. Signing of the Contract Agreement will be done in the office of the Office of the Dy. General Manager (E/M), PEM, AGBP, NEEPCO LTD., Bokuloni, Dibrugarh, Assam.
- 18.0 All the terms and conditions, technical specifications which are not indicated here shall be governed as per Bid documents and agreed terms and conditions. Further, any other necessary item/protective devices/equipment and accessories whether specifically mentioned herein or not, but necessary for completeness and satisfactory performance of the 245KV CT shall be provided.

You are requested to kindly acknowledge the receipt of this Detailed Order and conveyance your acceptance.

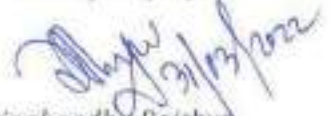


Enclosed:

- (i) Annexure- A (Price Schedule)
- (ii) Annexure- B (Guaranteed Technical Particulars)
- (iii) Annexure- C (Technical Specification).
- (iv) Annexure- D (Model Forms of BG for SD/CPG).

Thanking you.

Yours faithfully,



Dinabandhu Baishya
Dy. GM (E/M), PEM,
AGBPS, NEEPCO, Bokuloni
Dist.: Dibrugarh, Assam.

NIQ: Memo No. NEEPCO/AGBP/PEM/O&M-01/2022-23/503-508

dated 31/03/2022

1. The CGM (E/M) & HOP, AGBP, NEEPCO Ltd, Bokuloni for kind information please. This is as per Concurrence of project Finance on Evaluation Report of Price Bid conveyed vide FLCM ID: 0033 dated 23.03.2022 (12:47:41 hrs) and subsequent approval accorded vide FLCM ID: 0034 dated 23.3.2022 (16:06:03hrs) against FLCM File Number: Note Sheet/EM/PEM/O&M-01/88/AGBP/09/08//2021.
2. The GM (E/M), C&I and O&AWC, AGBP, Bokuloni- for kind information please.
3. The GM (F & A), AGBP, Bokuloni- for kind information please. This is as per concurrence on Evaluation Report of Price Bid conveyed vide FLCM ID: 0033 dated 23.03.2022 (12:47:41 hrs) against FLCM File No. Note Sheet/EM/PEM/O&M-01/88/AGBP/09/08//2021. Copy of approval is enclosed for your references. The expenditures shall be booked under the additional capitalization.
4. The DGM (E/M), MMW, AGBP, Bokuloni- for kind information please. The expenditures shall be booked under the additional capitalization.
5. The DGM (E/M), Vigilance, AGBP, Bokuloni - for kind information.
6. Office record file O&M-01.



Dinabandhu Baishya
Dy. Gen. Manager (E/M), PEM,
AGBPS, NEEPCO, Bokuloni
Dist.: Dibrugarh, Assam.

Schedule of Prices.

NIT No. NEEPCO/ACBP/PEM/O&M-01/2021-22/2 dated 04/08/2021 (Tender ID: 2021_NEEPC_04510_1)

Name of Manufacturer/Bidder: M/SHIVDLE TRANS Electrical Pvt. Ltd. (MSME)								
Sl. No.	Description of items (For Supply)-i	Quantity [Unit/Set] (q)	Set/Unit Price (Rs.) (a)	Total Price (Rs.) (q x a = a1)	Applicable GST (@ 18% of a1) = (b)	Freight Charges & Transit Insurance etc. (c)	Other applicable taxes & duties/TCI etc. (d)	Grand Total (Rs.) (a1+b+c+d=A)
	Supply: Supply of 245 kV Current Transformer along with retrofiting Material i.e. 1) Adapter frame to match new CT Base with existing structure. 2) Terminal Connectors for CT - Suitable for ACSR Zebra Conductor complete in all respect as specified in NIB.							
1.	Current Transformer 800/1 - For Line (3nos x 2set=6no)	6.00	325600.00	1953600.00	351698.00	180000.00	Inclusive	24,85,248.00
2.	Current Transformer 800/1 - For Bus-Coupler (3nos x 1set=3no)	3.00	325600.00	976800.00	173824.00	90000.00	Inclusive	12,42,642.00
3.	Supply: Mandatory Spare: Current Transformer complete in all respect including Terminal Connectors.						Inclusive	
4.	Current Transformer (800/1 -) For Line & BC.	2.00	325600.00	651200.00	117216.00	60000.00	Inclusive	8,28,416.00
	Total Price for Supply (A)	11.00	976800.00	3581600.00	644608.00	330000.00	Inclusive	45,56,298.00
6.	Service: Dismantling of Existing Current Transformer and installation, testing and commissioning of new 3 sets (3nosx3set=09nos) Complete in all respect.	9.00	40000.00	360000.00	64800.00	0.00	Inclusive	4,24,800.00
	Total Price for Dismantling, Retrofitting /Installation, testing & commissioning (B)			360000.00	64800.00	0.00	Inclusive	4,24,800.00
	Total Contract Price (A+B)			3941600.00	709488.00	330000.00	Inclusive	49,81,098.00
Rspees forty nine lakh eighty one thousand eighty eight only.								

Note: As per condition of bid, all Other applicable taxes & duties/TCI etc. are inclusive.



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

Assam Gas Based Power Plant

SOKULONI, DIST DEBRUGARH, ASSAM, PIN - 786 157

Phone: 9842430000

Ref No

Date

Ref: NEEPCO/AGBP/PEM/O&M-12/19-20/

Dated: 02/04/2020

To,

M/s Everite Engineering Industries
Everite House, Larpur
P.O: Paritola
Assam-786183
FAX: 0374-2310126; Phone: 03742218564/2316579
Email: everite@everiteindia.com

Sub: Detailed Order (No. 39NB/123 dated 30/03/2019) for supply, installation, testing and commissioning of standalone DR & EL for all GE make MiCOM Relays of AGBP, NEEPCO Ltd.

- Ref:
1. Enquiry vide letter no. NEEPCO/AGBP/PEM/O&M-12/19-20/335 dated 19/08/2019
 2. Offer vide SUT/NEEPCO/AGBPP/EL & DR dated 04/09/2019
 3. Our letter requesting clarification NEEPCO/AGBP/PEM/O&M-12/19-20/493 Dated 05/02/2020.
 4. Reply vide SUT/NEEPCO/AGBPP/EL & DR/Clarification dated 24/02/2020.
 5. Our email requesting clarification dated 27/02/2020.
 6. Reply vide email dated 27/02/2020
 7. Our email requesting clarification dated 25/03/2020
 8. Confirmation vide email dated 25/03/2020
 9. Our L1 vide letter no. NEEPCO/AGBP/PEM/O&M-12/19-20/604 dated 28/03/2020
 10. Your acceptance vide EET&SR2006/NEEPCO-AGBPP/2020/20130 dated 31.03.2020 conveyed vide email dated 01.04.2020

Dear Sirs,

With reference to the above, the corporation is pleased to issue the detailed Purchase Order (No. 39NB/123 dated 30/03/2019) for supply, installation, testing and commissioning of standalone DR & EL for all GE make MiCOM Relays of AGBP, NEEPCO Ltd as per following terms and conditions:

TERMS AND CONDITIONS:

1. **Price:** - Total basic price for supply, installation, testing and commissioning of standalone DR & EL for all GE make MiCOM Relays shall be Rs. 49,70,000.00 (Rupees Forty Nine Lakh Seventy Thousand) only as detailed in Annexure-A. The price is FOB Ex-Works, Chennai basis and exclusive of GST, Freight, Insurance and all other applicable taxes. The prices shall remain "FIRM" till completion of commissioning (works)
2. **Freight & Transit Insurance:** - Materials have to transport through reputed transporter/courier service. Freight charges shall be paid extra at actual against submission of documentary evidence and restricted @2% of basic price. The transit insurance shall be arranged by NEEPCO under NEEPCO's Marine Open Policy & the Firm has to intimate to the undersigned/Consignee before dispatch for insurance of Transit Insurance
3. **Taxes and Duties:** - All applicable taxes and duties shall be paid extra at actual at the time of erection as per Govt. prevailing norms. (Present rate of GST @ 18% for supply and service) GST shall be applicable subject to submission of GST details. Our (Assam Gas Based Power Plant) GSTIN and PAN is '18AAACN9991132P' and 'AAACN9991'. MSN code 85176290 & SAC Code 998736.

4. **Scope of Work:**


A. **Supply Part:** - The scope will include supply of materials as detailed in Annexure-A.

Supply of required wiring materials (i.e. wires, ferrules, lugs, Terminal blocks) for successful commissioning of Distributive Recorder and Event Logger during site activities will be supplied free of cost.

- 8. Service Part:** Scope of works under service shall include the followings:-
- i. Framing of data list, creation and submission of project documents such as System Architecture, communication cable structure, I/O list and site implementation plan as per documents provided by us.
 - ii. Completion of project as per schedule.
 - iii. GE shall offer its expertise in design and engineering for Event Logger and Disturbance Recorder system.
 - iv. Testing and commissioning of new EL scheme.
 - v. GE shall be responsible for factory design and site implementation.
 - vi. GE shall supply the required software and hardware for the project.
 - vii. GE shall provide support during warranty period of the system. The warranty period shall cover both the hardware and software supplied under the project except physical damages of the database after SAT.
 - viii. Auxiliary Relay /Lock Out Relay/CMR are not included in the offer.
 - ix. Time synchronization in the C-264 unit shall be achieved through IRIG-B modulated signal to be provided by us.
 - x. Power Supply to CC system and Auxiliary Supply to the system will be provided by us.
 - xi. Supply and termination of control and CT Cables outside to the protection panels/cubicle are not included in the scope of the work.
 - xii. All the drawing and System Architecture are to be submitted after receipt of the purchase order.
 - xiii. Any modifications which pertain to the switch gear controls are excluded in the offer. Painting of existing panel or replacement of entire panel is not considered under the scope of contract.
 - xiv. M/s GE confirmed to supply all necessary materials, required wires, ferrules, lugs, terminal blocks free of cost.
 - xv. Supply of any additional C264/or equipment will be on chargeable basis.
 - xvi. Onsite Training on DR &EL will be provided during commissioning at free of cost.
- 5. Technical specification and Drawing:** On receipt of this order and prior to commencement of commissioning activities, a copy each of project documents such as System Architecture, communication cable structure, I/O list and site implementation shall be submitted to this office for reference. You are also requested to submit modified final drawing if any modification is required during commissioning, (indicating the modification(s)).
- 6. Terms of Payment:**
- a. **For Supply**
100% (one hundred percent) payment against supply of the materials along with taxes and duties at actual shall be released within 30 days on receipt of the materials at AGBF site in full and good condition and against submission of the following dispatch documents:
 - a) Bill of lading,
 - b) Checklist/LR,
 - c) Guarantee /Warranty Certificate,
 - d) Test/Inspection Certificate
 - e) Bank account details for e- payment (as per format enclosed).
 - b. **For Works**
100% payment with taxes applicable will be released on successful commissioning completion of each relay (part payment) against submission of
 - a. Bill of lading,
 - b) Work completion report
 - c) Final as-Built drawing
- 7. Security Deposit/Bank Guarantee.** The supplier has to be submitted Performance Bank Guarantee cum security deposit @ 10% of ex-factory material value in prescribed format from a reputed and registered bank having a validity of 90 days after expiry of the guarantee period within 20 days. The SD/BG from issue of the purchase order on fulfilment of all the terms and conditions.
- 8. Delivery:** The materials shall be delivered within 12 (Twelve) weeks of from the date of drawing/BOQ approval at Assam Gas Based Power Plant site, NEPCO Ltd. P.O Bokuloni Chariali, District Dibrugarh, Assam-786191. However, effort should be given to shorten the delivery period.
- 9. Guarantee/Warranty:** The materials supplied will be guaranteed for a period of 12 (twelve) months from the date of commissioning or 18 (eighteen) months from the date of supply, whichever is earlier. The supplier will submit the Guarantee/Warranty certificate of all the numerical relays along with the invoice/Invoice.

10. **Testing and inspection:** The Event logger will undergo all the required tests as per the relevant IS codes. The supplier is to submit the test certificate of Event Logger along with the material/invoice.
11. **Commissioning:** Commissioning of the DR &EL at site will be carried out as mentioned in the offer of your principal M/s G.E.T & D India Ltd., Kolkata and as per the rates mentioned in enclosure 1. For this no separate order shall be issued. The supplier will coordinate with their principal M/s G.E.T & D India Ltd., Kolkata for commissioning of the DR &EL at completion of the job on site.
You will be informed at least 15 (fifteen) days advance of the commencement of commissioning for your necessary arrangement.
12. **Accommodation:** NEEPCO will provide accommodation to the commissioning Engineer/Team at site (Guest House) if of cost. However, the food shall be on chargeable basis as per our standard rate.
13. **Liquidated damage:** in case you fail to deliver the materials within the contractual delivery period due to reasons attributed to you, then the Corporation shall reserve the right to recover from your sum towards liquidated damages 1/4(one forth percent) value of the undelivered portion of the supply for each calendar week or part thereof delay for the scheduled delivery date. The total recovery from you on account of this shall, however, not exceed 5% (five percent) of the value of the undelivered portion of supply. However, the LD clause will not be imposed if you fail to deliver materials within the scheduled delivery period due to Force Majeure conditions which shall include without limitation wars, insurrection, civil war, disobedience, strikes, riots, epidemics, earthquakes, storms, floods, explosion or fire caused by your negligence, lightning, act of God, public enemy which is of such nature as to delay, curtail or prevent timely action by either party.
14. **Rejection of defective materials:** If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall have to replace the same at their cost.
15. **Consignee:** DGM (E/M), Material Management Wing, AGBP, NEEPCO Ltd., P.O. Buxaruni Chariali, District Dibrugarh, Assam 786111
16. **Paying authority:** The DGM (E), E&A Wing, AGBP, NEEPCO Ltd., P.O. Buxaruni Chariali, District Dibrugarh, Assam 786111.
Kindly acknowledge receipt of this order and confirm your acceptance thereof.
Thanking you.

Yours faithfully


 DGM (E/M), AGBP, NEEPCO Ltd.

Memo no. NEEPCO/AGBP/PEM/DMM-1/2021/02

Dated: 02/04/2020

Copy to:

1. M/s G.E.T & D India Ltd, Kolkata.
PLOT Park, Plot nos No. 8
Major Arterial Road, Block 'A1', Tower-C, 8th Floor
New Town & Jyoti, Kolkata 700 156
Fax: 033-401 97643

DGM (E/M), AGBP, NEEPCO Ltd.

Annexure-A

A. Supply Part		Quantity (No.)	UNIT	Unit Price (Rs.)	Total Price (Rs.)
Event Logger					
1	Event Logger Compatible to IEC-61850 suitable for 512 events. 18V set consists of 3NO/1C in 30/15/15 size suitable for 512 contacts, 250/15 rated rack (800T) 110V AC Base Rack, 40A Plug Load, 1 Way, Function keys, Indicators, Power Supply, CPU with access to legacy RS-485 towards substation (V.I)	1	SET	1350000.00	1350000.00
2	Engineering Workstation of Dual Platform D, Core 2 Duo CPU - 2.4 GHz, 2 GB DDR, 17 inch TFT Monitor, Windows XP Professional Software, CPU for Engineering Workstation - D2 Column 1st Main Printer - Brother L3650 A4, 250 MVA, Along with 1 X Uninterrupted Power Supply And necessary CAT 5 Cable	1	SET	250000.00	250000.00
3	Print for Mandatory Event Loggs	1	No	125000.00	125000.00
4	Discrete 575000 in Engineering Workstation PC (S) No. 2)	1	SET	35000.00	35000.00
Disturbance Recorder					
5	Industrial Switch with 8 poles	10	No	9000.00	90000.00
6	RS 485 cable with 1047 cable for communicating Relay and Protection switch - 115 mtrs. 15 No stated	150	No	2000.00	250000.00
7	RS 485 cable for Communication PC and Protection switch	100	Meter	50.00	10000.00
8	Industrial grade PC (40 12V)	1	No	200000.00	200000.00
9	UN Power 4.00	5	No	3000.00	15000.00
10	Arrestor with cable for protecting SW Busbar for Central Panel	1000	Meter	80.00	80000.00
11	Discrete 575000 in Industrial grade PC with 8VH (S) No. 2)	1	No	35000.00	35000.00
Total					3280000.00
Rupees thirty two Lakh Eighty Thousand Only					
B. Service (Installation and Commissioning) Part					
Sl.	Job Description	Quantity	UNIT	Unit Price	Total Price
1	Laying of Armored PO cable for connecting SW Board to Control Panel	1000	Meter	30.00	30000.00
2	Splicing & Termination of PO cable	1	Lot	100000.00	100000.00
3	Installation cost for EL & DS equipment	1	Lot	300000.00	300000.00
4	Configuration, Commissioning & Commissioning	1	Lot	400000.00	400000.00
5	Discrete 50000 in Configuration, Commissioning & Commissioning (Sl No. 1)	1	Lot	40000.00	40000.00
Total					1040000.00
Rupees Seven Lakh Ninety Thousand Only					
C. Total (For Supply, Installation and Commissioning)					
Sl.	Description	Price			
1	Supply (Materials) Part	3280000.00			
2	Installation and Commissioning (Service) Part	760000.00			
Total					4040000.00
Rupees Forty Lakh Seventy Thousand Only					



नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सङ्घात् खास संस्था)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 101
E-mail: ayba.bokuloni@neepco.com



Ref. No. NEEPCO/AGBP/PEM/O&M-05/2021-22/ 483

Date: 25/3/2022

To,

BHARAT HEAVY ELECTRICAL LIMITED
HEAVY POWER EQUIPMENT PLANT,
RAMCHANDRAPURAM
HYDERABAD-502032

Sub: Detailed Work Order for Technical Advisory Services for Major Overhauling and Testing of Generator and exciter of Gas Turbine # 5 (Type TARI 800 26P) at AGBPS, NEEPCO Ltd., PO, Bokuloni Chariali, Dibrugarh, Assam. (Kathalguri)

- Ref: 1. Our Enquiry vide NEEPCO/AGBP/PEM/O&M-05/2021-22/182 dtd. 13.08.2021
2. Your offer vide HY/ES/21FSSQ905084/2021-22 dtd. 20.08.2021
3. Our letter for clarification vide NEEPCO/AGBP/PEM/O&M-05/2021-22/339 dtd. 18.12.2021
4. Your reply vide email dtd. 18.01.2022, 1142Hr
5. Our email dtd. 18.01.2021, 1343Hr
6. Your reply dtd. 18.01.2021 1529Hr

Dear Sirs,

With reference to above, the Corporation is pleased to place this Work Order for Technical Advisory Services for Major Overhauling and Testing of Generator and exciter of Gas Turbine # 5 (Type TARI 800 26P) as per the following rate and terms & conditions.

1. **SCOPE:** Bharat Heavy Electrical Limited (BHEL) shall conduct complete overhauling of the subject generator and exciter by deputing required Technical Advisors and Manpower. Complete overhauling will include dismantling, overhauling, servicing, re-assembly, re-erection, testing and re-commissioning of the unit. Detailed scope of work is as detailed in Annexure-I.
2. **Rate:** The Complete charge for the subject work is Rs. 65,00,000.00 (Rupees Sixty five Lakh) only. The Taxes and Duties shall be paid extra at actual and shall be as per prevailing govt rules. Present rate of GST is 18%. **THE PRICE SHALL REMAIN FIRM TILL THE COMPLETION OF THE WORK.**
 - a) **Idling Charges:** If for any reason beyond BHEL's control, viz. non-availability of spares, consumables, equipment to be overhauled and connected auxiliaries etc. the work prolongs beyond the stipulated period, extra charges will be levied for the extended period of works as below:

(Signature)

- i. BHEL Service Engineer: Rs. 70,000.00 per 8 hours per person
- ii. Vendor Charges: Rs. 1,50,000.00 per day

In case, quarantine is applicable at our state, Idle charge will be applicable as per offer for the team.

- b) *Demobilization and remobilization charges:* One-time demobilization and mobilization charges are included in the price. Post 1 demobilisation and mobilization, if during the course of work, interruption of work exceeding one week is anticipated for reasons not attributable to M/s BHEL, M/s BHEL can withdraw their personal along with T&P. However, the same shall be remobilized on hearing of NEEPCO's request for remobilisation.
Demobilization and remobilisation (7 days intimation for vendor and 48 hours intimation for BHEL service engineer) of site shall be charged extra to contract value for a lump sum value of Rs.5,00,000.00. In case of remobilisation of any BHEL service engineer charges will be Rs. 70,000.00 per 8 hours per person.
- c) *Accommodation & Local conveyance:* Accommodation shall be provided to the Service Engineer/ Overhauling team at our Guest houses free of cost. M/s BHEL is requested to submit the complete list of the team members mentioning the designations, alongwith double vaccination certificates, well ahead of mobilization for necessary arrangement.
However, food shall be on chargeable basis.
To and Fro journey from nearest Airport/ Train station to Site and Local conveyance shall be arranged by NEEPCO for the service engineer/ overhauling team.

3. **Completion Period:** The complete overhauling shall be completed by BHEL within 26 (Twenty six) days. However, BHEL is requested to put the best effort to complete the overhauling job in as minimum days as possible. Bar chart for work schedule shall have to be shared before site mobilization.

NEEPCO shall give minimum advance notice of 2 months for the mobilization from the date of order or 20 days of written intimation whichever is later.

4. **Payment Terms:** Payment term will be as following:

- 20% of contract value on site mobilization
- 70% of the contract value on the completion of work.
- 10% of the contract value on completion of warranty period.

Payment shall be released on submission of the following documents:

- a) Original bill in triplicate,
- b) Test Report,
- c) Completion certificate,
- d) Warranty Certificate and
- e) Bank account details.

5. **Warranty:** The overhauled generator and exciter shall be guaranteed for a period of 3 (Three) months for any defective workmanship limited within BHEL's scope. If any such defects are noticed and proved that the problem is solely due to bad workmanship of BHEL, those shall be rectified free of cost within the guaranteed period.



6. **Tools and Equipment:** NEEPCO shall arrange all tools & plants required for conducting the overhauling which were supplied by the OEM. M/s BHEL shall arrange all special test equipment required for conducting the tests. However, NEEPCO can arrange the regular kind of testing equipment.
7. **Safety and Insurance:** M/s BHEL shall arrange all needful regarding the safety on engaged man power and also arrange valid appropriate insurance for them.
8. **Force Majeure:** M/s BHEL shall not be liable for loss and damage resulting from any delay or failure to complete the work, within time specified for all or any part of work due to acts of God, war declared or undeclared, act of public enemy, riots, civil commotion, invasion, insurrection, sabotage, act of restraints of Government, federal, state or municipal action or regulation, embargoes, strikes or other labour troubles, fire, flood, hurricanes, accidents, epidemics, earthquakes, quarantine restrictions, damage to or destruction in whole or in part of the tools and equipment or any failure on the part of NEEPCO or representative to supply materials, drawings or other technical documents in time or any other causes, contingencies or circumstances not subject to M/s BHEL's control, whether of a similar or dissimilar nature which prevents the work, any such causes or delays even though existing on the date of the contract or during the period of execution of work shall extend the time of M/s BHEL's performance by the length of delays occasioned thereby including delays reasonable incident to the resumption of normal work even though such case may occur after performance of our obligation has been delayed for the other causes.
9. **Paying Authority:**

The Gen. Manager (F)
F&A, AGBPS, NEEPCO Ltd.
PO. Bokuloni Chariali-786191
Dist. Dibrugarh, Assam

Please acknowledge the receipt of this work order and confirm your acceptance thereof.

Thanking you,

Yours faithfully,



DGM (E/M), PEMC
AGBPS, NEEPCO Ltd.



ISO 14001: 2015
ISO 9000: 2015
ISO 45001: 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लि
NORTH EASTERN ELECTRIC POWER CORPORATION LTD
(A GOVT OF INDIA ENTERPRISE)

1323 DOCUMENT/46

ASSAM GAS BASED POWER PLANT
BOKULONI, DIBRUGARH, ASSAM, 786191
Email:



No. NEPCO/AGBP/PEM/O&M-01/2023-24/48

Dated:08/06/2023

To,

Bharat Heavy Electricals Limited
Regional Operation Division
1st Floor, Part – 1 B, House No. 01
Banphool Nagar Path, Beltola
Basistha Road, Near House Fed Bus Stop
Opposite Rajdhani Apartment, Dispur
Dispur, Guwahati – 781006. E mail: rodguwahati@rediffmail.com, rishikesh@bhel.in

Sub: Work Order for dismantling of existing 01(one) number 50 MVA Generator Transformer (BHEL) & retrofitting/installation, testing & commissioning of new 50 MVA Generator Transformer at AGBPS, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam.

Ref:

1. Purchase Order No. NEEPCO/AGBP/PEM/O&M-01/2020-21/477 Dated 15/03/2021.
2. Our Letter Ref. No. NEEPCO/AGBP/PEM/O&M-01/2022-23/340 Dated 23/03/2023.
3. Your Offer Ref. No. RE/GAU/0003/2023 Dated 06/04/2023.
4. Our Letter Ref. No. NEEPCO/AGBP/PEM/O&M-01/2023-24/20 Dated 09/05/2023.
5. Our E-mail dated 16/05/2023.
6. Your clarification through E-mail dated 20th May, 2023,

Dear Sirs:

With reference to the above, the Corporation is placed to place this order for dismantling of existing 01(one) number 50 MVA Generator Transformer (BHEL) & retrofitting/installation, testing & commissioning of new 50 MVA Generator Transformer supplied by BHEL at AGBPS, NEEPCO Ltd., Bokuloni, District Dibrugarh, Assam. The rates and terms & conditions of the order are as follows:

Terms and conditions:

1. Scope of works:

- a) Dismantling of existing 50 MVA Generator Transformer (GT).
- b) Dragging of old and dismantled transformer approx. 200 Mtr. and 01 no. Turning and sifting of its accessories from plinth to destined place (Approx. 200 Mtr) & dragging and placing on plinth of newly procured 50 MVA GT (Approx. 200 Mtr) and one Turning.
- c) Hiring DG set for getting 3 phase power supply and minor civil works.
- d) Complete erection, Testing and commissioning of the new 50 MVA GT as supplied by BHEL.

2. Price: The schedule of price is as follows:

Sl. No.	Description	Amount (₹)
1	Basic price for dismantling of existing 01(one) number 50 MVA Generator Transformer (BHEL) & retrofitting/ installation, testing & commissioning of new 50 MVA Generator Transformer	38,11,500.00
A	Discount @1%	38,115.00
B	Total amount after discount	37,73,385.00

Total amount shall be ₹ 37, 73,385/- (Rupees thirty-seven lakh seventy-three thousand three hundred eighty-five) only excluding GST.



ISO 14001: 2015
ISO 9000: 2015
ISO 45001: 2018

नॉर्थ ईस्टर्न इलैक्ट्रिक पावर कार्पोरेशन लि
NORTH EASTERN ELECTRIC POWER CORPORATION LTD
(A GOVT OF INDIA ENTERPRISE)

ASSAM GAS BASED POWER PLANT
BOKULONI, DIBRUGARH, ASSAM, 786191
Email:



3. **GST:** GST shall be paid extra at actual. Present rate of GST is @18%, however, if any change will come on GST rule during execution of work /submission of work bill, the same shall be regularized accordingly. The GSTIN of M/s NEEPCO Ltd. (Assam Gas Based Power Plant) is **18AAACN9991J3ZP**.
4. **Payment Terms:** 100% payment along with applicable taxes & duties shall be made after successful completion of works and against submission GST Invoice in triplicate.
5. **Warranty/Defect Liability Period:** In reference to the Order No. NEEPCO/AGBP/PEM/O&M-01/2020-21/477 dated 15/03/2021, the equipment shall be guaranteed for successful operation for a period of 12 (twelve) months from the date of commissioning or 18 (eighteen) months from date of receipt whichever is earlier.
6. **Schedule of time and work:** To minimize the outage of Generating Unit, effort shall be given for retrofitting/installation, testing & commissioning of the new 50 MVA Generator Transformer (GT) within the shutdown period planned for overhauling works of Generator and Exciter of Unit # 5 to be carried out by BHEL (Hyderabad), tentatively in the 1st week of August 2023. Accordingly, BHEL is requested to discuss mutually with BHEL (Hyderabad) so that both the works could be completed during the shutdown periods of Unit # 5. However, advance intimation shall be given in due time for deputation of your dismantling, erection & commissioning team to carry out the works.
7. **Precautionary measure/protection:** All necessary safety measures are to be taken to execute the works in transformer yard. The Corporation shall not be responsible for any kind of accident and shall not liability to pay any compensation.
8. **Accommodation:** Free accommodation at our site will be provided for the retrofitting/commissioning team during the execution of the works. You are requested to submit the list of manpower with designation for necessary accommodation at site.
9. **Paying Authority:** Dy. Manager (Fin), F & A Wing, AGBP, NEEPCO Ltd., Bokuloni, District Dibrugarh, Assam.

Kindly acknowledge the receipt of this order and convey your acceptance.

Thanking you,

Yours faithfully,

(Dinabandhu Baishya)
DGM (E/M), PEM
AGBPS: NEEPCO Ltd.

Bokuloni, Dibrugarh, Assam.
Mobile No. 9435339966



ISO 14001: 2015
ISO 9000: 2015
ISO 45001: 2018

नॉर्थ ईस्टर्न इलैक्ट्रिक पावर कार्पोरेशन लि
NORTH EASTERN ELECTRIC POWER CORPORATION LTD
(A GOVT OF INDIA ENTERPRISE)

ASSAM GAS BASED POWER PLANT
BOKULONI, DIBRUGARH, ASSAM, 786191
Email:

1325

जयश्री महोत्सव



NIO.

Memo No. NEEPCO/AGBP/PEM/O&M-01/2023-24/49-53

Dated:08/06/2023.

Copy to:

1. The ED (Tech) & Head of Project, AGBP, NEEPCO Ltd., Bokuloni, for kind information. This is as per Approval conveyed through FLCM ID No. 015 Dated. 07/06/2023 against File No. EM/PEM/O&M-01/36/ AGBP/13/04/2023.
2. The DGM (IT), AGBP, NEEPCO Ltd., Bokuloni for kind information and further needful please.
3. The DGM (E/M), Vigilance Wing, AGBP, NEEPCO Ltd., Bokuloni for kind information.
4. The DM (Fin), F & A Wing, AGBP, NEEPCO Ltd., Bokuloni for kind information. This is as per Finance Concurrence FLCM ID No. 014 Dated. 01/05/2023 against File No. EM/PEM/O&M-01/36/ AGBP/13/04/2023
5. Work Order File.

Dy. General Manager (E/M),
Plant Electrical Maintenance Complex

NO: NEEPCO/AGBP/C&I/T-13(C)/2018-19/90NBI155/ Dtd 28/02/2019

To
M/S Willstrong Solutions Pvt Ltd
1-12B, UPSIDC Site - C
Surajpur Industrial Area,
Greater Noida
UP-201307.

E-mail: info@willstrong.in

SUB: P.O for Supply & Services of Up-gradation/Replacement of Vibration monitoring system of GT#1 & 2 by Design, Supply, Installation, testing and commissioning.

Our Ref. Tender No. NEEPCO/AGBP/C&I/T-13(C)/2018-19/NIQ/03 Dated 19/4/2018 & Online Tender Id. 38504

Dear Sir,

Referring to above, Corporation is pleased to place this Purchase order with you for the Up-gradation/Replacement of Vibration monitoring system of GT#1 & 2 by Design, Supply, Installation, testing and commissioning at AGBP, NEEPCO Ltd, Bokuloh, Dibrugarh Assam.

S/N	Item description	Unit Price (Rs)	Qty	Total Amt in (Rs)
1	Field devices	14,50,000.00	02 Set	29,00,000.00
2	Monitoring System	26,64,407.00	02 Set	53,28,814.00
--- Total of Supply in Indian Rs.				82,28,814.00
(Rupees Eighty-Two lakh, Twenty-Eight thousand, Eight hundred and Fourteen) only				
3	Installation & commissioning charges	2,50,000.00	02 Set	5,00,000.00
(Rupees Five lakh) only				

Your Bill of Materials must contain minimum of following items

1) Proximity Probe (5mm) Matrix	26 no
2) Proximiton Matrix	26 no
3) connecting cables Matrix	26 no
4) Seismoprobe Matrix	04 no
5) Monitoring System, Set point system	02 Sets

In addition to above if any materials are required for successful Installation & Commissioning of the complete system must be supplied free of cost by the supplier within the scope of this P.O.



NEEPCO
National Thermal Power Corporation
New Delhi

NEEPCO
National Thermal Power Corporation
New Delhi



Terms & Conditions

- 1) **Price Basis:** Total Price as shown above is in INR on **AGBP, Bokuloni** basis including Packing & forwarding and Freight.
 - 2) **Packing & forwarding:** Inclusive.
 - 3) **Taxes:** The above price is exclusive of Taxes. NEEPCO shall pay GST @ 18% or at actual both on **supply & Services**. Our GST No is 18AAAACN9991J3ZP. Your GST No: 09AABCW1717A1ZR.
 - 4) **Payment Terms:** As per tender & the same is as below
 - A) **For Supply:** 90% payment of supply along with 100% taxes after receipt of material at site and an submission of following:
 - a) Invoice in triplicate
 - b) Delivery Chalan
 - c) Tax/GST Invoice as applicable
 - d) Test certificate.
 - e) Warranty certificate
 - f) Bank details for E payment.
 - B) Balance 10% payment shall be payable only after successful installation & commissioning of the system.
 - For services:** 100% payment with taxes shall be made only after completion of successful installation & Commissioning of the system at site.
- 5. Shipment, Freight & Insurance:** The above price is inclusive of Freight charges up to **AGBP, Bokuloni** and exclusive of Insurance.
- 6) Delivery Period:** The material shall be delivered within 12-weeks from the date of acceptable P.O. The date of dispatch of the materials from the supplier's works shall be considered as date of delivery. However, you are requested to explore the possibility to reduce the delivery period to the possible extent
- 7) Mode of Transportation:** The supplier shall deliver the materials to **The Consignee of NEEPCO at AGBP, Bokuloni, Assam** by any reputed transporter on Freight paid basis. Insurance shall be born by NEEPCO under its open marine insurance policy. Supplier shall inform the consignee well in advance for insurance coverage of the consignment.
- 8) Warranty:** Materials are to be warranted for a period of 18 months from the date of receipt of the materials or 12 months from date of Installation & Commissioning whichever is earlier.
- 9) Fitment:** The supplier must ensure that materials supplied are suitably fit in the purchaser's application. In case of any mismatch, short supply the same must be replaced by the supplier at free of cost.
- 10) Liquidated Damage:** NEEPCO's standard LD clause is applicable which says if the supplier fails to deliver all the materials within the delivery time, NEEPCO's standard LD clause shall be applicable. Accordingly, Reduce the contract price by 1 (half) percent



per week for the whole contract subject to maximum of (10%) percent of the contract value.

11) PBE / SD M/S Willstrong Solutions Pvt. Ltd. shall have to furnish 10% bank guarantee of the Contract value of supply & services. The B.G. shall be valid to cover up warranty period as per referred tender. The contractor shall at his/her own cost get the validity period extension of Bank Guarantee furnished by him/her till the completion of warranty period.

12) Operational Manual: The supplier / contractor shall provide a set of operational/Instruction manual of the Instrument as well as the system.

13) Consignee: - The Sr. Manager (E/M) Material Management Wing (MMW), AGBP, NEERCO Ltd. Ph-(0374) 2825411.

14) Delivery Destination: - Assam Gas Based Power Plant(AGBP), NEERCO Ltd, Bokuloni, District Dibrugarh (ASSAM), PIN- 786-191.

Kindly convey your acceptance of this P.O.

Thanking you

Yours faithfully,

[Signature]
Sr. Manager (E/M) C&I Wing,
AGBP, NEERCO Ltd Bokuloni,
Dibrugarh, Assam.

-----X-----

SERVICE INVOICE

WILLSTRONG SOLUTIONS PVT. LTD.



Willstrong
Livingising Growth

Plot No-128, Block-I, UPSIDC Site-C, Industrial Area, Surajpur, Greater Noida (UP) 201307
Ph: 0120-2560650 CIN: U72300DL2011PTC228496
Email: info@willstrong.in
GSTIN: 09AABCW1717A1ZR

Invoice No: WSPL/19-20/SI-GN007

Invoice Date: 24.06.2019

Customer WO Ref : NEEPCO/AGBP/C&I/T-13(C)/2018-19/90NB1155/419; Dtd : 28/07/2019

WSPL Ref No: OM0036/19-20

WSPL GST No.: 09AABCW1717A1ZR

WSPL PAN No: AABCW1717A

Customer:

"The Sr. Manager (E/M)"

Material Management Wing (MMW),

Assam Gas Based Power Plant (AGBP),

NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin-786191

GSTIN : 18AAACN9991J3ZP

State Code:- 18

S. NO.	Cust. Code	Item Description	SAC	Qty	Unit	Unit Rate (INR)	Taxable Value
1		Installation & Commissioning Charges	998717	2	Set	2,50,000.00	5,00,000.00

Total Invoice Amount in Words :
Rupees Five Lakh & Ninety Thousand Only.

Amount Before Tax	5,00,000.00
Add: CGST @ 9%	-
Add: SGST @ 9%	-
Add: IGST @ 18%	90,000.00
Grand Total (Rs.)	5,90,000.00

E. & O. E.

1. Goods once sold will not be taken back.
2. Interest @ 24% p.a. will be charged if the bill is not paid on due date.
3. Risk & responsibility ceases on delivery to carrier.
4. Subject to Delhi Jurisdiction only.

For Willstrong Solutions Pvt. Ltd.

Authorised Signatory

NO. NEEPCO/AGBP/CAI/T-52/2018-19/1102111/ 373 Dtd 23/11/2018

To

M/S ABB India Ltd

Sy. No. 85/3 to 85/6, Kasaba Hobli,

Basavanahalli Village, Nelamangal

Bangalore-562 123.

Ph: (080)22948929/ 8975, Fax: (080)2294 6600

Kind Attn:- Mr. S. Bhattacharya, e-mail: subhankar.bhattacharya@in.abb.com

SUBJ: Up-gradation of existing AVR to DAVR (Digital AVR) for brushless excitation system in BHEL-make Steam Turbine Generator (STG#2) by Engineering, Design, Supply, Testing, Installation and Commissioning at (AGBP), NEEPCO Ltd.

Our Ref: Tender No. NEEPCO/AGBP/CAI/T-52/2018-19/1102111/373 Dtd 04/10/2018
 → NEEPCO/AGBP/CAI/T-52/2018-19/1102111/373 Dtd 04/10/2018
 → NEEPCO/AGBP/CAI/T-52/2018-19/1102111/373 Dtd 04/10/2018
 → Your offer ref: L1/NDSL/ISSN/RI/002/REP/002 04/10/18.

Dear Sir,

In reference to above the Corporation is pleased to place this Order with you for the supply and services of DAVR (Digital AVR), ABB make for brushless excitation system of STG#2 of AGBP, NEEPCO Ltd.

Terms & conditions:-

1. **Scope of contract:** The scope of supply includes supply of DAVR (Digital AVR) for brushless excitation system for BHEL make Steam Turbine Generator (STG) as per Price Schedule enclosed along with this order. Annexure I
 Scope of services includes dismantling, installation, commissioning and testing of DAVR at AGBP, NEEPCO Ltd.
2. **Price Basis:** Your total price of supply is Rs. 14,50,000.00/ (Rupees Fourteen lakh and Fifty thousand) only including I&P, Insurance but excluding Freight.
 Your total price for Services is Rs. 90,000/- (Rupees Ninety thousand) only.
3. **Payment terms:-**
 - a) For supply (90 % of supply+100% of Taxes) shall be paid after receipt of materials at site in full and good condition & balance 10% is payable only after successful Testtallation & commissioning of the system.
 - b) For Services, 100% + Taxes shall be paid after successful Testtallation & commissioning of the system at site.
4. **Taxes:** GST @ 18% and other taxes as applicable shall be paid extra by NEEPCO as actual. Our GST No: 18AAACN9991J32P.





NEEPCO LTD.
 1000 Avenue, Assam
 781 001, Assam
 www.neepecoltd.com


ASSAM GAS BASED POWER CORP. LTD.
 1000 Avenue, Assam
 781 001, Assam
 www.assamgasbasedpower.com



5. **Shipment, Freight & Insurance:** Your supply Price is inclusive of packing & forwarding, Shipment, Insurance but excluding of Freight. Freight charges shall be paid by NEEPCO at actual subject to submission of documentary evidence.
6. **Delivery Period:** The material shall be delivered within 4-months from the date of techno-commercially accepted P.O. The date of dispatch of the materials from the supplier's works will be considered as date of delivery. However, you are requested to complete the Supply & Services within 10th March 19
7. **Mode of Transportation:** You are responsible for safe transportation of the materials to AGBP, NEEPCO site on freight paid basis which shall be reimbursed at actual.
8. **Services:** Intimation of Site Readiness shall be conveyed and supplier shall complete the Installation, Commissioning and testing within the stipulated time.
9. **Warranty:** 18 months from the date of receipt of materials at site or 12 months from the date of commissioning whichever comes earlier.
10. **Fitment:** M/S ABB must ensure that materials supplied are suitably fit for Up-gradation of existing AVR at AGBP in STG#2. In case of any mismatch, the same must be replaced by M/S ABB at free of cost.
11. **LD clause:** NEEPCO's standard LD clause is applicable and accordingly contract price shall reduce by 1 (half) percent per week because of delay in delivery of the material(s) subject to maximum of (10%) percent of the contract value.
12. **Pre dispatch Inspection and Testing:** Testing of the materials as per relevant standard shall be carried at contractors works. The tests shall be performed in presence of the Corporation's representative. For deputation of an authorized representative for inspection and to witness such tests, advance intimation prior to the tests shall be given to the Corporation. The test certificates are to be forwarded for approval of the purchaser. However witness of tests or approval of tests reports shall not absolve the supplier from its responsibility towards satisfactory fulfillment of contractual obligation.
13. **Consignee:** - The Sr. Manager (E/M), MMW, Ph-(0374) 2525411.
14. **Delivery destination:** Assam Gas Based Power Plant (AGBP), NEEPCO Ltd. Bokuloni, District, Dibrugarh (ASSAM), PIN- 786 191.

Kindly convey your acceptance of this P.O.
 Thanking you

Yours truly,


 Sr. Manager (E/M), CSI Division
 AGBP, NEEPCO Ltd, Bokuloni,
 Dibrugarh, Assam.

Ref. NEEPCC/AGBP/C&I/1-52/2018-19/CONTRACT/233 Annexure-1
 Dtd. 23/11/2018

Schedule of Items & Prices

S/N	Item description	Unit Price in Rs	Qty	Total Amt in Rs
1	Supply of DAVR UNITROL#6080 1) <u>SUPPLY OF DAVR UNITROL#6080 Includes</u> 1.1) CONTROL ELECTRONICS A) CONTROL CHANNEL INCLUDES O CONTROL COMMUNICATION MEASUREMENT BOARD O POWER INTERFACE BOARD O 3-PHASE (6-PULS) THYRISTOR CONVERTER WITH REQUIRED HEAT SINKS AND COOLING FANS) SERVING FOR ALL REQUIRED REGULATION AND CONTROL FUNCTIONS WITH FOLLOWING FEATURES: I BASIC REGULATOR FUNCTIONS I SIGNAL ACQUISITION OF O SINGLE OR 3-PHASE MACHINE TERMINAL VOLTAGE AND CURRENT (M, I) O SINGLE-PHASE MV BUS TERMINAL VOLTAGE AND/OR CURRENT (M, I) O THYRISTOR CONVERTER INPUT VOLTAGE (M _{in}) O THYRISTOR CONVERTER OUTPUT VOLTAGE (M) O THYRISTOR CONVERTER CURRENT (I) FROM CTS AT INCOMING LINES II AUTOMATIC VOLTAGE REGULATION TYPE LEAD, LAG TYPE STA ACC. TO IEEE STD 421.5-2006 II Q AND/OR P DROOP/COMPENSATION (ACTIVE/REACTIVE POWER INFLUENCE) ABSOLUTE Q AND P INFLUENCE INDIVIDUAL ADJUSTABLE II AVR OE LIMITERS AS PER YOUR REFERENCE BID O 2 Stage Field Current Limiter (Ceiling And Delayed Thermal Current Limiting) Delay Selectable: Fixed Time Or Over Current Dependent Inverse, Very Inverse, Extremely Inverse (ANSI, IEC) O 2 Stator Current Limiters: One For Over-Excited And One For Under-Excited Area. During Delay Time No Limiting Function. *Delay Selectable: Fixed Time Or Over Current Dependent Inverse, Very Inverse, Extremely Inverse (ANSI, IEC). Released Only If Machine Is ON.	14,50,000.00	01	14,50,000.00

LINE-

* V/Hz Limiter Delay Selectable: Fixed Time Or Over Current Dependent, Inverse, Very Inverse, Extremely Inverse (ANSI, IEC)

* Q (P) U2 Based Under Excitation Limiter.

* Manual Control (Field Current Regulator FCR) As Per Your Reference Bid

* Manual Limiters: As Per Your Reference Bid.

* Operation Control: 1) Controlling All Auxiliaries Of The Excitation System, 2) Sequence Control Of Whole Excitation System As Per Your Reference Bid.

* Monitoring And Protection Functions: 1) Machine And Bus PT/CT Monitoring, 2) Machine Armature Monitoring, 3) Machine Rotor And Rotor Excitation Monitoring, 4) Self Monitoring (Protection) Etc As Per Your Reference Bid.

1.2) Power Converter (Channel Hardware): 5 Different Converter Frames D1-D5 Cover The Range From 20 To 2000A Dc For AVR And SSS Systems.

1.3) Human Machine Interface (HMI): Service Control Panel (SCP) Is Used For Local Operation Of The Excitation System, Display Of Actual Values, Parameter Settings, Event And Fault Recorder.

1.4) Interface Unit: Combined Input And Output For Interface Digital And Analogue Control Signals Of The Plant Including 12 Digital Input 24/48V, 18 Relay Output, 3 Analogue Input, 3 Analogue Output, 3 PT100 Or 2 PTC I/Is For Transformer Temperature, Ethernet Interface, Serial Link For Insulation Monitor (RS-485).

1.5) Auxiliary Power Supply: Power Supply Schemes Includes Input Coupling Unit And Power Supply Units.

1.6) Field BRK, Suppression & Field Voltage Protection: This Includes 1-DC Brk, 2-Pole (QO2) Type, 40 A, 1-Linear Discharge Resistor (R02).

1.7) Additional Hardware: Shunt A/75 Mw (R06)

1.8) Excitation Transformer (Standby Source Of PMG):

i) Type : Dry Type Cast Resin

ii) Rated Apparent Power: 10 Kvah

iii) Rated Primary Voltage: 415 V

iv) No-Load Secondary Voltage: Bidder To Propose To Meet The Specification.

v) Rated Frequency: 50 Hz.

vi) No Of Phases: 3 Phase.

NO. NEEPCO/AGBP/C&I/T-52/2018-19/0081139/2018 Dtd. 22/11/2018

To
M/S GE Oil & Gas India Pvt. Ltd.
(Div. Bentley Nevada)
A-75/1 CHAKAN MIDC Phase-II
Vasub village, KHED Taluka,
Pune, Maharashtra. Pin-410 501

SUB: P.O for Up gradation of Vibration monitoring system & Temperature Monitoring system of STG#1 & 2. (Supply portion)

Ref: 1) Inv Ref: NEEPCO/AGBP/C&I/T-52/2018-19/139/2018
2) Inv Ref: NEEPCO/AGBP/C&I/T-52/2018-19/139/2018
3) Offer reference: 002522 Rev 02

Dear Sir,

In reference to the above corporation is pleased to place this P.O. for up-gradation of Vibration monitoring system & Temperature Monitoring system of STG#1 & 2 at AGBP, NEEPCO Ltd, Bokulani.

a) Basic Price of P.O.

1) Field devices	2-SET	99,98,576.00
2) Monitoring System	2-SET	
Basic Price for 02(two) units.		99,98,576.00
Rs 99,98,576/- (Rupees Ninety-Nine Lacs, Ninety-Eight thousand, Five hundred and Seventy Six) only.		

b) Terms & Conditions are as below:

- 1. Price Basis:** - The price indicated above is Ex-work (Pune) basis including packing and forwarding but excluding any tax, duty or levy that may be imposed in India and which, if applicable, shall be borne by NEEPCO at actual.
- 2. Taxes:** GST @ 18% shall be paid extra against tax invoice. Our GST no is 15AAACN9991J3ZP.
- 3. Payment terms:** - 90% payment against dispatch document through bank with taxes and balance 10% is payable after receipt of material in full and good conditions through RTGS/NEFT within 30 days of receipt of material. Bank charge is chargeable to the supplier account. Dispatch document must include copy of all document including Consignment note, challan, Warranty certificate etc.
- 4. Freight:** Supplier shall have to send the material to AGBP, NEEPCO through reputed transporter on freight paid basis and the same shall be reimbursed at actual against documentary evidence.

ANNEXURE: A

Bill of materials

S/N	Part No	Item Description	Qty for 2 m/ck
a) Monitoring system:			
01	3500/05	OS00 19" Rack	02
02	3500/16	Power supply module	02
03	3500/22M	Transient data Interface modules	02
04	3500/25M	Enhanced Keyphasor modules for ST- Keyphasor	02
05	3500/45	Proximator/Seismic monitor for differential & casing expansion	02
06	3500/42M	Proximator /Seismic monitor for ST front vibration/rear vibration/ ST axial thrust- dial & Eccentricity	10
07	3500/65	ST-front/rear bearing temperature module	02
08	3500/33	16 channel relay card	02
09	3500/92	Compton module Ethernet	02
10	3500/94M	VGA display	02
11	3500/01	Configuration software	01
12	Bently Manuals		01
b) Field devices:			
01	330105-02-12-10-02- 05	Proximity Probe (5mm)	12x2=24
02	330103-040-00-05	Proximator	12x2=24
03	330180-05-05	Extension Cable	12x2=24
04	26530-00-00-03-025- 035-00-03-00	Probe Housing	08x2=16
05	9200-09-15-03-00	Velocity Probe	08x2=16
06	84660-30	Seismic probe Cable	05x2=10
07	330705	11 mm Reverse mounting Probe	02x2=04
08	330780-50-05	Proximator	02x2=04
09	330730-040-00-05	Extension Cable	02x2=04
10	24765-02-01	LVDT	01x2=2

20/11/2018



NO. NEPCO/AGBP/CAI/T-52/2018-19/334

Dtd 27/12/2018

To

M/S GE Oil & Gas India Pvt. Ltd.

(Div Bently Nevada),

A-78/1, CHAKAN MIDC Phase-II,

Vastak village, KHED Taluka,

Pune, Maharashtra, Pin-410 501

SUB: Supervision of Installation, Configuration and Commissioning of Vibration monitoring & Temperature Monitoring system of STG#1 & 2 (Service portion of up gradation)

Ref: - 1) Offer reference: 1912322 4th Qtr Services

2) NEPCO/AGBP/CAI/T-52/2018-19/00NB1129/245 Dtd 22/11/2018

Dear Sir,

In reference to the above we are pleased to place this work order with you for Supervision of Installation, Configuration and Commissioning of Vibration monitoring & Temperature Monitoring system of STG#1 & 2 (Service portion) of AGBP, NEPCO Ltd, Assam.

a) Basic Price of W/O

Particulars	Qty	Total basic price (Rs)
Supervision of Installation, Configuration and Commissioning of Vibration monitoring & Temperature Monitoring system of STG#1 & 2	2-SET	9,47,783.65
~Rs. 9,47,784/- (Rupees Nine Lakh, Forty Seven thousand, Seven hundred and Eighty Four) only.		

b) Terms & Conditions are as below:-

- 1. Price Basis** - The Price indicated above is Basic price in INR for two units.
- 2. Taxes** GST @ 18% or at actual shall be extra to be paid by NEPCO.
- 3. Payment terms**:- 100% payment after successful installation & commissioning of the systems within 30 days through RTGS/NEFT against submission of 1) Invoice in triplicate, 2) Completion certificate, 3) Supplier's bank details etc. Bank charges if any is chargeable to the supplier account.



4 **Paying Authority** The Sr. Manager (P&A) AGBP, NEEPCO Ltd Bokuloni, Dibrugarh, Assam. Pin: 786191.

- 5 **Others:**
- a) To & fro air fare is inclusive.
 - b) Local conveyance is inclusive.
 - c) Boarding & lodging at NEEPCO's Guest House is chargeable if requested.

for

Thanking you.

Yours faithfully,



Sr. Manager (E/M) C&I Division,
 AGBP, NEEPCO Ltd, Bokuloni





TAX INVOICE

SHIPPING ADDRESS
 GE Oil & Gas India Pvt. Ltd.,
 BNSS Div.
 (formerly Dresser Valve India
 Pvt. Ltd.)
 A-78/1, MIDC CHAKAN
 Industrial Area, PHASE II,
 Vasuli, Khed, Pune
 Maharashtra - 410501, India

Ship To
 NORTH EASTERN ELECTRIC POWER
 CORPORATION LIMITED
 ASSAM GAS BASED POWER PLANT
 BOKULONI DIST
 DIBRUGARH, 786191 Assam
 India
 Phone: 03742825216
 GSTIN No : 18AAACN9991J3ZP

INVOICE NO. Z65211901619	INCOTERMS EXW: Pune
CUSTOMER ORDER NO. PO:NEEPCOIAGBPVC&IT-52/2018-19/334	
SELLER ORDER NO. 75101932	WAY BILL NO.
PACKING LIST NO.	PAYMENT TERMS Within 35 days Due net
REMIT TO GE Oil & Gas India Private Limited c/o: HSBC Acct:166385823001 (INR) SWIFT: HSBCIN98 IFSC: HSBC0110002 25 Sanskhamba Road New Delhi Delhi India	
INVOICE DATE 11-Nov-2019	SELLER GSTIN No. 27AAACD219L12C
NO. OF PKGS	GROSS WEIGHT
Seller PAN No. AAACD195L	

ITEM NO.	QTY.	UOM	DESCRIPTION	UNIT PRICE	NET TOTAL
1000	1	EA	<p>Kind Attn.: Mr. O.Ering opang.erino@gmail.com 9435339693</p> <p>Engineer Visited : Mr. Manpreet Singh</p> <p>SERVICES PER Supervision of Installation, HSN Code: 999599 IN: Integrated GST @18.00% Configuration and Commissioning of Vibration Monitoring & Temperature Monitoring system of STGW1 & 2</p>	947,783.65	947,783.65
<p>TOTAL BEFORE TAX (INR) :</p> <p>TOTAL IN: Integrated GST (INR) :</p> <p>INVOICE TOTAL (INR) :</p>					<p>947,783.65</p> <p>170,601.06</p> <p>1,118,384.71</p>
<p>AMOUNT IN WORDS : ELEVEN LAKH EIGHTEEN THOUSAND THREE HUNDRED EIGHTY FOUR Rupees SEVENTY ONE Paise only</p> <p>If paying by electronic funds transfer, please include invoice number or payment reference when making payment. Additionally, forward the payment remittance advice/memo to Remit.OilandGas@ge.com. If paying by check, please include remittance advice with payment to the Lockbox.</p>					

BILL TO
 NORTH EASTERN ELECTRIC POWER
 CORPORATION LIMITED
 ASSAM GAS BASED POWER PLANT
 BOKULONI DIST
 DIBRUGARH, 786191 Assam
 India

Bill To GSTIN No
 18AAACN9991J3ZP

266722

Original For Recipient

TAX INVOICE

INVOICE NO.
ZS6211901619

ITEM NO.	QTY.	U/M	DESCRIPTION	UNIT PRICE	NET TOTAL
			<p>Whether reverse charges are applicable(Y/N):</p> <p>(Authorized Signatory)</p> <p>_____</p> <p>For and on behalf of GE Oil & Gas India Pvt Ltd BNSS Div.</p> <p>Place of Supply : DISRUGARH,Assam</p>		

Original For Receipt



TAX INVOICE

SHIPPING ADDRESS
 GE Oil & Gas India Pvt. Ltd.-
 BNSS Div.
 (formerly Dresser Valve India
 Pvt. Ltd.)
 A-78/1, MIDC CHAKAN
 Industrial Area, PHASE II,
 Vasul, Khed, Pune
 Maharashtra - 410501, India

Ship To
 NORTH EASTERN ELECTRIC POWER
 CORPORATION LIMITED
 ASSAM GAS BASED POWER PLANT
 BOKULONI DIST
 DIBRUGARH, 786191 Assam
 India
 Phone: 03742826216
 GSTIN No : 18AAACN9991J3ZP

INVOICE DATE
 11-Nov-2019

NO. OF PKGS GROSS WEIGHT Seller PAN No.
 AAACD199L

INVOICE NO. 265211901619	INCOTERMS EXW: Pune
CUSTOMER ORDER NO. PO:NEEPCO/AGBPVCS/IT-62/2018-19/334	
SELLER ORDER NO. 75101932	WAY BILL NO.
PACKING LIST NO.	PAYMENT TERMS Within 30 days Doc recd
REMIT TO GE Oil & Gas India Private Limited c/o: HSBC Acct:16638623001 (INR) SWIFT: HSBCIN33 IFSC: HSBC0110002 25 Banskhermha Road New Delhi Delhi India	
SELLER GSTIN No. 27AAACD1199L1ZC	

ITEM NO.	QTY.	UOM	DESCRIPTION	UNIT PRICE	NET TOTAL
1000	1	EA	<p>Kind Attn.: Mr. O.Ering opang_erling@gmail.com 9435339633</p> <p>Engineer Visited : Mr. Manpreet Singh</p> <p>SERVICES PER Supervision of Installation, HSN Code: 998539 IN: Integrated GST @18.00% Configuration and Commissioning of Vibration Monitoring & Temperature Monitoring system of STG#1 & 2</p>	947,783.65	947,783.65
<p>TOTAL BEFORE TAX (INR) :</p> <p>TOTAL IN: Integrated GST (INR) :</p> <p>INVOICE TOTAL (INR) :</p>					<p>947,783.65</p> <p>170,601.06</p> <p>1,118,384.71</p>
<p>AMOUNT IN WORDS : ELEVEN LAKH EIGHTEEN THOUSAND THREE HUNDRED EIGHTY FOUR Rupees SEVENTY ONE Paise only</p> <p>If paying by electronic funds transfer, please include invoice number or payment reference when making payment. Additionally, forward the payment remittance advice/memo to 'Remit.OilandGas@ge.com'. If paying by check, please include remittance advice with payment to the Lockbox.</p>					

BILL TO
 NORTH EASTERN ELECTRIC POWER
 CORPORATION LIMITED
 ASSAM GAS BASED POWER PLANT
 BOKULONI DIST
 DIBRUGARH, 786191 Assam
 India

Bill To GSTIN No
 18AAACN9991J3ZP

260722

Triplicate for Supplier

TAX INVOICE

INVOICE NO.
ZB5211901619

ITEM NO.	QTY.	U/M	DESCRIPTION	UNIT PRICE	NET TOTAL
<p>Whether reverse charges are applicable(Y/N):</p> <p>(Authorized Signatory)</p> <p>_____</p> <p>For and on behalf of GE Oil & Gas India Pvt Ltd BNSS Div.</p> <p>Place of Supply : DIBRUGARH, Assam</p>					

Triplicate for Supplier

VMS
STG#2

NO.NEPCO/AGBP/G&I/T-52/2019-20/293 Dtd.13/3/2020.

To
M/S GE Oil & Gas India Pvt. Ltd.
(D/o Bently Nevada)
A-78/1, CHAKAN MIDC Phase-II,
Kasali village, KHED Taluka
Pune Maharashtra Pin-410 501

SUB: P.O for Up gradation of Vibration monitoring & Temperature monitoring system of STG# 2-(Supply portion).

Ref: Order Ref. NEPCO/AGBP/G&I/T-52/2019-20/293 Dtd. 13/03/2020
in Offer reference No. and dt. 24/1/2020

Dear Sir,

In reference to the above Corporation is pleased to place this P.O for Up gradation of Vibration monitoring & Temperature monitoring system of STG# 2 of AGBP, NEPCO Ltd, Bokulni. Basic Price and terms & conditions of P.O are as below.

1) Field devices (18 no Proximity Probe (5mm)+ 13 no. Proximity+ 13 no connecting cables + 2 no Seismoprobe)	01-SET	49,99,288.00
2) Monitoring System	01-SET	49,99,288.00
Basic Price for 01(One) sets		49,99,288.00
Rs. 49,99,288/- (Rupees Forty Nine Lac, Ninety-Nine Thousand, Two hundred and Eighty-Eight) only		

b) Terms & Conditions are as below:-

- 1. Price Basis** - The Price indicated above is Ex-work (Pure) basis including packing and forwarding but excluding any tax, duty or levy that may be imposed in India and which, if applicable, shall be borne by NEPCO at actual.
- 2. Payment terms** - 90% payment against dispatch document through bank with taxes and balance 10% is payable after receipt of material in full and good conditions through RTGS/NEFT within 30 days of receipt of material. Bank charge is chargeable to the supplier account. Dispatch document must include copy of all document including Consignment note, challan, Warranty certificate etc.
- 3. Freight** Supplier shall have to send the material to AGBP, NEPCO through reputed transporter on freight paid basis and the same shall be reimbursed at actual against documentary evidence.
- 4. Insurance** Prior to dispatch Supplier shall inform to The DGM (E/M), MMW, AGBP for insurance coverage of the consignment. Accordingly The DGM

NEEPCO Ltd. Bokuloni, Dibrugarh, Assam. Pin: 786191
 NEEPCO Ltd. Bokuloni, Dibrugarh, Assam. Pin: 786191
 NEEPCO Ltd. Bokuloni, Dibrugarh, Assam. Pin: 786191
 NEEPCO Ltd. Bokuloni, Dibrugarh, Assam. Pin: 786191
 NEEPCO Ltd. Bokuloni, Dibrugarh, Assam. Pin: 786191
 NEEPCO Ltd. Bokuloni, Dibrugarh, Assam. Pin: 786191




- (E/M) MMW, AGBF shall make necessary arrangement for transit insurance coverage under NEEPCO's open marine insurance policy.
5. **LD clause:** An amount of 0.5% of Contract value per week shall be deducted from the basic value of P.O subject to maximum of 5% of the basic value of P.O. for delay in delivery of the material. LD shall be the sole and exclusive remedy for delay in delivery.
 6. **PBG:** 10% of basic value for which Supplier shall have to submit BG of Nationalized Bank in India, BG format shall be mutually discussed and agreed.
 7. **Delivery period:** The material shall be delivered within 26- weeks from the date of receipt of confirmed P.O.
 8. **Warranty:** Warranty coverage of the materials shall be 24 months from date of supply or 18 months from the date of commissioning whichever is earlier. Seller shall not be responsible for removal of Buyer's facility.
 9. **Delivery destination and Consignee:** The DGM, (E/M), MMW, AGBF, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin: 786191
 10. **Paying Authority:** The DGM, (FAA), AGBF, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin: 786191
 11. **Bill of materials shall be as per Annex: A**

All other terms & conditions are as per your offer and both way e-mail communications. Kindly convey your acceptance to the Purchase Order and execute the same as early as possible.

Thanking you

Yours faithfully,


 DGM (E/M) C&I Division,
 AGBF, NEEPCO Ltd, Bokuloni

-----X-----

ANNEXURE A

Bill of materials

Sr No	Part No	Description	Qty for 1 machine
Steam Turbine Transducer			
01	330105-07-12-10-02-05	Proximity Switch	10
02	330130-040-00-05	Proximit	10
03	330180-50-05	Extension Cable	12
04	330101	Axial Sensor	245-07
05	26530	Probe Housing	08
06	5200-05-15-03-00	Velocity Probe	08
07	330705	11 MM Reverse Mount Probe	02+10-04
08	330780-60-05	Proximeter	02
09	330730-040-00-05	Extension Cable	02
10	24765-02-01	LVDI	01+01+02
Steam Turbine Monitoring System			
01	3500-05	3500 19" Rack	01
02	3500-15	3500 Redundant Power Supply	01
03	3500-22M	3500 Transient Data Interface Module	01
04	3500-25M	3500 Key Phase Module	01
05	3500-45	3500 Expansion Module	01
06	3500-42M	3500 Vibration Module	02
07	3500-55	3500 Temperature Module	01
08	3500-33	3500 16 Channel Relay Card	01
09	3500-02	3500 MODBUS Comm Module	01
10	3500-04M	10" Dcila-Panel Mount	01

[Handwritten signature]

HM 1
GT # 5, 6

Toward file

P.O. @ 92111111
7838010010

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(विद्युत) सीएल २०१०

North Eastern Electric Power Corporation Limited,
10000 West 10th

असम गैस बेस्ड पावर प्लांट, का सॉल्यू प्रमुख

Assam Gas Based Power Plant, O/c the Head of Project

द्वारा असम गैस डेवलपमेंट

10000 West 10th
10000 West 10th
10000 West 10th

No. NEEP/CO/ACBP/PHOP/2010/15-118/004

Date: 25/06/2010

MS BHEL Ltd Gas Turbine Services Pvt Ltd
21, Ad & AI, Quarters 1, 17th floor
Cyber Towers, Malabar,
Hyderabad, Telangana,
Pin - 500 081

Re: NEEP/CO/ACBP - Purchase order for Upgradation of HMs of Main Vm-Circle system of WBCL make GTG # 5 & 6

- 1. Your letter No. Q18/001 Dated 14/06/2010
- 2. Our letter No. NEEP/CO/ACBP/PHOP/2010/15-118/004 Dated 01/06/2010
- 3. Your letter No. Q48/001/2010 Dated 12/06/2010
- 4. Your Email Dated 24/06/2010
- 5. Our Email Dated 29/06/2010
- 6. Your Email Dated 28/06/2010
- 7. Our Email Dated 14/08/2010
- 8. Your Email Dated 14/08/2010

Dear Sirs

With the above references, the Corporation is pleased to place this P.O. for supply of materials for Upgradation of HMs Main Vm-Circle system of WBCL make GTG # 5 & 6 of ACBP on the following terms & conditions

Terms & Conditions:

1. **Scope of Contract:**
The scope shall include supply of materials for Upgradation of HMs Main Vm-Circle system of WBCL make GTG # 5 & 6 as detailed at Schedule of Items & Prices (Annexure-I) attached along with this order.
2. **Price Basis:**
The prices for supply of the materials as detailed at Schedule of Items & Prices (Annexure-I) are US \$ 1,18,000.00 on FCA-2010 on High Sea Sale basis from USA or any other GE Warehouse located in Europe, which is inclusive of freight charges up to nearest port of export. The prices shall remain firm till completion of delivery. Payment shall be made in Indian Rupees based on the exchange rate prevailing on the date of High sea sale. However, credit date for exchange rate conversion shall not be later than the last date of shipment dispatch as per purchase order.
3. **Payment terms:**
For imported items mentioned at Annexure-I, 100% (one hundred percent) payment through NEFT/RTGS after receipt of materials at site in full and good condition and incorporation of the following documents:
 - (a) Original invoice
 - (b) Airway bill copy / Bill of lading
 - (c) High Sea Sale Agreement
 - (d) Packing list
 - (e) Insurance cover note

This is for
reference only

10. Certificate of Origin Form (C/O):

200. Manufacturer's certificate (Form C/O)

As per procedure on C/O Bill and C/O Bill, European Union goods, airfreight upto 1000kg Airport shall be V. NEEPCO's account. Customs clearance and Port/Porters/Chow shall be arranged by NEEPCO. For details at NEEPCO ACOW site.

4. Taxes & Duties:

Taxes mentioned in Schedule of Items and Prices (Appendix F) do not include any tax, duty or levy. Air taxes, duties & levies, if applicable, shall be reimbursed to NEEPCO on receipt of invoice and/or other documentary evidence to the effect that the same have actually been paid by you. Customs clearance for the materials shall be by NEEPCO.

5. Transit Insurance:

The insurance during transit shall be taken by M/S BGSIS in the name of NEEPCO from any Indian Insurance Co. The insurance shall cover the shipment against loss or risk from the port of origin to NEEPCO's warehouse at ACOW plant site. However, the duration of insurance coverage shall expire in any case on completion of 60 (sixty) days after discharge of the goods at Indian port. NEEPCO shall settle claim, if any, directly with the insurance company. The original insurance policy shall be submitted to NEEPCO within 2 (two) weeks from date for the purpose of settling claim, if any, with the underwriter. The insurance charges shall be reimbursed to BGSIS in full against documentary evidence.

6. Delivery period:

The material shall be delivered within 24 weeks after receipt of technically and commercially cleared P.O. and shall be received from the date of receipt of order at BHEL, GE Gas Turbine Services.

7. Mode of Delivery:

Delivery of the imported materials shall be on High Sea sales basis. Initially M/S GE, USA shall consign the imported materials in the name of M/S BGSIS. After loading up the material in Ship/Air, the material will take from BGSIS to NEEPCO by endorsing the documents like Bill of Lading / AWB along with invoice etc.

A separate agreement for High Sea sales shall be executed between BGSIS and NEEPCO. All separate communications shall be addressed to correct addresses about such transportation and with this frequency the Tariffs/charges will be offered to NEEPCO at High Seas. NEEPCO will arrange about transportation from Kolkata Airport to NEEPCO Plant after Custom clearance.

8. Packing & Marking:

Manufacturer's standard packing shall be applied. Following particulars shall be marked on each box/crate:

- (a) Purchase Order number
- (b) Consig number with dimension and weight
- (c) Country of origin
- (d) Consignee name
- (e) Port of discharge

9. Warranty:

All the materials supplied shall be guaranteed against any manufacturing defect or faulty workmanship for a period of 12 (twelve) months from the date of installation or 18 (eighteen) months from the date of supply whichever ever is earlier.

10. Shipping Documents:

Copies of shipping documents shall be forwarded to the following offices in advance:

- (a) The ordering authority
- (b) The Consignee, NEEPCO (to: OS-1, Mahatma Civic Centre, M/S VIP Road, CIT Scheme No. VII M, P. O. Kankurachhi, Kolkata - 700 054. Phone: 091 033-2385434)

11. Port of Embarkation:

Any ESA / European Port / airport

12. Port of Entry:

As per the choice of BGSIS

13. Ultimate Consignee:

The OGM (F-3)
Material Management Wing
Assam Gas Engine Power Plant
No. 3 Bakura Stage

Dist. Dibrugarh, PIN - 786121, Assam

14. Paying Authority:

The DGM (EM)
Assam Gas Based Power Plant (AGBP)
No. 3 Bokulom Village,
Dist. Dibrugarh, PIN - 786121, Assam

15. Address for correspondence:

All correspondence in respect of this order shall be made with -
The Chief General Manager & Head of Project,
Assam Gas Based Power Plant (AGBP) Ltd
No. 3 Bokulom Village,
Dist. Dibrugarh, Assam - 786121
Fax No. 0364-252221

The Assam Gas shall advise the entry date, place and time of office, where the consignment is to be cleared. This will enable Assam Company to make cargo arrival notes to your port office. Address of our Kolkata Port office is given above.

The Assam Gas should ensure a free access to the DGM (EM) Assam Gas Based Power Plant (AGBP) Ltd, in port which will help in correct assessment of duty. Pack to be received clearly marks the correct physical dimensions of the package. It will be an aid to clear.

Kindly acknowledge receipt of this order and return your acceptance please.

Thanking you,

(For Assam Gas Based Power Plant (AGBP) Ltd)

Yours faithfully,

DGM (EM)
For & on behalf of
Chief General Manager & Head of Project

NO:

Memo No. NEEPCC/AGBP/HOP/2004-05/177/Regd/10

Dated 29/05/2004

Copy to

- 1. The Director (Tech), NEEPCC Ltd, Dispur, for kind perusal (for non reference to his approval) Dated 27/05/2004 forwarded vide E-mail dated 27/05/2004 to DGM (EM)
- 2. The Executive Director (ADM), NEEPCC Ltd, Dispur, for kind perusal
- 3. The GM (F), NEEPCC Ltd, Dispur, for kind perusal
- 4. The DGM (F), AGBP, NEEPCC Ltd, Bokulom, for kind perusal and records please. Enclosed a copy of the approval of D (T) Dated 27/05/2004 and Finance consentancy.
- 5. The DGM (EM), CS&P, AGBP, NEEPCC Ltd, Bokulom, for information please
- 6. The DGM (EM), MMV, AGBP, NEEPCC Ltd, Bokulom, for information and necessary action please.
- 7. The DGM (Finance), AGBP, NEEPCC Ltd, Bokulom, for information please.
- 8. The Coordinator, NEEPCC Ltd, USA, Maranda 3/15, VSP Road, G.T Scheme No. 54, M.P.C. Kankurgachi, Kolkata - 700054 for information and necessary action please.

DGM (EM)
For & on behalf of
Chief General Manager & Head of Project

P.O. No. WEP/CO/AGBT/HOP/2020-21/W/118/024 Dated 29/05/2020

SCHEDULE OF ITEMS & PRICES

SL NO	DESCRIPTION OF ITEMS	QNTY	PRICE in US \$
1	<p>Commercial grade HMI Terminal for HMI or HM computer per HMI unit (HMI2 Standard) which includes the following items as per BBO</p> <ul style="list-style-type: none"> • Windows 10 IoT • Microsoft – I, T, A – 431 Item, 3 yr work class license & T, I, T, A – 444 Item • Xeon Processor (3.5-4.0 GHz) Quad Core 12M Cache, 3.50 GHz • 8TB Two 256GB SATA Solid State Drives – For Operating system, license file and • Two 8GB DDR4 SDRAM (16GB) in Dual in-line • 2 x 4GB RAM module • Factory pre-installed • 1 x external USB port • 1 x RS-232 serial port • PS/2 Ports • 4 x RJ 45 Ethernet ports • DVD – RW • 1 – PCIe Slot available for optional card • 1 – PCI slot • Keyboard (USB) • Mouse (USB) • Auto setting 750W Power Supply (110-220 VAC, 594W 80-90% Efficient Power Supply) • Temp rating: Operating: 5° to 35°C (40° to 95°F) / Non-Operating: -40° to 60°C (-40° to 140° F) • Humidity: Operating: 5% to 25% relative humidity, non-condensing / Non-Operating: 5% to 80% relative humidity, non-condensing • M.2 NVMe – Two, L2M Dual Port Ethernet • 50' section of CAT6 Ethernet cables with RJ45 connectors (100% 4) • Windows 10 with REDUNDANCY ADVANCED MHWFR 6.2 and Workstation GT 1.0 or higher • Microsoft Excel and Word • SOPHOS Antivirus Software • Acronis Backup & Restore Software • Documentation • English Language 	2 Nos	11800000
2	24 inch LED Monitor per HMI	2 Nos	
3	<ul style="list-style-type: none"> • ENGINEERING OPERATOR WORKSTATION with per BBO software per HMI • License Fee per HMI 	2 Nos	

103/201/2016

*103/201/2016
@ 25/-
R. P. S. S. S. S.*

[Signature]

4	Engineering and software update fee (RM)	2 Nos	
5	Network Switches	4 Nos	
6	Server Rackcase (not for Core and cabinet for DC)	1 No	
7	Multi User Configuration for (per) 5 user	7 No	

USD Dollar One Hundred Eighteen Thousand only.

[Handwritten signature]

12
18/08/2020

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
 North Eastern Electric Power Corporation Limited,
 (High Safety Category - 1, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट का सर्वेय प्रमूख
 Assam Gas Based Power Plant, D/o the Head of Project
 डिब्रुगढ़, असम, भारत, Dibrugarh (Assam)

REG NO. - 2011
 HD 1401 2210
 CHMS 4001 2210

Ref: NEEPCC/AGBP/HR/020-2/15/1/18/17/19

Date: 23/08/2020

To: M/S BHEL, Gas Turbine Services Pvt. Ltd.
 A1, A2 & A3, Quarters, 1st Floor,
 Cyber Towers, Manasahi,
 Hyderabad, Telangana
 Pin - 500 081

Re: NEEPCC/AGBP - Work Order for Upgrade of HRMS Maximo Control system to Windows 10 of BHEL, make CTG 4.5 & 6

- 1. Your letter No. 019-0026 Dated 11/08/2020
- 2. Quotation No. NEEPCC/AGBP/CA/1-78/2020-21/ Quoted 14/08/2020
- 3. Your letter No. 001/00012/2019/0000070 dated 02/08/2019
- 4. Your Email Dated 18/08/2020
- 5. Our Email Dated 23/08/2020
- 6. Your Email Dated 29/08/2020
- 7. Your Email Dated 29/08/2020
- 8. Our Email Dated 14/08/2020
- 9. Your Email Dated 14/08/2020

DEFINITION

With the above refer to the Contract, it is agreed to make an advance Order for Upgrade services for degradation of HRMS Maximo Control system to Windows 10 of BHEL, make CTG 4.5 & 6 of AGBP as per following terms & conditions.

Terms & Conditions

1. **Scope of Contract**
 The scope shall include site work for installation and commissioning of degradation of HRMS Maximo Control system of BHEL, make CTG 4.5 & 6. NEEPCC will provide accommodation at site and service for speed transfer to NEEPCC Technical Supervisor.
2. **Price Basis**
 The prices for site services for installation and commissioning of degradation of HRMS Maximo Control system of BHEL, make CTG 4.5 & 6 is Rs. 8,00,000 (Rupees Eight Lakhs only) excluding of GST.
3. **Payment terms**
 Service charges: 100% payment along with taxes and duties shall be released within 7 days of installation and commissioning of the system through the bank against presentation of the following documents:
 - (i) BQ/TS detailed invoice & invoice
 - (ii) Work completion certificate duly signed by NEEPCC
 - (iii) Bank details for payment
 Bank charges shall be its respective account i.e. BQ/TS bank charges to BQ/TS account and NEEPCC bank charges to NEEPCC account.
4. **Taxes & Duties**
 Actives shall be paid extra as applicable. The present rate of GST is 18%.

- 4. **Completion period**
The work shall be completed within 12 days from the date of starting of work.
- 5. **Paying Authority**

The DGM (FM),
Western Gas Based Power Plant
No.2 Bokard Village
Dist. Dibrugarh, PIN - 786141 Assam

- 6. **Address for correspondence**
All correspondence in respect of this order shall be made with -
The Chief General Manager & Head of Project
Western Gas Based Power Plant, NEEPSCO Ltd
No.3 Bokard Village
Dist. Dibrugarh, Assam, PIN - 786141
(Fax No. 0374-250217)

- 7. **Apprentice, if any**
Apprentice Form, wherever applicable, may follow.

Kindly acknowledge receipt of this work order and convey your acceptance/assent
Thru-NEEPA.

15/04/2014

DGM (FM)
For & on behalf of
Chief General Manager & Head of Project

RD

Memo No: NEEPA/2014/2500/0002/2/19/1504214/2/18
Date: 15/04/2014

201404150000

- 1. The Director (Tech), NEEPSCO Ltd. Shriang for kind perusal. - The link reference to the approval dated 07/04/2014, conveyed vide E-mail of GM (CSM) dated 07/04/2014.
- 2. The Executive Director (CSM), NEEPSCO Ltd. Shriang for kind perusal.
- 3. The GM (FM), NEEPSCO Ltd. Shriang for kind perusal.
- 4. The DGM (FM), ACBP, NEEPSCO Ltd. Shriang for kind perusal and receipt. Please Enclose a copy of the approval of U/T dated 07/04/2014 with your communication.
- 5. The DGM (FM), CSBP, ACBP, NEEPSCO Ltd. Shriang for information please.
- 6. The DGM (Finance), ACBP, NEEPSCO Ltd. Shriang for information please.

15/04/2014
DGM (FM)
For & on behalf of
Chief General Manager & Head of Project

AVR to
DAVR GT#5,6

NO: NEEPCO/AGBP/C&T/T-55/2020-21/90NBC110/161 Dtd 19/11/2020

To
M/S ABB India Ltd.
Sv No 88/3 to 88/6, Koraba Hothi
Basavanahalli Village, Nelamangudi
Bangalore-562 123. Ph (080)22948929/ 8925, Fax (080)2294 8600
Evd. Attn: Mr.S. Bhattacharya, e-mail: srikankar.bhattacharya@in-abb.com.

SUB: Up-gradation of existing AVR to DAVR (Digital AVR) for brushless excitation system in BHEL-make Gas Turbine Generators (GT# 5 & 6) by Engineering, Design, Supply, Testing, Installation and Commissioning at (AGBP), NEEPCO LTD.

DATE: 19/11/2020
NO: NEEPCO/AGBP/C&T/T-55/2020-21/90NBC110/161
Dtd 19/11/2020

Dear Sir,

In reference to above the Corporation is pleased to place this Order for the supply and services of DAVR (Digital AVR) ABB-make for brushless excitation system of Gas Turbine Generators# 5&6 at AGBP, NEEPCO Ltd.

Terms & Conditions:

- 1. Scope of contract:** The scope of supply includes supply of 02(two) no DAVRs (Digital AVR) for brushless excitation system for BHEL-make Gas Turbine Generators (GT# 5 & 6) as per below Price Schedule. The LIMITAQOL No080 DAVR shall have characteristics and materials as per Annexure-I. Scope of services includes installation, commissioning and testing of 02(two) no DAVRs at AGBP, NEEPCO Ltd.

2. Price Basis - Your total price of supply & services are as below

Sr	Item description	Unit Price (Rs)	Qty	Amount (Rs)
A	Supply of DAVR for GT#5 & 6 as per Annexure A.	16,45,000/-	02-sets	32,90,000.00
Rs. 32,90,000.00/- (Rupees Thirty-Two lakh and Ninety thousand) only including P&F but excluding Freight & insurance.				
B	Installation, commissioning and testing charges of DAVR.	2,00,000/-	02 set	2,00,000.00
Rs. 2,00,000/- (Rupees Two lakh) only.				



3. Payment terms

- a) 70% payment with 100% taxes and duties shall be paid after receipt of materials at site within 15 days. Balance 10% payment shall be made after successful commissioning or within 3 months from the date of supply, whichever is earlier.
- b) Payment for services along with taxes shall be made after completion of job & on submission of service invoices, Completion certificate etc.

4. Taxes: GST @ 18% and other taxes as applicable shall be paid extra by NEEPCO at actual. Our GST No. 18AAACN9991J32P GST No of ABB. 29AAACA3814A81Z4.
5. Shipment, Freight & Insurance: Your supply Price is inclusive of packing & forwarding, but excluding of freight & Insurance. Freight charges shall be paid by NEEPCO at actual subject to submission of GST invoice of transporter.
6. Delivery Period: The material shall be delivered within 3(three) months from the date of techno-commercially accepted P.O. and approval of final drawing. The date of dispatch of the materials from the suppliers works will be considered as date of delivery. However, you are requested to complete the Supply & Services within 10th February 2020 for final completion of the work within this fiscal year.
7. Mode of Transportation: You are responsible for the safe transportation of the materials to ASBP, NEEPCO site on freight paid basis which shall be reimbursed at actual.
8. Services: Intimation of Site Readiness shall be conveyed and supplier shall complete the Installation, Commissioning and testing within the stipulated time.
9. Warranty: 12 months from the date of commissioning or 36 months from the date of shipment of equipment whichever is earlier.
10. Fitment: M/S ABB must ensure that materials supplied are suitably fit for Up-gradation of existing AVR at In Gas Turbine Generators# 5&6 at ASBP, NEEPCO Ltd. In case of any mismatch, the same must be replaced by M/S ABB at free of cost.
11. LD clause: Standard LD clause is applicable and accordingly contract price shall reduce by 1/2 (half) percent per week because of delay in delivery of the material(s) subject to maximum of 5 (Five) percent of the contract value.
12. Force Majeure Condition: Neither party shall be liable for any loss, damage, failure or delay in performing its obligations under the contract to the extent directly or indirectly caused by or arising from an event of force majeure which shall include but not be limited to acts of God, acts of Governmental authorities, earth quakes, strikes, fire, war, flood, epidemics, civil unrest, riots or other causes beyond its reasonable controls. The time lines shall be extended for period equal to the time lost by reason of delay plus such additional time as may be reasonably necessary to overcome the effect of the delay.




- 13. **Limitation of Liability** Notwithstanding anything to the contrary contained in the order(s) neither party shall be liable to the other for any indirect or consequential losses or damages or any loss of profits, loss production, loss of revenue or loss of use, and (ii) the maximum aggregate liability of the ABB/Contractor, for any/all claims arising out of or in connection with the order shall in no event exceed 100% of the order price of payments received under the purchase order, whichever is lower.
- 14. **Exclusion Of Indirect & Consequential Losses** Notwithstanding anything to the contrary herein, at law or otherwise, neither party shall be liable for any special, indirect or consequential damages or losses, such as, but not limited to loss of revenue, loss of use, loss of production, loss of power, cost of capital, loss of savings, cost of replacement power or costs connected with interruption of operation.
- 15. **Arbitration** In case of any breach of contract/disputes/differences arising under or in connection with this agreement, which cannot be settled by friendly negotiation and agreement amongst the parties, this offer is subjected to the standard arbitration clause in accordance with the provisions of the arbitration and conciliation act 1950. The venue of arbitration proceedings shall be mutually agreed place in India.
- 16. **Pre dispatch Inspection and Testing** Testing of the materials as per relevant standard shall be carried at contractor's works. The tests shall be performed in presence of the Corporation's representative. For deputiation of an authorized representative for inspection and to witness such tests, advance intimation prior to the tests shall be given to the Corporation. The test certificates are to be forwarded for approval of the purchaser. However, witness of tests or approval of tests reports shall not absolve the supplier from its responsibility towards satisfactory fulfillment of contractual obligation.
- 17. **Consignee** - The DGM (E/M), MMW, Pk (0374) 2825411.
- 18. **Delivery destination:** Assam Gas Based Power Plant (AGBP), NEEPCO Ltd, Bokuloni District, Dibrugarh (ASSAM) PIN: 786 191.

Kindly convey your acceptance of this P.O

Thanking you

Yours truly,


DGM (E/M), C&I Division
 AGBP, NEEPCO Ltd, Bokuloni,
 Dibrugarh, Assam.

3. Payment terms

- a) 90% payment with 100% taxes and duties shall be paid after receipt of materials at site within 15 days. Balance 10% payment shall be made after successful commissioning or within 3 months from the date of supply, whichever is earlier.
- b) Payment for services along with taxes shall be made after completion of job & on submission of service invoices, Completion certificate etc.

4. Taxes: GST @ 18% and other taxes as applicable shall be paid extra by NEEPCO at actual. Our GST No: 28AAACN9951Z3ZP GST No of ABB: 29AAACA3834AB1ZA.

5. Shipment, Freight & Insurance: Your supply Price is inclusive of packing & forwarding, but excluding of freight & Insurance. Freight charges shall be paid by NEEPCO at actual subject to submission of GST invoice of transporter.

6. Delivery Period: The material shall be delivered within 3(three) months from the date of techno-commercially accepted P.O. and approval of final drawing. The date of dispatch of the materials from the supplier's works will be considered as date of delivery. However, you are requested to complete the Supply & Services within 15th February 2020 for final completion of the work within this fiscal year.

7. Mode of Transportation: You are responsible for the safe transportation of the materials to AGRP, NEEPCO site on freight paid basis which shall be reimbursed at actual.

8. Services: Intimation of Site Readiness shall be conveyed and supplier shall complete the Installation, Commissioning and testing within the stipulated time.

9. Warranty: 12 months from the date of commissioning or 18 months from the date of shipment of equipment whichever is earlier.

10. Fitment: M/S ABB must ensure that materials supplied are suitably fit for Up-gradation of existing AVR at in Gas Turbine Generators# 536 at AGRP, NEEPCO Ltd. In case of any mismatch, the same must be replaced by M/S ABB at free of cost.

11. LD clause: Standard LD clause is applicable and accordingly contract price shall reduce by 1 (half) percent per week because of delay in delivery of the material(s) subject to maximum of 5 (Five) percent of the contract value.

12. Force Majeure Condition: Neither party shall be liable for any loss, damage, failure or delay in performing its obligations under the contract to the extent directly or indirectly caused by or arising from an event of force majeure, which shall include but not be limited to acts of God, acts of Governmental authorities, earth quakes, strikes, fire, war, flood, epidemics, civil unrest, riots or other causes beyond its reasonable controls. The time lines shall be extended for period equal to the time lost by reason of delay plus such additional time as may be reasonably necessary to overcome the effect of the delay.

Annexure - 1

Ref. NEEPCO/AGBP/C&I/T-55/2020-21/90NBC110/

Dtd. 19/11/2020

Schedule of Items & Prices

S/N	Item description	Unit Price in Rs	Qty	Total Amt in Rs
1	Supply of DAVR CONTROL BOARD	16,45,000/-	02 (two) sets	32,90,000.00
	2) Supply of DAVR CONTROL BOARD Includes			
	(1) CONTROL ELECTRONICS			
	A) CONTROL CHANNEL INCLUDES:			
	0 CONTROL COMPUTATION MEASUREMENT BOARD			
	0 POWER INTERFACE BOARD			
	0 3-PHASE 48-PULSE THYRISTOR CONVERTER WITH REQUIRED HEAT SINKS AND COOLING FANS			
	SERVING FOR ALL REQUIRED REGULATION AND CONTROL FUNCTIONS WITH FOLLOWING FEATURES:			
	i) BASIC REGULATOR FUNCTIONS			
	0 SIGNAL ACQUISITION OF			
	0 SINGLE OR 3-PHASE MACHINE TERMINAL VOLTAGE AND CURRENT (4) 0			
	0 SINGLE-PHASE MV-BUS TERMINAL VOLTAGE AND/OR CURRENT (4) 0			
	0 THYRISTOR CONVERTER INPUT VOLTAGE (4) 0			
	0 THYRISTOR CONVERTER OUTPUT VOLTAGE (4) 0			
	0 THYRISTOR CONVERTER CURRENT (2) FROM CTs AT DISCOMING (IFRS)			
	ii) AUTOMATIC VOLTAGE REGULATION TYPE: LEAD, LAG TYPE WITH ACC. TO IESG STD. 4215-2009			
	iii) Q AND/OR PFCORR COMPENSATION (ACTIVE/REACTIVE POWER TURBOFACTOR)			
	ABSOLUTE Q AND P INFLUENCE INDIVIDUAL ADJUSTABLE			
	DAVR DE LIMITERS AS PER YOUR REFERENCE REQ.			
	0 2 Stage Field Current Limiter (Gain) and Delayed Thermal Current Limiting			
	Delay Adjustable, Fixed Time Or Over Current Dependent, Inverse, Very Inverse, Extremely Inverse (ANSI, IEC)			
	0 2 Stage Current Limiter (Gain) and Delayed Thermal Current Limiting			
	Delay Adjustable, Fixed Time Or Over Current Dependent, Inverse, Very Inverse, Extremely Inverse (ANSI, IEC)			
	* V/Hz Limiter Delay Adjustable, Fixed Time Or Over Current Dependent, Inverse, Very Inverse, Extremely Inverse (ANSI, IEC)			
	* Q/P Limiter Delay Adjustable, Fixed Time Or Over Current Dependent, Inverse, Very Inverse, Extremely Inverse (ANSI, IEC)			

Handwritten signature and date: 19/11/2020

- * Manual Control Field Current Regulator (FCR) As Per Your Reference Bid
- * Manual Limiters As Per Your Reference Bid
- * Operator Control: 1) Controlling All Auxiliaries Of The Excitation System, 2) Sequencing Control Of Whole Excitation System As Per Your Reference Bid
- * Monitoring And Protection Functions: 1) Machine And Bus PT/CT Monitoring, 2) Machine Armature Monitoring, 3) Machine Rotor And Rotor Excitation Monitoring, 4) Self-Monitoring (Protection) Etc. As Per Your Reference Bid
- 1.2) Power Converter (Chopper Hardware): 3 Different Converter Phases (A), (B) Cover The Range From 20 To 2000A (3) For AVR And SES Systems.
- 1.3) Human Machine Interface (HMI): Service Control Panel (SCP) To Used For Local Operation Of The Excitation System Display Of Actual Values, Parameter Settings, Event And Fault Recorder.
- 1.4) Interface Unit: Contains Input And Output For Interface Digital And Analogue Control Signals Of The Plant Including 12 Digital Input 24/48V, 18 Relay Output, 3 Analogue Input, 3 Analogue Output, 3 RTD On 2 RTD I/Ps For Transformer Temperature, Ethernet Interface, Serial Link For Insulation Monitor (RS-485).
- 1.5) Auxiliary Power Supply: Power Supply Schemes Includes Inrush Coupling Unit And Power Supply Units.
- 1.6) Field BRG, Suppression & Field Voltage Protection: This Includes 2 DC BRG, 2-Phase (400) Type, 40 A, 1-Linear Discharge Resistor (400).
- 1.7) Additional Hardware: Shunt 4/75 Mw (400)
- 1.8) Excitation Transformer (Standby Source Of PMG)
 - i) Type: Dry Type Cast Resin
 - ii) Rated Apparent Power: 10 kVA
 - iii) Rated Primary Voltage: 415 V
 - iv) No-Load Secondary Voltage: Slightly To Exceed To Meet The Specification
 - v) Rated Frequency: 50 Hz
 - vi) No. Of Phases: 3 Phase





নর্থে ইষ্টার্ন ইলেকট্রিক পাওয়ার কর্পোরেশন লিমিটেড
(ভারত সরকার কা সংস্থান)
অসম গ্যাস আধারিত শক্তি সংস্থান

North Eastern Electric Power Corporation

(A Govt. of India Enterprise)

www.neepco.co.in

ASSAM GAS BASED POWER PLANT

BOKULORI, DIST. DISRUGARH, ASSAM, PIN - 786 101

Tel: 0374-232115, 2325331, 2325423, 2325238 FAX: 0374-2325132, 2325211

DOCUMENT/53



ISO-9001:2000
ISO-14001:2004
OHSAS-18001:2007

মকুলোৰী, জিলা- ডিব্ৰুগড়, অসম, পিন- ৭৮৬ ১০১

NO: NEEPCO/AGBP/C&I/T-09/2022-23/360000

Dtd 28/3/2022.

To

M/S Energia Systems Pvt. Limited,
52, Golf Club Road,
Kolkata-33, WB.

Kind. Attn: Mr. Amit Paul, Ph: (033)23675715/5727

SUB:→ Purchase Order for Upgradation of EMS (ABT) software with High-end server.

Your offer No: 2122-0164-R0 Oct 01, 2021 & 2122-0164-R0/1 October 30, 2021.

Dear Sir,

The Corporation is pleased to place this Purchase order for the supply and services of Upgradation of EMS (ABT) software with High-end server as per BOM. Supply and service charges shall be as below.

S/N	Item Description	Qty	Total Rs
A	Supply		
1	Existing PME Software License Upgrade	1 set	23,70,000.00
2	High End Server for latest PME software with OS	1 set	
3	ION - 8650 ABT Meter	1 No	
4	PM - 5560 Multifunction Energy Meter	3 No	
5	NTP Server with Display Clock	1 No	
6	Industrial Wireless	2 No	
7	Wireless Communication Cabinet for Colony	1 No	
B	Services		
8	Customization of EMS software	1 No	1,50,000.00
9	Commissioning of the New Server System at site.	1 No	

Terms & Conditions:

- Price Basis:-** Total Price as shown above is FOR site basis including P&F, Freight and insurance etc.
- Payment terms:** (a) 90% of supply plus 100% GST payment within 15 days of delivery of the material at site.
(b) Balance 10% is payable only after successful commissioning of the system and on submission of Bill / Invoice in triplicate supported by the other relevant documents.
(c) 100% service charge along with taxes shall be paid on successful commissioning of the system and on submission of Bill/Invoice in triplicate supported by other relevant documents. Following document must be submitted for in time payment. a) Bill/ Invoice in triplicate. b) Bank details in RTGS mandate format. c) Warranty/Guaranty certificate d) Delivery Challan.

GME
23/3/22

GME
23/3/22

AM(E)

Dr. 11/22



3. **Taxes:** GST @18% extra shall be paid by NEEPCO. GST No of AG's. NEEPCO: 18AAACN9991J3ZP & yours: 18AIEPG5476C1ZD.
4. **Shipment, Freight and Insurance:** Inclusive.
5. **Delivery Period:** Within 12-weeks from the date of receipt of techno-commercially acceptable P.O. However, you are requested to explore the possibility to reduce the delivery period.
6. **Liquidated Damage:** LD clause is applicable in this order. Accordingly, if the contractor fails to deliver the materials within 12-weeks, contract price shall reduce by $\frac{1}{2}$ (half) percent of contract value per week subject to maximum of 10(Ten) percent of the contract value.
7. **Settlement of Disputes and Arbitration:** In case of any dispute concerning this Order, both the supplier and NEEPCO shall try to settle the same amicably through mutual discussion/negotiation. Any unsettled dispute shall be settled in terms of Indian Act of Arbitration and Conciliation. Place of arbitration shall be within Assam. Arbitrator shall be appointed by Chairman & Managing Director, NEEPCO Limited and for that this contract shall be interpreted in accordance with the laws of India.
8. **CONTRACT PERFORMANCE GUARANTEE (CPG) or SD:** Supplier shall have to furnish bank guarantee @3% of the Contract value of supply & services. The B.G. shall valid till the expiry of warranty period. The contractor shall at his/her own cost get the validity period extension of Bank Guarantee furnished by him/her till the completion of warranty period. Otherwise, SD shall be deducted to cover-up warranty period.
9. **Mode of Transportation:** The supplier shall deliver the materials to **The Consignee** at AGBPS, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin-786191 by a reputed transporter on Freight paid basis.
10. **Warranty:** The system supplied by us will be covered for standard warranty clauses for 18 months from the date of dispatch and 12 months from the date of commissioning whichever is earlier.
11. **Consignee:** The DGM(E/M), Material Management Wing(MMW), AGBPS, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin-786191, Ph-(0374) 2825411.
12. **Delivery destination:** - Assam Gas Based Power Station(AGBPS), NEEPCO Ltd, Bokuloni, District: Dibrugarh (ASSAM), PIN: 7866191.
13. Boarding, lodging and local conveyance from nearest Air/Rail hub for the engineer and technicians at site will be provided by NEEPCO free of cost.

Kindly convey your acceptance of this P.O.

Thanking you,

Your faithfully,

GM (E/M), C&I wing
AGBPS, NEEPCO Ltd, Bokuloni,
Dibrugarh, Assam.



NEEPCO
180-4026-3504
CHCAG - 4854-1300

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र

पुस्तक, निवा: चिकुवाड़, असम, पिन - 786 111

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)

www.neepco.gov.in

ASSAM GAS BASED POWER PLANT

BORULDEH, DIST. DIBRUGARH, ASSAM, PIN - 786 111

Ph: 0374-262515, EPACT 1825600320423702503 FAX: 0374-262544/2625217

1364



NO: NEEPCO/AGBPS/C&I/T-09/2022-23/ 594-598 Dtd 28/3/2022


1) The HOP, AGBPS, NEEPCO Ltd for favour of information please. This has your kind approval through FLM dated 11/3/2022.

2) The GM (Fin), AGBPS, NEEPCO Ltd for necessary action please

3) The DGM (E/M), MMW, AGBPS, NEEPCO Ltd for necessary action please.

4) The DGM (E/M), Vigilance, AGBPS, NEEPCO Ltd for information please.

5) T-09/Guard file.


GM (E/M), C&I wing
AGBPS, NEEPCO Ltd.

---X---



নর্থ ইস্টার্ন পওয়ার কর্পোরেশন লিমিটেড North Eastern Power Corporation Limited
(ভারত সরকারের অধীনস্থ)
অসম গ্যাস সিস্টেম প্রকল্প সংস্থা
Assam Gas Based Power Plant
BOKARJALIA-32 JAMUNAGIRI A.C. 781004, Assam
INVESTMENT PROMOTION AUTHORITY (I.P.A.)

ASSAM GAS BASED POWER PLANT
BOKARJALIA-32 JAMUNAGIRI A.C. 781004, Assam
INVESTMENT PROMOTION AUTHORITY (I.P.A.)



NO. NEEPCO/AGBP/HOP/2021-22/W-111BI/3600000 / Dt. 23/7/2021

To
M/S ABB India Ltd,
1A Building, Plot No. 4A, 5 & 6,
Peenya Industrial Area,
Peenya 2nd Phase, Bangalore,
Karnataka-560058, India.
GSTIN Registration No (KARNATAKA): 29AAACA3834B1Z4

05,91,70,000.00
GST@18% 01,06,50,600.00
06,98,20,600.00
R/o : 07,00,00,000.00

Kind Attn: - Mr. Rajesh Raina Director (Service Sales)/Mr. Sudipta Sarkar.
(Sales Manager)

SUB: UPGRADATION OF DCS SYSTEM OF MODULE-1 & GOVERNOR OF STG1, AGBP, NEEPCO Ltd.

- Our Ref:**
1) NEEPCO/AGBP/C&I/T-52/2020-21/23 15/06/2020.
2) NEEPCO/AGBP/C&I/T-52/2020-21/37 27/06/2020.
3) NEEPCO/AGBP/C&I/T-52/2020-21/ 10/12/2020.

- M/S ABB's ref:**
1) Offer: IAPG.RE 19, Firm.00307 Dt. 17.06.2021.
2) Clarification dtd 21/7/2020.
3) Letter dtd 08/07/2020.
4) E-mail dtd 11th January,2021.

Dear Sir,

The Corporation is pleased to place this Purchase Order for the UPGRADATION OF DCS SYSTEM OF MODULE-1 & GOVERNOR SYSTEM OF STG1, AGBP, NEEPCO Ltd in reference to the above. Scope of order shall be Engineering, Supply of materials as per BOM (Annexure-1), Supervision of installation & Commissioning of HMI, Upgradation of DCS Controller of module-1 and Governor System of Steam Turbine-1

Terms & conditions:

1. **Price Basis:** - Price is FOR, AGBP basis and are as below.

S/	Item description	Unit Price (Rs)	Qty	Amt in (Rs)
1	Supply of materials for i) DCS Controller & IOs ii) 800xA HMI system iii) Governor up-gradation (Skid, Controller etc.)	5,46,31,500.00	01-sets	5,46,31,500.00
2	Supply of Mandatory Spares	24,31,000.00	01-sets	24,31,000.00

3	100% P&I		6,00,000.00
	Total of Supply		5,76,62,500.00
Rs. 5, 76, 62,500/- (Rupees Five Crore, Seventy-six lakh and Sixty-two thousand and five hundred) only.			
2	Supervision of installation & Commissioning of the system.	15,07,500.00	15,07,500.00
Rs. 15, 07,500/- (Rupees Fifteen lakh, Seven thousand and Five Hundred) only.			

2. Payment terms:

- 65% of the value of supply with 100% taxes shall be paid against dispatch documents through bank.
- 25% of the supply value shall be released within 15 days of receipt of the material at site.
- Balance 10% of the supply portion shall be released within 15 days of commissioning. In case commissioning is delayed beyond ninety days for the reasons not attributable to ABB, the amount shall be released against submission of a Bank Guarantee of equal amount. Validity of BG shall be for a period of 3 months + 3 months claim period.
- 100% payment for mandatory spares shall be released within 30 days of receipt of the material at site.
- 100% payment against Services shall be released within 30 days of completion of the commissioning.

3. Taxes: GST @ 18% and other taxes as applicable shall be paid extra by NEEPCO at actual. Our GST No: 18AAACN9991J3ZP, GST No of ABB: 29AAACA3834B1Z4.

4. Shipment, Freight & Insurance: Your supply Price is as per price schedule.

5. Delivery Period: The material shall be delivered within 25(twenty-five) weeks from the date of techno-commercially accepted P.O. The date of dispatch of the materials from the supplier's works will be considered as date of delivery. However, you are requested to supply the materials within 31st Dec'2021 for completion of the work within this fiscal year.

6. Mode of Transportation: You are responsible for the safe transportation of the materials to AOBP, NEEPCO site on freight paid basis.

7. Services: Intimation of readiness of site shall be conveyed and supplier shall complete the Installation, Commissioning and testing within the stipulated time.

8. Warranty: 18 months from the date of commissioning or 24 months from the date of supply whichever is earlier.

9. Fitment: M/S ABB must ensure that materials supplied are suitably fit for Up-gradation of existing system of AOBP, NEEPCO Ltd. In case of any mismatch, the same must be replaced by M/S ABB at free of cost.

10. LD clause: NEEPCO's Standard LD clause is applicable. Accordingly contact price shall reduce by ½ (half) percent per week for delay in delivery of the material(s) subject to maximum of 10 (Ten) percent of the contract value.



11. **CPBG/SD** CPBG @ 3% of total contract value shall be submitted by the supplier.
12. **Force Majeure Condition:** Neither party shall be liable for any loss, damage, failure or delay in performing its obligations under the contract to the extent directly or indirectly caused by or arising from an event of force majeure, which shall include but not be limited to acts of God, acts of Governmental authorities, earth quakes, strikes, fire, war, flood, epidemics, civil unrest, riots or other causes beyond its reasonable controls. The time lines shall be extended for period equal to the time lost by reason of delay plus such additional time as may be reasonably necessary to overcome the effect of the delay.
13. **Limitation of Liability :** Notwithstanding anything to the contrary contained in the order(s) neither party shall be liable to the other for any indirect or consequential losses or damages or any loss of profits , loss production , loss of revenue or loss of use , and (ii) the maximum aggregate liability of the ABB/Contractor, for any/all claims arising out of or in connection with the order, shall in no event exceed 100% of the order price of payments received under the purchase order, whichever is lower.
14. **Exclusion of Indirect & Consequential Losses:** Notwithstanding anything to the contrary herein, at law or otherwise, neither you nor us shall be liable for any special, indirect or consequential damages or losses, such as, but not limited to loss of revenue, loss of use, loss of production, loss of power, cost of capital, loss of savings, cost of replacement power or costs connected with interruption of operation.
15. **COVID-19:** In India, according to the Office Memorandum on Force Majeure Clause ("FMC") issued by Ministry of Finance No.F.18/4/2020-PPD dt. Feb 19, 2020 disruption of supply chains due to spread of corona virus in China or any other country will be covered in the Force Majeure Clause. Further in March, 2020 Government of India has declared Covid19 as a "notified disaster" and World Health Organization (WHO) has categorized Covid19 as a pandemic situation. The Parties [i.e. Purchaser and Seller] are aware of the current outbreak of the Covid19 worldwide which impacts or may impact the normal business and execution of this Contract. The Parties agree that ABB is entitled to any potential cost compensation, time extension, or other reasonably required adjustments in the Contract, if any consequences, whether directly or indirectly resulting out of, or in connection with the Covid19 outbreak, lead to delays in delivery of goods or provision of services, supplies or otherwise affect ABB's contractual obligations and/or duties.
16. **Arbitration:** In case of any breach of contract/disputes/differences arising under or in connection with this agreement, which cannot be settled by friendly negotiation and agreement amongst the parties, this offer is subjected to the standard arbitration clause in accordance with the provisions of the arbitration and conciliation act 1996. The venue of arbitration proceedings shall be mutually agreed place in India.
17. **Pre-dispatch Inspection and Testing:** Testing of the materials as per relevant standard shall be carried at contractor's works. The tests shall

অসম গ্যাস বাসেড পাৱাৰ প্লান্ট (AGBP) কোম্পানী লিমিটেড
Assam Gas Based Power Plant Ltd.
গুৱাহাটী, অসম
Guwahati, Assam



- be performed in presence of representative of NEEPCO. For deputation of an authorized representative for inspection and to witness such tests, advance intimation shall be given to the Corporation. The test certificates are to be forwarded for approval of the purchaser. However, witness of tests or approval of tests reports shall not absolve the supplier from its responsibility towards satisfactory fulfilment of contractual obligation.
- 18. **Consignee:** - The DGM (E/M), MMW, AGBP, NEEPCO Ltd, Bokuloni, District: Dibrugarh (ASSAM), PIN: 786 191.
 - 19. **Delivery destination:** Assam Gas Based Power Plant (AGBP), NEEPCO Ltd, Bokuloni, District: Dibrugarh (ASSAM), PIN: 786 191.
 - 20. **Billing destination:** The DGM (E/M), C&I/MMW, AGBP, NEEPCO Ltd, Bokuloni, District: Dibrugarh (ASSAM), PIN: 786 191
 - 21. **Paying authority:** The DGM (F&A), AGBP, NEEPCO Ltd, Bokuloni, District: Dibrugarh (ASSAM), PIN: 786 191.

Kindly convey your acceptance of this P.O.

Thanking you.

Yours truly,

DGM (E/M), C&I

For and on behalf of CGM & Head of the Plant, AGBP, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam.

NO: NEEPCO/AGBP/HOP/2021-22/W-11(B)/134-4/ Dtd. 23/7/2021.

- 1) The GM(Tech), O/O the CMD, NEEPCO Ltd, Shillong for kind appraisal of CMD please. This has reference to his kind approval dtd 21/7/2021 conveyed vide e-mail of ED(O&M) dated 21/07/2021.
- 2) The GM(Tech), O/O the Director(T), NEEPCO Ltd, Shillong for kind appraisal of Director(T) please.
- 3) The ED (O&M), NEEPCO Ltd, Shillong for favour of kind information please.
- 4) The DGM (E/M), C&I, AGBP, NEEPCO Ltd for necessary action please.
- 5) The DGM (E/M), MMW, AGBP, NEEPCO Ltd for necessary action please.
- 6) The DGM (Fin), AGBP, NEEPCO Ltd for for necessary action please.
- 7) The DGM (E/M), Vigilance, AGBP, NEEPCO Ltd for information please.
- 8) File. -W11 (B).

DGM (E/M), C&I

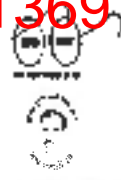
For and on behalf of CGM & Head of the Plant, AGBP, NEEPCO Ltd,



उत्तर पूर्वी बिजली एवं गैस कारपोरेशन लिमिटेड
(असम, मेघालय, त्रिपुरा, मिजोरम)
उत्तर पूर्वी बिजली कारपोरेशन लिमिटेड
North Eastern Electric Power Corporation Ltd.

North Eastern Electric Power Corporation Ltd.
(असम, मेघालय, त्रिपुरा, मिजोरम)
उत्तर पूर्वी बिजली कारपोरेशन लिमिटेड
North Eastern Electric Power Corporation Ltd.

1369



Annexture-1

Ref: **NEEPCO/AGBP/HOP/2021-22/W-11(B)/3600000 /133 Dt. 23/7/2021.**

Schedule of Items & Prices

Sl	Item description	Unit Price (Rs)	Qty	Amt in (Rs)
1	Supply of materials for DCS Controller & IOs 800xA HMI system Governor up-gradation (Skid, Controller etc)	5,46,31,500.00	01-sets	5,46,31,500.00

800xA HMI system:

S/N	Description	Make/Model	Brief Specification	Qty
1	System Server	DELL/HP/IBM	Intel Xeon Single Processor, Silver 4112, 2 GHz, 4C/8T | 2x8GB RDIMM, DDR4, ECC RAM | 3x 600GB SAS 10K 2.5" HDD |RAID| DVD RW Slim Drive | USB, keyboard, Mouse| 6 x1Gbps NIC | Windows Server 2019 Std	1
2	Spare Server	DELL/HP/IBM	Intel Xeon Single Processor, Silver 4112, 2GHz, 4C/8T | 2x8GB RDIMM, DDR4 ECC RAM | 3x 600GB SAS 10K 2.5" HDD | RAID| DVD RW Slim Drive | USB Keyboard, Mouse| 6 x1Gbps NIC | Windows Server 2019 Std	1
3	Operator Station	DELL/HP/IBM	Intel® Xeon® Processor E3-1225 v5, 2, Ghz, Turbo 8MB, 4C | 16 GB non-ECC DDR4 Memory | P400, 2 GB Graphics Card, | 2x 1Gbps network port | USB, Keyboard & Mouse | DVD RW drive | 1TB, Sata 3.5" HDD 7200RPM | Windows 10, IoT Enterprise LTSC 2019	3
4	Monitor	DELL P2419h	24" LED Monitor | Optimal Resolution: 1920 x 1080 at 60 Hz Contrast Ratio: 1000: 1 (typical), Dynamic Contrast Ratio : 2 Million:1 (Max) | 1 Digital Visual Interface connectors (DVI-D) with HDCP, 1 Video Graphics Array (VGA)	5
5	MS office 2019 Pro-Plus	MS office 2019 Pro-Plus	MS Office 2019 Professional Plus Edition	1
6	MS office	MS office 2019	MS Office 2019 Home & Business Edition	3

Handwritten signature and date: 23/7/2021

1. The Bidder shall submit a copy of the Bid to the Engineer in duplicate, one copy to be retained by the Engineer and the other copy to be returned to the Bidder. The Bid shall be valid for a period of 90 days from the date of opening of the Bid.



1.7	Analog Input / Output Module	No	1 Lot
1.8	Digital Input / output Module	No	1 Lot
2	Governing Hydraulic Skid	No	1
2.1	Base frame 1400 x 1200 mm (Approx) MS	No	1
2.2	2.2 Duplex oil filter 10 Micron	No	1
2.3	Pressure gauge 100 mm dial, Glycerin filled	No	7
2.4	I/H Converter	No	1
2.5	Trip block with 2 out of 3 voting logic	No	1
2.6	Pilot operated valve for Turbine trip	No	1
2.7	Solenoid operated direction valve for starting oil & trip oil	No	2
2.8	Solenoid operated direction valve for switch oil & QCNRV	No	2
2.9	Flow control valve for starting oil	No	1
2.10	Flushing plate for all valves within skid	No	5
2.11	Manifold Block	No	1
2.12	Main isolation valve	No	1
2.13	Bladder accumulator	No	1
2.14	Pressure switch for start oil, trip oil & trip oil header	No	3
2.15	SS 304 pipe & fitting for interconnection	No	1
2.16	SS 304 pipes for external connection	Mtr	10
2.17	Impulse tubes and needle valves for instrument	Mtr	10
2.18	Painting & finishing	Lot	1
2.19	Other skid accessories	Lot	1
3	System cabinets	No	1
4	Relays and accessories	Lot	1
5	Power Supplies	Lot	1

2	Supply of Mandatory Spares	2,431,000.00	01-sets	2,431,000.00
---	----------------------------	--------------	---------	--------------

Mandatory Spares:			
S/N	Model/Part No	Description	Qty
1	PM866AK01	PM866AK01 Processor Unit	1
2	CI854BK01	CI854BK01 PROFIBUS-DP/V1 interface	1
3	CI840A	CI840A PROFIBUS DP-V1 Interface	4
4	AI810	AI810 Analog Input 8 ch	2
5	AI820	AI820 Analog Input 4 ch	1
6	AI830A	AI830A Analog input RTD 8 ch	1
7	AI835A	AI835A Thermocouple/mV Input 8 ch	1
8	AO810V2	AO810V2 Analog Output 8 ch	3
9	AO820	AO820 Analog Output 4 ch	1
10	DI810	DI810 Digital Input 24V 16 ch	4
11	DO810	DO810 Digital Output 24V 16 ch	2
12	SD831	SD831 Power Supply, 3A	1
13	SD834	SD834 Power Supply, 20A	1
14	SS832	SS832 Power Voting Unit	1

20/11/2021
 20/11/2021

NO: NEEPCO/AGBP/C&I/T-13/2021-22/3600000 ^{52²} / 366 Dtd. 28/06/2021

To

M/S Sonepar India Pvt. Ltd. (100-112)

Ecospace Business Park
Block 4B, Unit 503, 5Th Floor,
Newtown Rajarhat, Kolkata.
PIN - 700156, India.

SUB: UPGRADATION OF PLC BASED AUTOMATION SYSTEM OF DM PLANT, AGBP (PLC based controller)

Your offer ref: NEEPCO/AGBP/C&I/T-13/2021-22/Revs dtd 28/06/2021.

Dear Sir,

The Corporation is pleased to place this Purchase Order for Upgradation of PLC based automation system of DM-plant, AGBP by way of Supply, Installation & commissioning of new hardware's as per BOQ

BOQ, Prices, terms & conditions of the P.O. are as below.

Description (HSN Code/SAC Code)	Unit Price	Qty	Total Amt (Rs)
A) Supply of PLC hardware and software, Rockwell-make and other accessories as per BOQ // (90328990)	19,50,000.00	01 lot	19,50,000.00
Total of supply excluding taxes			19,50,000.00
➤ Rs. 19,50,000/- (Rupees Nineteen Lakh and Fifty-thousand) only.			
B) Installation, commissioning, and engineering Services of PLC system// (998732)	3,00,000.00		3,00,000.00
Total of services excluding taxes			3,00,000.00
➤ Rs. 3,00,000/- (Rupees Three Lakh) only.			

1.

(a) Price Basis. The prices as shown above are FOR NEEPCO, Kathalguri basis including P&F but excluding taxes.

(b) Prices of services as shown above is also excluding taxes

2. Packing charge: Above prices are inclusive of P&F charges.

3. Taxes: GST @18% shall be paid by NEEPCO against GST invoice. Our GST No: 18AAAAN9991J3ZP and GST no of supplier: 19AACCE2411Q1ZH.

4. Shipment, Freight & Insurance: Transportation charge & Transit Insurance are inclusive in the above prices

5. Payment terms: (a) Supply: 90% payment including taxes against dispatch documents through bank and rest 10% after installation and commissioning or 3 months from the date supply whichever is earlier. Bank charges in total are to the account of supplier. Payment shall be made against submission of i) Tax

Handwritten notes: 1. 19,50,000.00, 2. 3,00,000.00




invoices in triplicate, ii) Delivery challan, iii) Guarantee/warranty certificate as per P.O.,
 iv) B.G./SD in original, v) Bank details in RTGS/NEFT mandate format, etc.

(b) Services: 100% after successful Installation & Commissioning of the system against submission of service invoices in triplicate and Commissioning report etc.

6. Delivery Period: Seller shall deliver the Goods within 14 weeks from the date of receipt of technically and commercially clear purchase order. The date of dispatch of the materials from the supplier's works shall be considered as date of delivery. However, you are requested to explore possibilities to reduce delivery period to the extent possible.
7. The supplier shall deliver the materials to The Consignee at AGBP, NEEPCO, Bokuloni, Assam, Pin-786191 by reputed transporter on Freight paid basis.
8. Warranty: 12 months from the date of commissioning or 18 months from date of supply whichever is earlier.
9. Liquidated Damage: LD clause is applicable in this order. Accordingly, if the contractor fails to deliver all the materials within 14-weeks, contract price shall reduce by $\frac{1}{2}$ (half) percent per week subject to maximum of 5 (five) percent of the Order value. However the force majeure clause shall be considered.
10. CONTRACT PERFORMANCE GUARANTEE (CPG) or SD: Supplier shall have to furnish bank guarantee @3% of the Contract value of supply & services. The B.G. shall valid till the expiry of warranty period. The contractor shall at his/her own cost get the validity period extension of Bank Guarantee furnished by him/her till the completion of warranty period, otherwise SD @3% shall be deducted from the payable amount.
11. Settlement of Disputes and Arbitration: In case of any dispute concerning this Order, both the supplier and NEEPCO shall try to settle the same amicably through mutual discussion/negotiation. Any unsettled dispute shall be settled in terms of Indian Act of Arbitration and Conciliation. Place of arbitration shall be within Assam. Arbitrator shall be appointed by Chairman & Managing Director, NEEPCO Limited and for that this contract shall be interpreted in accordance with the laws of India.
12. Consignee: The DGM(E/M), Material Management Wing(MMW), AGBP, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin-786191, Ph-(0374) 2825411.
- 13) Delivery destination: Assam Gas Based Power Plant (AGBP), NEEPCO Ltd, Bokuloni, District: Dibrugarh (ASSAM), PIN: 7866191,
 Kindly convey your acceptance of this P.O.


Thanking you

Your faithfully,


DGM (E/M), C&I wing
 AGBP, NEEPCO Ltd, Bokuloni,
 Dibrugarh, Assam.

Memo No: NEEPCO/AGBP/C&I/T-13/2021-22/367-372 Dtd. 28/06/2021.

- 1) The HOP, AGBP, NEEPCO Ltd for favour of information pl. This has your kind approval under U.O No: HOP/FLM dtd 25/6/2021.
- 2) The GM (E/M), AGBP, NEEPCO Ltd for favour of information please.
- 3) The DGM (E/M), MMW, AGBP, NEEPCO Ltd for necessary action please.
- 4) The DGM (Fin), AGBP, NEEPCO Ltd for necessary action please.
- 5) The DGM (E/M), Vigilance, AGBP, NEEPCO Ltd for information please.
- 6) T-13/Guard file.


DGM (E/M), C&I wing
AGBP, NEEPCO Ltd

-----X-----

A)	Supply	→	₹	19,50,000.00
B)	Services	→	₹	3,00,000.00
			₹	22,50,000.00
	GTS @ 18	₹	₹	4,05,000.00
				<u>26,55,000.00</u>



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बकुलोनि, डिब्रुगढ़, असम, पिन - 781 191

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN- 781 191
Ph: 0364-265276, 27661, 26501, 27626-43, 2625, 26676X, 11294, 192, 211, 2625127



NO: NEEPCO/AGBPS/C&I/T-48/2022-23/ 96

Dt.05/07/2022.

To
M/s TJA ENGINEERING & TRADING CO.
FLAT NO.109 C-1, BLOCK ABCD,
PALM GROVE ENCLAVE, NEAR CAPUCHIN HOUSE,
JURIPAR PATH, PANJABARI ROAD,
PIN-781022, GUWAHATI, ASSAM

Sub:-> Purchase Order for Upgradation of SWA-System of Module-1 at Assam Gas Based Power Station (AGBPS), NEEPCO LTD., Bokuloni, Dibrugarh.

Our Ref: 1) Tender ref: AGBP/C&I/T-48/2021-22/NIQ 01 dtd 02/12/2021.
2) E-tendering ID: 2021_NEEPC_95907_4.
Your ref: 1) Online Bid No: 375784 dtd 25/01/2022.
2) E-mail ref regarding final price dtd 18.06/2022.

Dear Sir,

Inviting reference to the above the Corporation is pleased to place this purchase order for Upgradation of SWA-System of Module-1 by Design, Supply, Installation and Commissioning at Assam Gas Based Power Station (AGBPS), NEEPCO LTD., Bokuloni, Dibrugarh, Assam.

The complete sampling system shall be as below consisting of 02(two) sections 1(a) & 1(b).

1) Sampling table for module-1 shall be as below.

S/N	Sampling lines	DM make-up water	CEP/Con'sate	De'tor I/L	Eco'ter/Boiler feed water-1 & 2	Boiler Drum 1 & Boiler Drum 2	Boiler Super-heater 1 & 2	Main steam-1 & 2	Total
1	Conductivity (Specific)	1	1	0	2	2	0	0	6
2	Conductivity (Cation)	0	1	0	0	0	2	2	5
3	pH.	0	1	0	2	2	2	2	9
4	Dissolved oxygen	0	1	1	0	0	0	0	2
5	Phosphate	0	1	0	2	2	2	2	9
6	Silica	0	1	0	2	2	2	2	9
7	Ammonia (NH3)	0	1	0	2	0	0	0	3
8	Hydrazine (N2H4)	0	1	0	2	0	0	0	3
9	Total	0	1	0	2	2	2	2	9



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बहुमूल्य निगम- डिप्ट. असम, डि. - 781 001

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
AGUAM GAS BASED POWER PLANT
DOKULONG, DIST. JORHATA, ASSAM, PIN - 781 101
Tel: 0364-255221, Email: neepco@nic.nic.in



1	Supply part			
1a	Supply of SWA-system for Module-1	1,69,60,520.00	1.00 lot	1,64,51,704.40
1b	Mandatory spares required for smooth operation for minimum 1-years as per BOM.	5,78,000.00	1.00 lot	5,78,000.00
2	Service Part			
2a	Installation and commissioning of SWA-system for Module-1.	66,500.00	1.00 lot	66,500.00
2b	AMC for 2-yrs with quarterly mandatory visit & Servicing.	33,250.00	8.00 lot	2,66,000.00
A	Freight on Supply of SWA-system.	2,25,000.00	1.00 lot	Waived off
B	Freight on Supply of Mandatory spares	15,000.00	1.00 lot	Waived off
C	Total Discount			(-) 7,48,815.60
	TOTAL (₹)			1,73,62,204.40

>>₹. 1,73,62,204/- (Rupees One Crore, Seventy-Three Lac, Sixty-Two thousand, Two hundred and Four) only.

Terms & Conditions:-

- Scope of Supply:** As per Annexure: 1. Supplier has to submit fresh P & I, Wiring and other engineering drawing after acceptance of P.O. Based on remarks, approval of AGBPS, NEEPCO, supplier can start the manufacturing process.
 - Scope of Services:** Installation and Commissioning of the system in module-1. Supplier shall be liable to maintain the system for 02(two) years with quarterly mandatory visit after completion of Warranty period. Each on-call duty shall be considered as a mandatory visit.
 - Price Basis:-** Total Price as shown above is in INR and on AGBPS, NEEPCO basis including P&F and Freight.
 - P&F:** Nil.
 - Payment terms:-** (i) 90% payment of supply with 100% taxes shall be paid after receipt of materials in full and good condition,
(ii) Balance 10% of supply shall be paid after successful installation and commissioning of the system.
(iii) **For Services:** 100% payment of services shall be made only after successful installation & commissioning of the system.
(iv) **Service charges for AMC:** 100% payment shall be made only after successful visit of Service engineer.
- Supplier shall submit following documents for on time payment.**
- GST Bill/ Invoice in triplicate.
 - Bank details in RTGS mandate format.
 - Warranty/Guaranty certificate



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बुकुलोनी, डिब्रुगढ़, असम, पिन - 786 191

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, AS, PIN, 786 191
Ph: (0374) 2825411, FAX: (0374) 2825412, 2825413, 2825414, 2825415, 2825416, 2825417, 2825418, 2825419, 2825420, 2825421



- d) Delivery Challan etc in case of supply.
e) Test certificate in case of supply.
6. **Taxes:** GST @18% extra shall be paid by NEEPCO. Our GST No: 18AAACN9991J3ZP & GST of supplier: 18AIEPG5476C1ZD.
7. **Shipment, Freight & Insurance:** Freight charge is inclusive in above prices.
8. **Indian Insurance** up to Project site AGBPS, NEEPCO Ltd shall be covered against our open marine insurance policy. Dispatch details of the materials must be sent in advance to the Consignee/Division for arranging necessary insurance coverage.
9. **LD:** Applicable for delay in delivery of material(s) @0.5% per week subject to maximum of 5% as per e-mail dtd 30th April'22.
10. **CPG or SD:** Applicable and the same is equivalent to 3% of basic value of 1st P.O. which shall be extended for the 2nd P.O. as well (No additional BG shall be submitted for 2nd P.O.) Alternatively, equivalent amount shall be deducted from the bill/invoices to cover-up warranty period as per meeting dtd 18/6/2022 of Price negotiation.
11. **Site accommodation:** Accommodation for Service Engineer(s) shall be provided by NEEPCO during commissioning of the system as well as during the period of AMC. Local conveyance from & to the nearest Airport or Railway station shall be arranged by NEEPCO as per meeting of Price negotiation dtd 18/6/2022.
12. **Delivery Period:** Within 12-weeks from the date of receipt of techno-commercially acceptable P.O. However, you are requested to explore the possibility to reduce the delivery period.
13. **Mode of Transportation:** The supplier shall deliver the materials to **The Consignee** at AGBPS, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin-786191 through a reputed transporter on Freight paid basis.
14. **Warranty:** 12 months from the date of commissioning or 18 months from the date of dispatch whichever is earlier. Guarantee/Warranty are not applicable for Spares, Reagents, Accessories and Consumables.
15. **Order for Module-2:** The Corporation shall place the purchase order for Module-2 with the same Price and T & C only after successful completion of installation & commissioning of Module-1.
16. **Consignee:** - The DGM(E/M), Material Management Wing (MMW), AGBPS, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin-786191, Ph-(0374) 2825411.
17. **Delivery destination:-** Assam Gas Based Power Station(AGBPS), NEEPCO Ltd, Bokuloni, District: Dibrugarh (Assam), PIN: 786-191.

Kindly convey your acceptance of this P.O.

Thanking you.

Your faithfully,

GM (E/M), C&I Division
AGBPS, NEEPCO Ltd, Bokuloni,
Dibrugarh, Assam.




नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बोकुलोन, जिला- डिब्रुगढ़, असम, पिन - 786 111

North Eastern Electric Power Corporation Ltd.
(A Government Enterprise)
ASSAM GAS BASED POWER PLANT
BOKULON, DIST-DEBRUGARH, ASSAM, PIN-786 111
PH: 0374-252516, E-MAIL: AGS@NEEPCO.CO.IN, AGS@NEEPCO.COM



Memo No: NEEPCO/AGBPS/C&I/T-48/2022-23/ 97-101. Dt.05/07/2022.

- 1) The HOP, AGBPS, NEEPCO Ltd for favour of information pl. This has your kind approval through FLM dtd. 01/7/2022.
- 2) The GM (Fin), AGBPS, NEEPCO Ltd for kind necessary action please.
- 3) The DOM (E/M), MMW, AGBPS, NEEPCO Ltd for necessary action please.
- 4) The Sr. Manager (Civil), Vigilance, AGBPS, NEEPCO Ltd for information please.
- ✓ 5) T-48/Tender file/Guard file.


GM (E/M), C&I Division
AGBPS, NEEPCO Ltd.

---X---



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
सुबर्ग, तिसा-डिब्रुगढ़, असम, तिसा - 786 111

North Eastern Electric Power Corporation Ltd.
(A Govt of India Enterprise)

www.neepecol.com

ASSAM GAS BASED POWER PLANT

SUKULOH, DIST. DIBRUGARH, ASSAM, INDIA - 786 111

PH: 9374202510 E-MAIL: neepecol@necol.com



Annexure-1

Ref: NEEPCO/AGBPS/C&I/T-48/2022-23/

Dt 05/07/2022

Schedule of Items & Prices

S/N	Item description	Unit Price in Rs.	Qty	Total Amt in Rs
1	Supply of SWA-system for Midule-1	1,64,51,704/-	1.00 lot	1,64,51,704/-
S/N	ITEM DESCRIPTION	UNITS	QTY PER SET	
1	SAMPLE HANDLING SYSTEM			
A	FREE FRAME STANDING WET PANEL STG BUILDING (RACK A): i) DM make-up water ii) CBP/ Condensate iii) Deaerator I/L Supply of 3 Lines Sample Conditioning System as per above for continuous online analysis, mounted over a free-standing rack type with structural framework of CRCA, consisting of following components mounted over back plate of MS: <ul style="list-style-type: none"> ➤ Bulkhead Union (3/4" NB SWX 1/4" O.D) ➤ Sample Isolation valve HT, Globe Type (for T>200DegC) – IBR Certified ➤ Sample Isolation Valve LT, Needle Type (for T<200DegC) ➤ Blow Down Isolation Valves ➤ Blowdown Headers ➤ Cooling Water Headers ➤ Isolation Valves, At Cooling Water Headers ➤ Pressure Gauge & Temperature Gauge at Cooling Water Headers ➤ Flow switch, At Cooling Water Header ➤ Isolation Valves, Cooling Water I/L & O/L Line ➤ Coolant flow Indicator at Cooling Water O/L Lines ➤ Sample Cooler (INCONEL Coil & SS 316 Shell Construction) – IBR Approved ➤ Along with Sample Pressure Relief Valve ➤ Sample filter, 40 Micron, Redundant Type, Arrangement ➤ Variable pressure reducer(VRTS) (For P> 30 Bar) ➤ Pressure Regulator (For P<30 Bar) ➤ Thermal Shutoff Valve, Mechanical Type ➤ Along with Contacts ➤ Pressure Gauge ➤ Temperature Gauge ➤ Rotameter (Flow Indicator) with built in Needle 	no	1	

Signature
05/07/2022



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
एंगुलिन, तिरुवा - डिब्रुगढ़, असम, त्रिपुरा - 785 191

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 785 191
Ph: 0364 2326278, FAX: 0364 2326279, 0364 2326280, 0364 2326281



	<ul style="list-style-type: none"> ➤ Back Pressure Regulator ➤ Drain Header ➤ Grab Sample Valve ➤ Tundish ➤ Flow Thru Chambers for the required sensors: 			
C	Dry Panel for mounting analyzers of "A" above.	no	1	
D	Dry Panel for mounting analyzers of "B" above.	no	1	
2	Analyzers	lot	01	
	Conductivity (Specific) (Single channel)	no	6	
	Conductivity (Cation) (Single channel)	no	5	
	pH (Single channel)	no	9	
	Dissolved oxygen (Single channel)	no	2	
	Silica (5-channel with external sequencer)	no	2	
	Phosphate (5-channel)	no	2	
	Ammonia (NH ₃) (3-channel)	no	1	
	Hydrazine (N ₂ H ₄) (3-channel)	no	1	
	Total hardness (5-channel)	no	2	
	TDS (Single channel)	no	2	
4	SS-Sampling tube with connectors (straight, T, elbow) etc	Mtr	500	
5	Control cables (Cu), 1.5 mm ²	Mtr	500	
6	Start-up, Commissioning Spares and Consumables as required for commissioning & Handing over of System.	lot	1	
7	LOOSE SUPPLY ITEMS FOR SWAS	lot	1	
8	Engineering documentation shall Includes a) Detailed engineering of the system, b) P&I diagram, c) Panel wiring diagram, d) Instrument List, User manuals, Item Data Sheets, Item catalogue etc.	lot	1	
2	Mandatory spares required for smooth operation for minimum 1-years.	5,78,000.00	1.00 lot	5,78,000.00
	Item description			Qty
	PH SENSOR			1 NOS
	PH TRANSMITTER			1 NOS
	CONDUCTIVITY SENSOR			1 NOS
	CONDUCTIVITY TRANSMITTER			1 NOS
	DO SENSOR			1 NOS
	DO TRANSMITTER			1 NOS
	TDS SENSOR			1 NOS
	TDS TRANSMITTER			1 NOS
	SAMPLE FILTER			2 NOS
	PRESSURE REDUCER			2 NOS
	CATION COLUMN			2 NOS
	ROTAMETERS			5 NOS
	SPARE KIT FOR SILICA ANALYZER FOR 1 YEAR OPERATION			2 SET
	REAGENT KIT FOR SILICA ANALYZER FOR 1 YEAR OPERATION			2 SET
	REAGENT KIT FOR HYDRAZINE ANALYZER FOR 1 YEAR OPERATION			2 SET



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

असम गैस आधारित ऊर्जा संयंत्र

जुमला, डिमा - डिब्रुगढ़, असम, बिहार - 781 199

0361-257-0269
0361-257-0264
0361-257-0265

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)

www.neepl.com

ASSAM GAS BASED POWER PLANT

BOKULONI, DIST. DIBRUGARH, AS - 781 199

Ph: 0361-2525216, 2525217, 2525218, 2525219 Fax: 0361-2525220



	<ul style="list-style-type: none"> Valve ➤ Cation Columns, Redundant Arrangement ➤ Back Pressure Regulator ➤ Drain Header ➤ Grab Sample Valve ➤ Tuncish ➤ Flow Thru Chambers for the required sensors : 		
B	<p>FREE FRAME STANDING WET PANEL NEAR BOILERS (RACK B):</p> <ul style="list-style-type: none"> i) Economizer Inlet/Boiler feed water for Boiler-1 & 2 ii) Boiler Drum 1 & Boiler Drum 2 iii) Boiler Super-heater 1 & 2 iv) Main Steam-1 & 2 <p>Supply of 8 Lines Sample Conditioning System as per above specifications for continuous online analysis, mounted over a free-standing rack type with structural framework of CRCA, consisting of following components mounted over back plate of MS:</p> <ul style="list-style-type: none"> ➤ Bulkhead Union (3/4" NB SWX 1/4" O.D) ➤ Sample Isolation valve HT, Globe Type (for T>200 DegC) – IBR Certified ➤ Sample Isolation Valve LT, Needle Type (for T<200 DegC) ➤ Blow Down Isolation Valves ➤ Blowdown Headers ➤ Cooling Water Headers ➤ Isolation Valves, At Cooling Water Headers ➤ Pressure Gauge & Temperature Gauge at Cooling Water Headers ➤ Flow switch, At Cooling Water Header ➤ Isolation Valves, Cooling Water i/L & O/L Line ➤ Coolant flow Indicator at Cooling Water O/L Lines ➤ Sample Cooler (INCONEL Coil & SS 316 Shell Construction) – IBR Approved ➤ Along with Sample Pressure Relief Valve ➤ Sample filter, 40 Micron, Redundant Type Arrangement ➤ Variable pressure reducer (VRTS) (For P> 30 Bar) ➤ Pressure Regulator (For P<30 Bar) ➤ Thermal Shutoff Valve, Mechanical Type ➤ Along with Contacts ➤ Pressure Gauge ➤ Temperature Gauge ➤ Rotameter (Flow Indicator) with built in Needle Valve ➤ Cation Columns, Redundant Arrangement 	no.	1



NEEPCO
ESTD - 1956
AGRAHARI
AGRAHARI

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
आसम गैस आधारित थर्मल संयंत्र
बुधुपति, डिब्रूगढ़ - डिब्रूगढ़ जिला, असम - 786 011

North Eastern Electric Power Corporation Ltd.
(A Govt of India Enterprise)

www.neepco.co.in

ASSAM GAS BASED POWER PLANT
BUDHUPTI, DIST. DIBRUGARH, ASSAM, PIN - 786 011

PH: 0364 252555, 252556, 252557, 252558, 252559, 252560 FAX: 0364 252561, 252562, 252563

1383



PRESSURE REGULATORS	2 NOS
PRESSURE GAUGES	2 NOS
TEMPERATURE GAUGES	2 NOS
BACK PRESSURE REGULATOR	2 NOS
3 WAY GRAB SAMPLE VALVE	2 NOS
NEEDLE VALVES	2 NOS
FLOW SWITCH	2 NOS
HT ISOLATION VALVES	2 NOS
THERMAL SHUTOFF VALVES	2 NOS
PRIMARY COOLER	1 NOS
SECONDARY COOLER	1 NOS

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कार्पोरेशन लि
NORTH EASTERN ELECTRIC POWER CORPORATION LTD
(A GOVT OF INDIA ENTERPRISE)

1384 DOCUMENT/57

ASSAM GAS BASED POWER PLANT

BOKULONI, DIBRUGARH, ASSAM, 786191

Email: dgmagbpelect@gmail.com



No: NEEPCO/AGBP/O&AWC/T-11(Vol-IV)/2021-22/ 739

Date: 31.03.2022.

To,

M/S Pranjana & Associates,
Thapona Gaon, House No. 08,
Near Ganesh Mandir, Lakhra
Guwahati-781034
Tel: 84748 19701/94351 85783 (M)
E-mail: pranjana_co@rediffmail.com

Sub - Work Order for Renovation of Existing CO2 Flooding system (Fire Suppressions System) of MHI make Gas Turbine unit # 1, 2, 3 & 4 including supply, erection, testing and commissioning with interlock protection of respective gas turbine units of Assam Gas Based Power Station, NEEPCO Ltd, Bokuloni, Dibrugarh (Assam)

- Ref: 1 E-tender no NEEPCO/AGBP/O&AWC/2021-22/01 dated 25.06.2021
2 Corrigendum 1 issued under Memo no. NEEPCO/AGBP/O&AWC/T-11/2021-22/ 231-36 dated 29.07.2021,
3. Tender ID: 2021_NEEPC_80411_2
4 Corrigendum 2 issued under Memo no. NEEPCO/AGBP/O&AWC/ T-11/ 2021-22/ 297-302 dated 27.08.2021
5 Corrigendum 3 issued under Memo no. NEEPCO/AGBP/O&AWC/ T-11/ 2021-22/ 343-348 dated 09.09.2021
6 This office letter no. NEEPCO/AGBP/O&AW/2021-22/T-11/557 dated 06.01.2022
7. Your response vide email dated 15.01.2022.
8 E-Auction dated 07.03.2022
9 Your Price Confirmation Letter (Annexure-II of Tender) dated 07.03.2022
10 LOI issued vide letter no. NEEPCO/AGBPS/O&AWC/T-11 (Vol-III)/2021-22/ 723 Dated 19.03.2022.
11. Your acceptance vide letter dated 28.03.2022

Dear Sirs,

With reference to the above, the Corporation is pleased to place this order on you for Renovation of Existing CO2 Flooding system (Fire Suppressions System) of MHI make Gas Turbine unit # 1, 2, 3 & 4 including supply, erection, testing and commissioning with interlock protection of respective gas turbine units of Assam Gas Based Power Station, NEEPCO Ltd., Bokuloni, Dibrugarh (Assam) as per terms and conditions stated below:

TERMS & CONDITIONS:

A. TECHNICAL:

SCOPE OF WORKS

Scope of work shall include Renovation, modification & automation, testing and commissioning of CO2 Flooding system in Mitsubishi make Gas Turbine unit # 1, 2, 3 & 4 including interlock protection of respective gas turbine unit. The scope of work shall also include supply of requisite materials for the purpose of renovation/modification & automation of CO2 flooding system and installation, testing and commissioning of the system. Emphasis should be given on modification of the existing system

[Signature]

without any change in existing design aspects of CO₂ Flooding system. For renovation, modification & automation, testing and commissioning of CO₂ flooding system, only 1 (one) unit will be available at a time. Clearance for next unit will be given after successful commissioning and successful test operation/observation of the 1st unit for a period of 15 (fifteen) days

- a) The following items of the existing system may be reused after thorough inspection & testing
- CO₂ cylinders
 - Discharge pipe lines
 - Mounting frame of CO₂ bank and platform of CO₂ bank

The hydro testing of cylinders & associated pipelines, testing of valves are to be done at plant site in presence of Engineer-In-Charge prior to installation/re-installation of the same. In case hydro test of CO₂ cylinder fails, the new cylinder shall be supplied by the Corporation free of cost to the Contractor

b) SPARES TO BE SUPPLIED:

The Spares/Materials of reputed make or as indicated in this order shall be provided by the contractor for normalizing the system.

c) MODIFICATION OF EXISTING SYSTEM

Any modification of the existing system, prior approval of the Project Authority shall be obtained by the Contractor. Existing zone system (drawing attached-Annexure-II) of CO₂ path and signal path shall be maintained.

d) TEST CERTIFICATES:

The following test certificate shall be submitted along with the bill:

- (i) Hydro-Testing Certificate of CO₂ Cylinder and its associated pipe lines
- (ii) Test certificate of cylinder valve
- (iii) Test certificate of flameproof heat detector mentioning the range of detector
- (iv) Test certificate of the FRLS cable utilized in CO₂ flooding system

e) INSPECTION AND TEST:

Upon completion of the various phases of work or at a convenient time during the progress of work, work executed by the Contractor, shall be checked, tested and inspected by the In-Charge, C&I Division or his authorised representative along with Manager (Fire & Safety). Any defects pointed out, shall be corrected by the Contractor at no additional cost to the Corporation.

All checking and testing procedure shall be performed by the Contractor as directed by the In-Charge, C&I Division.

Pre-commissioning test and operation/observation tests shall be performed by the Contractor under the supervision of the In-Charge, C&I Division.

f) WARRANTY:

The work executed shall be warranted for a period of two years from the date of handing over the system. Any defect/problem arises during the period of warranty shall be replaced or repaired by the Contractor at his own cost within a period of 7 (seven) days failing which the security deposit shall be forfeited.

As per

B. COMMERCIAL:**1.0 PRICE BASIS:**

The price shall remain firm during the currency of the contract. The lump sum contract price for the entire Scope of work shall be **Rs. 1,10, 80,760.00** (Rupees one crore ten lakhs eighty thousand seven hundred and sixty) only including GST @18%. The Price is inclusive of the prices of all spares to be supplied/repared, site visit, service charge and all other applicable charges, if any, in all respect for completion of entire scope of work.

SCHEDULE OF SCOPE OF WORK AND PRICE IS FURNISHED BELOW:

Sl. No.	Description of Work	Amount (Rs)	GST @ 18% (Rs)	Total Amount (Rs)
1.	Renovation of Existing CO2 Flooding system (Fire Suppressions System) of MHI make Gas Turbine unit # 1, 2, 3 & 4 including supply, erection, testing and commissioning with interlock protection of respective gas turbine unit of Assam Gas Based Power Plant, NEEPCO Ltd, Bokuloni, Dibrugarh (Assam). Hence, the price for 1 (one) unit shall be Rs 23,47,618.65 (rupees twenty-three lakhs forty-seven thousand six hundred eighteen and paise sixty-five) only	93,90,474.58	16,90,285.42	1,10,80,760.00
Total:	Rupees one crore ten lakhs eighty thousand seven hundred and sixty only			

2.0 TAXES & DUTIES:

The price indicated above is **inclusive of 18% GST**. However, taxes & duties shall be paid at actual as applicable at the time of execution of work.

3.0 CONTRACT PERFORMANCE GUARANTEE:

Within 30 (Thirty) days from the date of issue of LOI/WO, the Contractor shall furnish unit wise Bank Guarantee in lieu of Security-cum-Performance Guarantee for an amount equal to 3 (three) percent of the basic contract value, as per the enclosed format (**Annexure - III**) from any Nationalized Bank in favour of NEEPCO Ltd. valid for entire period of contract and additional 90 (ninety) days. OR

SECURITY DEPOSIT:

Within 30 (Thirty) days from the date of issuance of work order, the Contractor shall deposit 3 (three) percent of basic contract value towards Security Deposit as per the procedure/steps mentioned at Clause No. 5 of Section-I of tender document for payment by SB-COLLECT of

Dr. K.S.

State Bank of India in to NEEPCO (AGBP) SBI Account, Bokuloni Chariali Branch, Dist. Dibrugarh, Assam. Security Deposit shall be valid till entire guarantee/warranty period and additional 90 (ninety) days thereafter covering claim period.

4.0 PAYMENT TERMS:

- i. 100% value of the contract against each unit shall be released after successful completion of work as per scope of work and submission of work completion certificate of relevant Gas Turbine unit thereof as per contract subject to submission of security deposit equivalent to 3 (Three) % of basic value as mentioned in Clause No. 3.0 above. Otherwise 3 (Three) % of total contract value shall be deducted from the bill as Security Deposit.
- ii. Bill in triplicate, along with requisite documents if any, shall be submitted to the Manager (Fire & Safety) for releasing payment.

5.0 COMPLETION SCHEDULE:

The work of renovation/modification & automation of CO₂ Flooding system for **one unit shall be completed within 80 days** from the date of handing over of site by the Engineer-In-Charge. The unit wise completion period shall include the period of test operation/observation (15 days).

6.0 PAYING AUTHORITY

The GM (F&A), Assam Gas Based Power Station,
NEEPCO Ltd., P.O. Bokuloni Chariali, Dist. Dibrugarh,
Assam, PIN – 786 191.

7.0 LIQUIDATED DAMAGE:

The Contractor shall ensure timely completion of work under this contract to the satisfaction to the Engineer in Charge of NEEPCO. The Contractor shall ensure engagement of adequate skilled manpower for timely completion of entire work satisfactorily as per scope of work. In case the Contractor fails to complete the work satisfactorily within stipulated time period (or any extension thereof) due to reasons attributable to the contractor / supplier, then the Corporation reserve the right to recover from the contractor / supplier's sum towards Liquidated Damage @ ½ % (half percent) value of the total contract for each calendar week or part thereof delay from the schedule completion date (or extension thereof). The total recovery from the contractor / supplier on account this shall, however, not exceed 10% (Ten percent) of the value of the total contract value.

8.0 FORCE MAJEURE:

The terms and condition mutually agreed upon with respect to this agreement shall be subject to force majeure. Neither the contractor nor the Corporation shall be considered default in performing of its obligation herein under if such performance is prevented or delayed because of war, hostilities, revolution, civil commotion, epidemic, accidents, fire, wind, flood or because of any law and order proclamation, regulation or ordinance of the Government or any act of God which is beyond control.

9.0 REPORTING AT SITE:

The Contractor shall report at site immediately after placing the work order. The completion time of 1 (one) unit will be 80 (eighty) days from the date of handing over of site. The 2nd unit shall be handed over for renovation/modification only after successful commissioning of 1st unit and successful completion of test operation/observation of the unit for a period of 15 (fifteen) days.

C. GENERAL TERMS AND CONDITION:

- a. The Contractor is required to comply with all relevant acts, rules and regulations applicable in respect of safety of the personnel engaged for the works

Butt

- b. NEEPCO will not accept any liability for accidents to Contractor's workmen and compensation required to be paid to the Contractor's workmen in the event of any accident. NEEPCO bears no responsibility whatsoever towards the Contractor's workmen for any loss / damage caused by any accident during the works. For any such eventuality the responsibility lies solely on the Contractor.
- c. The Contractor at his own interest and cost shall arrange for adequate insurance cover for his workers to protect them against all claims applicable under Workmen's Compensation Act, 1923
- d. The Contractor's workmen will not be entitled to free medical treatment from NEEPCO. The Contractor shall ensure the receipt of medical benefit to his workmen under Employees State Insurance Act 1948.
- e. The Contractor shall ensure full compliance of various Indian Laws and Statutory Regulations, to the extent applicable, as stated below, but not limited to, in force from time to time:
- i) Workman's Compensation Act, 1923
 - ii) Payment of Wages Act, 1936.
 - iii) Minimum wages Act, 1948.
 - iv) Contract Labour (Regulation & Abolition) Act, 1970.
 - v) Provident Funds and Miscellaneous Provisions Act, 1952.
 - vi) Income Tax Act 1961.
 - vii) Assam Finance Act 1956.
 - viii) Assam Sales Tax Act 1947.
 - ix) Any other Act or Statute having bearing over engagement of workers directly or indirectly for execution of the Contract
- f. The Income Tax and other taxes as may be payable under the provision of relevant Acts will be deducted at source
- g. The Contractor's personnel shall maintain strict discipline and harmony at the work site. The Engineer-in-Charge of NEEPCO shall be at discretion to object to the presence of any worker / representative of the Contractor at site, if in his opinion, such worker / representative has misconducted himself or found incompetent or negligent or otherwise undesirable; the Contractor shall remove such person(s) immediately
- h. The persons engaged by the Contractor must not be found under the influence of alcohol and drugs within the Plant area during the duty hours and also maintain decorum in the Plant area at all the time. The Contractor shall not engage minor labour below 18 (eighteen) year of age under any circumstances.
- i. Temporary Entry Pass for entry into the work site will be issued by NEEPCO in favour of the Contractor and each of his workers till expiry of the contract period. No personnel shall be allowed to enter inside the NEEPCO's Plant/Colony area without valid Entry Pass. The Contractor shall apply for the temporary Entry pass for his employees giving full details of them.
- j. SETTLEMENT OF DISPUTES:**
A process of mutual settlements shall decide all the differences or disputes arising out of the Contract between the parties. However, if the process of mutual settlements fails, then the dispute under this contract will be settled through arbitration as per Indian Arbitration and Conciliation Act.
- k. TERMINATION OF CONTRACT:**
NEEPCO reserves the right to terminate this contract in the event of Contractor's continued default in providing requisite services after proper and due notice having being served upon.

NEEPCO also reserves the right to terminate this contract if any condition under FORCE MAJEURE warrants stoppage of the work. In case of termination on account of this reason, before completion of the Contract period the Contractor shall be paid all eligible charges as per this contract on pro rata basis for the work done up to the date of termination. On expiry of the Contract period, this contract will automatically stand terminated.

n. AGREEMENT:

The Contractor shall be required to sign the Contract Agreement in 3 (three) copies along with appropriate Power of Attorney and other requisite material within 7 (seven) days from the date of placement of order, the Contractor shall depute representative for signing the Agreement.

o. BREACH OF CONTRACT:

In case of infringement of any terms and conditions major or minor of this covenant/agreement by the Contractor the Corporation shall have full power to rescind, cancel or terminate the contract after observing all legal formalities. The decision of Corporation in this regard shall be final and binding.

p. SUSPENSION OF WORK:

- i. The Corporation reserves the right to suspend and restore execution of the whole or any part of the awarded Contract. Orders for suspension or restoring the works will be issued by the Engineer-in-Charge to the Contractor in writing.
- ii. Any necessary and demonstrable costs incurred by the Contractor as a result of such suspension of the works will be paid by the Corporation, provided such costs are substantiated to the satisfaction of the Engineer-in-Charge. The Corporation shall not be responsible for any liabilities if suspension is due to some default on the part of the Contractor.

All other terms and conditions under this work order shall be governed by the terms and conditions of E-tender no **NEEPCO/AGBP/O&AWC/2021-22/01** dated 25.06.2021 (Tender ID: 2021_NEEPC_80411_2)

You are requested to start the works in consultation with the Manager (Fire & Safety) and I/C C&I Division. Kindly acknowledge receipt of this work order.

Thanking you,

Yours faithfully,

Encl: Annexure-I, II & III

(Binita Dutta)
DGM (E/M), O&AWC,
AGBPS, NEEPCO Ltd.,
Bokuloni Chariali,
Dibrugarh-786 191
E-mail: dgmagbpelect@gmail.com

No. **NEEPCO/AGBPS/O&AWC/T-11 (Vol-IV)/2021-22/ 739-44**

Date: 31.03.2022.

Copy for favour of kind information to:

1. The HOP, AGBPS, NEEPCO Ltd., This order is in accordance with his approval note ref. no HOP/1243 dated 14.03.2022.
2. The GM (F&A), AGBPS, NEEPCO Ltd, with a copy of approval note.
3. The GM (E/M), C&I-O&AWC-PEM, AGBPS, NEEPCO Ltd., for favour of necessary action please.
4. The DGM (E/M), Vigilance Wing, AGBPS, NEEPCO Ltd.
5. The Manager (Safety), AGBPS, NEEPCO Ltd, for necessary action please.

DGM (E/M), O&AWC
AGBP, NEEPCO Ltd.



Dial 122 for Complaints on Electricity

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191
E-mail : agbp.bokuloni@gmail.com



Assam Gas Based Power Plant

No. NEEPCO/AGBPS/CWC/ 2022-2023/T-02/MSME/२१२

Date. 17/11/2022

To
Sri Jitu Gogoi
P.O Bhadol Panchall
Dist. Dibrugarh, Assam.
Pin. 786191

Sub: Work Order for " Repairing and Renovation works of 2 (Two) nos. of Clariflocculator of Assam Gas Based Power Station, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam."

Ref: (i) Our NIB No. NEEPCO/AGBPS/CWC/2022-23/07 Dtd.08.08.2022
(ii) Your Offer Dtd.29.08.2022
(iii) Your Letter Dtd.07.11.2022

Dear Sir,

With reference to the above, we are pleased to place this order for execution of above-mentioned work as per the Schedule of Item and Rate sheet mentioned at Annexure – I and as per Terms & Conditions as stated below:

TERMS AND CONDITIONS:

- SCOPE OF WORK:** The scope of work covered under this contract includes " Repairing and Renovation works of 2 (Two) nos. of Clariflocculator of Assam Gas Based Power Station, NEEPCO, Bokuloni, Dist. Dibrugarh, Assam."
Material required under the scope of the Contract shall be arranged by the Contractor without any extra cost to the Corporation.
All works are to be executed in accordance with the Specifications as mentioned in the Annexure - I and as directed by the Engineer-in- Charge or his authorised representative.
- VALUE OF WORK:** The value of the work is Rs.8.03,000.00 (Rupees Eight lakhs three thousand) only including GST.
- VARIATIONS IN QUANTITIES:** Rates mentioned at ANNEXURE-I are FIRM and shall hold good for all quantity variation till completion of entire works to the full satisfaction of the Corporation.
- TIME OF COMPLETION:** The entire work under this contract is to be completed in all respects within 75 (Seventy-five) days from the date of issue of work order.
- PAYMENT:** Payment shall be made after completion of entire works to the full satisfaction of the Corporation.
- COMPENSATION FOR DELAY:** Compensation for delay shall be as per the relevant clause of the agreement.
- DEFECT LIABILITY PERIOD:** The Defects Liability Period is 12 (twelve) months from the date of successful completion of the Work.

GME
G. Gogoi
21/11/22

G/M (E)
Dr
21/11/22

N-7(B)

GME
G. Gogoi

8. SECURITY DEPOSIT: Security Deposit, 3% (Three) of the total value of the work actually executed including escalation, if any, shall be retained from payments to the Contractor for a defect liability period of 12 (Twelve) months from the date of completion of the work. Contractor shall rectify the defects as observed/pointed out during the defect liability period at his own cost. The security deposit shall be released on demand to the contractor on expiry of defect liability period or completion of defect rectification work to the satisfaction of the Engineer-in-charge after duly deducting any outstanding dues pending if any against the contractor.
9. All the terms and conditions as stipulated in the bid documents shall prevail.
10. G.S.T: GST as per Government applicable norms.
11. LABOUR ACT & REGULATION: All statutory Labour Rules and Regulations as notified by the Govt. of India and State Govt. shall govern this contract.

You are requested to attend this office along with Non-Judicial Stamp Paper of Rs.100.00 (Rupees hundred) only for signing of the formal agreement within 30 (Thirty) days from the date of issue of this order.

Enclosed: Annexure - 1

Yours faithfully,


GM (Civil)
Civil Works Complex,
AGBPS, NEEPCO, Bokuloni, Assam.

Date: 17/11/2022

Memo. No. NEEPCO/AGBPS/CWC/2022-23/T-02/MSME/798-802

Copy to:

1. The Head of Project, AGBPS, NEEPCO, Bokuloni for favour of kind information please.
2. The DGM (C), Vigilance, AGBPS, NEEPCO, Bokuloni for information please.
3. The Sr. Manager (C), CWC, AGBPS, NEEPCO, Bokuloni for information & necessary action please.
4. Sri Jogesh Saikia, Manager (C), CWC, AGBPS, NEEPCO, Bokuloni for information & necessary action please.
5. The DM (Fin), AGBPS, NEEPCO, Bokuloni for information & necessary action please. This has reference to the approval of HOP conveyed vide U.O. No. 969 Dtd.15.11.2022.


17/11/2022
GM (Civil)
Civil Works Complex,
AGBPS, NEEPCO, Bokuloni, Assam.

Schedule of Item & Rate Sheet

Annexure-I

Name of Work: Repairing and Renovation works of 2 (Two) Nos. of CLARIFLOCCULATOR of Assam Gas Based Power Station, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam.

Sl.No	Description of Item(s)	Units	Quantity	Rate in Rs.	Amount in Rs.
1	Cleaning of exposed concrete surface of sticking material including loose and foreign material by sand blasting with coarse sand followed by and including cleaning with oil free air blast as per direction of Engineer-in-Charge.	Sqm	885.91	286.43	253751.20
2	Providing, mixing and applying SBR polymer (of approved make) modified Cement mortar in proportion of 1:4 (1 cement : 4 graded coarse sand with polymer minimum 2% by wt. of cement used) as per specifications and directions of Engineer-in-Charge. 25 mm average thickness in 2 layers	Sqm	1325.51	395.02	523602.96
3	15 mm cement plaster on the rough side of single or half brick wall of mix: 1:4 (1cement : 4 fine sand)	Sqm	97.53	262.96	25646.49
Total :(Rupees Eight Lakh Three Thousand) only including GST.				Rs.	8,03,000.00

[Signature]
18/11/2022
General Manager (C),CWC
AGBPS, NEEPCO Ltd., Boukuloni.



ISO 14001: 2015
ISO 9000: 2015
ISO 45001: 2018

नॉर्थ ईस्टर्न इलैक्ट्रिक पावर कॉर्पोरेशन लि
NORTH EASTERN ELECTRIC POWER CORPORATION LTD
(A GOVT OF INDIA ENTERPRISE)



ASSAM GAS BASED POWER PLANT
BOKULONI, DIBRUGARH, ASSAM, 786191

Email:



No. NEEPCO/AGBPS/CWC/2022-2023/T-02/MSME/ 1092

To

M/s New Horizon Enterprise
Block 5, 102 B, Larika Green Valley
Dharapur, Azara, Guwahati
Kamrup Metro, Assam.

Date: 11/01/2023
GM(E)
Per
13/1

Sub: Work Order for Repairing and Renovation works of Aerator at Plant area of Assam Gas Based Power Station, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam.
Ref: (i) Our NIB No. NEEPCO/AGBPS/CWC/2022-2023/16 Dtd.21.11.2022.
(ii) Your Offer Dtd.19.12.2022.

Dear Sir (s),

With reference to the above, we are pleased to place this order for execution of above-mentioned work as per the Schedule of Item and Rate sheet mentioned at Annexure - 1 and as per Terms & Conditions as stated below:

TERMS AND CONDITIONS:

- SCOPE OF WORK:** The scope of work under this contract shall include Repairing and Renovation works of Aerator at Plant area of Assam Gas Based Power Station, NEEPCO Ltd., Dist. Dibrugarh, Assam.
Material required under the scope of the Contract shall be arranged by the Contractor without any extra cost to the Corporation.
All works are to be executed in accordance with the Specifications as mentioned in the Annexure - I and as directed by the Engineer-in- Charge or his authorised representative.
- VALUE OF WORK:** The value of the work is Rs.4,64,415.00 (Rupees Four lakhs sixty-four thousand four hundred & fifteen) only including GST.
- VARIATIONS IN QUANTITIES:** Rates mentioned at ANNEXURE-I are FIRM and shall hold good for all quantity variation till completion of entire works to the full satisfaction of the Corporation.
- TIME OF COMPLETION:** The entire work under this contract is to be completed in all respects within 60 (Sixty) days from the date of issue of this work order.
- PAYMENT:** Payment shall be made after completion of entire works to the full satisfaction of the Corporation.
- Paying Authority:** Dy. Manager (Fin), AGBPS, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam.
- COMPENSATION FOR DELAY:** Compensation for delay shall be as per the relevant clause of the agreement.
- DEFECT LIABILITY PERIOD:** The Defects Liability Period is 12 (twelve) months from the date of successful completion of the Work.

GM(E)
Per
11/1/23

11-7(B)

Enter
Per



ISO 14001: 2015
ISO 9000: 2015
ISO 45001: 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कार्पोरेशन लि
NORTH EASTERN ELECTRIC POWER CORPORATION LTD
(A GOVT OF INDIA ENTERPRISE)

ASSAM GAS BASED POWER PLANT
BOKULONI, DIBRUGARH, ASSAM, 786191

Email:



9. SECURITY DEPOSIT: Security Deposit, 3% (Three) of the total value of the work actually executed including escalation, if any, shall be retained from payments to the Contractor for a defect liability period of 12 (Twelve) months from the date of completion of the work. Contractor shall rectify the defects as observed/pointed out during the defect liability period at his own cost. The security deposit shall be released on demand to the contractor on expiry of defect liability period or completion of defect rectification work to the satisfaction of the Engineer-in-charge after duly deducting any outstanding dues pending if any against the contractor.
10. All the terms and conditions as stipulated in the bid documents shall prevail.
11. G.S.T: GST applicable as per Govt. norms.
12. LABOUR ACT & REGULATION: All statutory Labour Rules and Regulations as notified by the Govt. of India and State Govt. shall govern this contract.

You are requested to attend this office along with Non-Judicial Stamp Paper of Rs.100.00 (Rupees hundred) only for signing of the formal agreement within 30 (Thirty) days from the date of issue of this order with deposition of Initial Security Deposit (ISD) equivalent to the amount of EMD through SB Collect, State Bank of India Account (AGBP), Bokuloni Chariali Branch, Dist. Dibrugarh, Assam. The Initial Security Deposit shall be released after issuance of Completion Certificate by the Corporation.

Enclosed: Annexure - I

Yours faithfully,

GM (Civil)
Civil Works Complex,
AGBPS, NEEPCO, Bokuloni, Assam.

Memo. No. NEEPCO/AGBPS/CWC/2022-23/T-02/MSME/1093-96

Date: 11/01/2023

Copy to:

- ✓ 1. The Head of Project, AGBPS, NEEPCO, Bokuloni for favour of kind information please.
2. The DGM (C), Vigilance, AGBPS, NEEPCO, Bokuloni for information please.
3. Sri Jogesh Saikia, Manager (C), CWC, AGBPS, NEEPCO, Bokuloni for information & necessary action please.
4. The DM (Fin), AGBPS, NEEPCO, Bokuloni for information & necessary action please. This has reference to the approval of HOP conveyed vide U.D. No. 1167 Dtd.06.01.2023.

GM (Civil)

Civil Works Complex,
AGBPS, NEEPCO, Bokuloni, Assam.

Schedule of Item & Rate Sheet

Annexure-I 1395

Name of Work: Repairing and Renovation works of AERATOR at Plant area of Assam Gas Based Power Station, NEEPCO Ltd.,
Jokuloni, Dist : Dibrugarh, Assam .

Sl.No	Description of Work / Item(s)	Units	Quantity	Rate in Rs.	Amount in Rs.
1	Cleaning of exposed concrete surface of sticking material including loose and foreign material by sand blasting with coarse sand followed by and including cleaning with oil free air blast as per direction of Engineer in charge.	Sqm	295.87	294.25	87059.75
2	Providing and inserting 12mm dia galvanised steel injection nipple in honey comb area and along crack line including drilling of holes of required diameter (20mm to 30mm) up to depth from 30mm to 80mm at required spacing and making the hole & crack dust free by blowing compressed air, sealing the distance between injection nipple with adhesive chemical of approved make and allow it to cure complete as per direction of Engineer in-Charge.	Each	74.00	215.80	15969.20
3	Providing grouting in R.C.C Column and slab by drilling holes up to the required depth in a zigzag manner or as per drawing using a drill machine fixing a nozzle 12 mm dia for injecting grout materials till the refusal of injected grout materials from the adjacent nozzle (grouting operation pressure shall be in between 2 to 4kg per 5qm). Followed by cutting the exposed nozzle so as to make the surface of the column and slab area free from grouting pipes and to seal the gap with polymer modified mortar as specified and directed by the department complete at all levels. All required machine and materials to be arranged by the contractor. Polyurethane injection grout in concrete/RCC work of approved make . Materials description:Fosroc Nitofil WS60 PU Foam Grout.	Kg	45.00	2452.49	110362.05
4	Providing, mixing and applying SBR polymer (of approved make) modified Cement mortar in proportion of 1:4 (1 cement: 4 graded coarse sand with polymer minimum 2% by wt. of cement used) as per specifications and directions of Engineer-in-charge. Note: Measurement and payment: The premeasurement of thickness shall be done just after the surface preparation is completed and Payment under this item shall be made only after proper wet curing has been done and surface has been satisfactorily evaluated by sounding / tapping with a blunt metal instrument and/or the 75mm size cube crushing strength at the end of 28 days to be not less than 30 N/Sqmm2). 12 mm average thickness	Sqm	147.99	343.35	50812.37
5	25 mm average thickness in two layers	Sqm	147.87	686.68	101539.37

Name of Work: Repairing and Renovation works of AERATOR at Plant area of Assam Gas Based Power Station, NEEPCO Ltd., Bokuloni, Dist : Dibrugarh, Assam .

Sl.No	Description of Work / Item(s)	Units	Quantity	Rate in Rs.	Amount in Rs.
6	Providing and applying Deckguard E 2000 or Masterseal 878 of BASF or equivalent, a High Performance Anticarbonation Protective Coating System, over the prime surface using an airless spray or roller at right angles to each other @ coverage of 5 Sqm per litre per coat @ 200 microns wft / 100 microns DFT with an intercoat period of minimum 12 hrs @ 35°C. The coverage per litre for 2 coats shall be 2.5 Sqm @ 200 microns DFT. The protective coating system should have CO2 diffusion resistance not less than 240mm equivalent of air thickness and 60cm equivalent of 30N concrete along with a water vapour transmission resistance of less than 1.0 metre (Taywood method), the coating should have static crack accommodation of not less than 2mm (BRE) and adhesion greater than 1.0 N/mm ² as per BS 1881.	Sqm	295.87	333.50	98672.65
Total : (Rupees four lakhs sixty four thousand four hundred fifteen) only including GST.					Rs. 4,64,415.00


 11/01/2023
 General Manager (C), CWC
 AGBPS, NEEPCO Ltd., Bokuloni.



ISO 14001: 2015
ISO 9000: 2015
ISO 45001: 2018

নॉর্থ ईस्टर्न इलैक्ट्रिक पावर कार्पोरेशन लि
NORTH EASTERN ELECTRIC POWER CORPORATION LTD
(A GOVT OF INDIA ENTERPRISE)

ASSAM GAS BASED POWER PLANT

BOKULONI, DIBRUGARH, ASSAM, 786191

Email:



No. NEEPCO/AGBPS/CWC/2022-2023/T-02/MSME/1099

Date: 11/01/2023

To

M/s Loknath & Company
No 2 Kathalguri
P.O. Bhadoi Panchali
Dist. Dibrugarh, Assam.

ZM(E)
Date 13/1/23

Sub: Work Order for Repairing and Renovation of Intake Well Pump House of Assam Gas Based Power Station at Fakial Ghat, Joypur, Dist. Dibrugarh, Assam.

Ref: (i) Our NIB No. NEEPCO/AGBPS/CWC/2022-2023/12 Dtd.20.10.2022
(ii) Your Offer Dtd.16.11.2022

Dear Sir(s),

With reference to the above, we are pleased to place this order for execution of above-mentioned work as per the Schedule of Item and Rate sheet mentioned at Annexure - I and as per Terms & Conditions as stated below:

TERMS AND CONDITIONS:

- SCOPE OF WORK:** The scope of work under this contract shall include "Repairing and Renovation of Intake Well Pump House of Assam Gas Based Power Station at Fakial Ghat, Joypur, Dist. Dibrugarh, Assam".
Material required under the scope of the Contract shall be arranged by the Contractor without any extra cost to the Corporation.
All works are to be executed in accordance with the Specifications as mentioned in the Annexure - I and as directed by the Engineer-in-Charge or his authorised representative.
- VALUE OF WORK:** The value of the work is Rs.4,89,180.00 (Rupees Four lakhs eighty-nine thousand one hundred & eighty) only including GST.
- VARIATIONS IN QUANTITIES:** Rates mentioned at ANNEXURE-I are FIRM and shall hold good for all quantity variation till completion of entire works to the full satisfaction of the Corporation.
- TIME OF COMPLETION:** The entire work under this contract is to be completed in all respects within 80 (Eighty) days from the date of issue of this work order.
- PAYMENT:** Payment shall be made after completion of entire works to the full satisfaction of the Corporation.
- Paying Authority:** Dy. Manager (Fin), AGBPS, NEEPCO Ltd., Bokuloni, Dist. Dibrugarh, Assam.
- COMPENSATION FOR DELAY:** Compensation for delay shall be as per the relevant clause of the agreement.
- DEFECT LIABILITY PERIOD:** The Defects Liability Period is 12 (twelve) months from the date of successful completion of the Work.
- SECURITY DEPOSIT:** Security Deposit, 3% (Three) of the total value of the work actually executed including escalation, if any, shall be retained from payments to the Contractor for a

Subscribed
[Signature]

ZM(E)
[Signature]
Date 12/1/23



ISO 14001: 2015
ISO 9000: 2015
ISO 45001: 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कार्पोरेशन लि
NORTH EASTERN ELECTRIC POWER CORPORATION LTD
(A GOVT OF INDIA ENTERPRISE)

ASSAM GAS BASED POWER PLANT

BOKULONI, DIBRUGARH, ASSAM, 786191

Email:



defect liability period of 12 (Twelve) months from the date of completion of the work. Contractor shall rectify the defects as observed/pointed out during the defect liability period at his own cost. The security deposit shall be released on demand to the contractor on expiry of defect liability period or completion of defect rectification work to the satisfaction of the Engineer-in-charge after duly deducting any outstanding dues pending if any against the contractor.

10. All the terms and conditions as stipulated in the bid documents shall prevail.
11. G.S.T: GST shall be applicable as per Govt. norms.
12. LABOUR ACT & REGULATION: All statutory Labour Rules and Regulations as notified by the Govt. of India and State Govt. shall govern this contract.

You are requested to attend this office along with Non-Judicial Stamp Paper of Rs.100.00 (Rupees hundred) only for signing of the formal agreement within 30 (Thirty) days from the date of issue of this order with deposition of Initial Security Deposit (ISD) equivalent to the amount of EMD through SB Collect, State Bank of India Account (AGBP), Bokuloni Chariali Branch, Dist. Dibrugarh, Assam. The Initial Security Deposit shall be released after issuance of Completion Certificate by the Corporation.

Enclosed: Annexure - I

Yours faithfully,

GM (Civil)
Civil Works Complex,
AGBPS, NEEPCO, Bokuloni, Assam.

Memo. No. NEEPCO/AGBPS/CWC/2022-23/T-02/MSME/1100-04 Date: 11/01/2023
Copy to:

- ✓ 1. The Head of Project, AGBPS, NEEPCO, Bokuloni for favour of kind information please.
2. The DGM (C), Vigilance, AGBPS, NEEPCO, Bokuloni for information please.
3. The Sr. Manager (C), CWC, AGBPS, NEEPCO, Bokuloni for information & necessary action please.
4. Sri Jogesh Saikia, Manager (C), CWC, AGBPS, NEEPCO, Bokuloni for information & necessary action please.
5. The DM (Fin), AGBPS, NEEPCO, Bokuloni for information & necessary action please. This has reference to the approval of HOP conveyed vide U.O. No. 1292 Dtd. 10.01.2023.

GM (Civil)

Civil Works Complex,
AGBPS, NEEPCO, Bokuloni, Assam

कु

Schedule of Item & Rate Sheet

Annexure-I

Name of Work: Repairing and Renovation of Intake Well Pump House of AGBPS at Fakial Ghat, Joypur, Dist. Dibrugarh, Assam.

Sl.No	Description of Work / Item(s)	Unit	Quantity	Rate in Rs.	Amount in Rs.
1	Providing & Applying a multi coat, anticorrosive, Priming Epoxy and Polyurethane paint on structural metal surface. Scope of the work: Clearing of the existing structural metal surface by manual method using emery paper, grinding wheels and necessary power tools. All consumable such as safty belt emery paper grinder wheels, wire brush, painting brush etc will be in applicator scope. 1. Priming coat : RUST OCap, DFT-80 micrown (one layer) from Asian paint 2). Epoxy paint Asian epoxy H.B finishe, DFT 50 micrown (one layer) from Asian paint. 3) Polyurethane paint, Apcothane CF 675 from Asian paint. DFT 40 micrown (one layer) excluding scaffolding work.	Sqm	303.09	420.00	127297.80
2	Providing and fixing double scaffolding system (cup lock type) on the exterior side, up to seven story height made with 40 mm dia M.S. tube 1.5 m centre to centre, horizontal & vertical tubes joining with cup & lock system with M.S. tubes, M.S. tube challes, M.S. clamps and M.S. staircase system in the scaffolding for working platform etc. and maintaining it in a serviceable condition for the required duration as approved and removing it there after. The scaffolding system shall be stiffened with bracings, runners, connection with the building etc wherever required for inspection of work at required locations with essential safety features for the workmen etc. complete as per directions and approval of Engineer in-charge. The elevational area of the scaffolding shall be measured for payment purpose. The payment will be made once irrespective of duration of scaffolding.	Sqm	478.20	189.00	90379.80
3	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level 1:2:4 (1 cement : 2 coarse sand (zone-III) derived from natural sources : 4 graded stone aggregate 20 mm nominal size derived from natural sources)	Cum	8.454	7000.00	59178.00
4	Painting with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade One or more coats on old work.	Sqm	230.25	60.00	13815.00
5	Wall painting with plastic emulsion paint of approved brand and manufacture to give an even shade One or more coats on old work.	Sqm	287.43	70.00	20120.10
6	Steel work welded in built up sections/ framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required. In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works	Kg	467.57	130.00	60784.10

Name of Work: Repairing and Renovation of Intake Well Pump House of AGBPS at Fakial Ghat, Joypur, Dist. Dibrugarh, Assam.

Sl.No	Description of Work / Item(s)	Unit	Quantity	Rate in Rs.	Amount in Rs.
7	Finishing with Deluxe Multi surface paint system for interiors and exteriors using Primer as per manufacturers specifications : Two or more coats applied on walls @ 1.25 ltr/10 sqm over and including one coat of Special primer applied @ 0.75 ltr /10 sqm	Sqm	325.68	100.00	32568.00
8	Demolishing cement concrete manually/ by mechanical means including disposal of material within 50 metres lead as per direction of Engineer - in - charge Nominal concrete 1:3:6 or richer mix (l/c equivalent design mix)	Cum	2.70	1500.00	4050.00
9	Application: Providing and applying 3 coats of Fosroc Brush bond roof guard, single component acrylic polymer Brush bond roof guard, single component acrylic polymer modified reinforced high build water proofing compound after priming on the roof to get a minimum dry thickness of 1mm as per manufacturers specification .No toping required over the grading.The cured membrane should exhibit the tensile strength of 1.1Mpa as per ASTM 0412 with elongation 100% as ASTM D12 with very low penetration to rapid chloride as per ASTM C1202-03 with pull of Adhesion 0.92 Mpa as per ASTM D4541.The cured membrane should also have resistance to algae growth las per ASTM 05589-97 with permeability of 5mm as per BSEN 12390 Part 8, with water vapour transmission 6kg/Sqmh as per BSEN 12390 part 8.	Sqm	147.25	550.00	80987.50
Total : (Rupees Four lakhs eighty nine thousand one hundred & eighty) only including GST.				Rs.	4,89,180.00

J. J. J.
11/01/2023
GM (Civil), CWE,
AGBPS, NEEPCO Ltd., Bokuloni.

NEEPCO/AGBP/U&WC/T-6/2020-21/ 277

dtd. 04/01/2021

M/S Glocon Enterprise,
Manab kalia Namghar Road,
Tinsukia, 786125.

3700000109

SUB: Supply and erection of Medium Voltage Covered Conductor (MVCC) in 11KV Intake line of AGBP, NEEPCO LTD, Bokuloni.

- Ref: i) NITNo. NEEPCO/AGBP/U&WC/2020-21/02 dated 20/08/2020.
ii) Online tender ID NO. 2020_NEEPC_56077_1.
iii) Your mail dated 02/12/2020.

Dear sir(s),

With reference to the above, we are pleased to place this order for supply and erection of Medium Voltage Covered Conductor (MVCC) in 11KV Intake line of AGBP, NEEPCO LTD, Bokuloni as per the 'Items & Prices' indicated in 'ANNEXURE-I' enclosed herewith under terms and conditions stated below.

Terms & conditions:

1. **Scope:** - Supply, Installation, Testing & commissioning of Medium Voltage Covered Conductor (MVCC) in 11 KV line as per specification mentioned in ANNEXURE-I at AGBP, NEEPCO Ltd., P. O. Bokuloni Chariali, Dist. Dibrugarh, Assam, PIN - 786 191.
2. **Prices:** - The total prices for the contract is Rs.15,39,543.00 (Rupees fifteen lakh thirty nine thousand five hundred forty two) only including GST indicated in ANNEXURE-I and shall remain firm during the currency of this contract.
3. **Payment terms:** - 90 % payment shall be released on successful completion of the works and another 10% value of the contract shall be deducted from the bill in lieu of security deposit and shall be released after completion of the guarantee/warranty period.
4. **Taxes & Duties:** The above price is including of GST.
5. **Guarantee/Warranty:** The works shall be guaranteed for a period of 12 (twelve) calendar months from the date of completion of the works satisfactorily.
6. **Materials:** Materials to be used for the works shall be provided by the contractor subject to the acceptance of the site engineer. In the event of any defect found in materials or workmanship or otherwise not conformity with the requirement of the contract specification the same will be rejected and contractor shall have rectify/replace the same free of cost.
7. **Tools & Plants:** The contractor shall arrange the Tools & Plants required for execution of works.
8. **The Corporation bears no responsibility whatsoever towards the contractor's personnel for any loss /damage caused by any accident during the works. For any such eventuality the responsibility lies solely on the contractor.**

9. **The contractor shall** be solely responsible for arranging adequate safety personnel while at work and adhere to relevant safety regulations.
10. **The Contractor shall** ensure full compliance to various laws and statutory Regulation to the extent applicable as stated below, but not limited to in force from time to time:
- Workman's compensation Act 1948.
 - Payment of wages Act.
 - Contract labour (Regulation & Abolition) Act 1970.
 - Provident fund and Miscellaneous Provision Act 1952.

11. **Completion Period:** The works shall be completed within 60 (sixty) days in all respect from the date of issue of this order.

12. **Liquidity Damage:** Liquidity damage would be charged 0.5% per week subject to maximum 10% if the work will be not completed within stipulated time period except under force majeure condition.

13. **Force Majeure:** Force majeure is herein defined as any cause which is beyond the control of supplier or purchaser as the case may be, which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affects the performance of the contract. This includes but not limited to wars, insurrection, civil disobediences, strikes, riots, epidemics, earthquakes, storms, floods, explosions or fire not caused by contractors negligence, lighting acts of God or the Public enemy which is of such a nature. Such occurrence will be notified by the either party within 15 days from the date of occurrence. The purchaser or the supplier shall not be liable for delays in performing his obligations resulting from any force majeure cause as referred above. The date of completion will, subject to hereinafter provided, be extended by a reasonable time even though such cause may occur after supplier's performance of obligation has been delayed due to other causes.

14. **Paying authority:** The DGM(F&A),AGBP, NEEPCO Ltd., Bokulani, Dibrugarh.


15. **Consignee:** (i) The DGM (E/M), MMW, AGBP, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam for item sl.no 1 to 7 and (ii) The Manager (E/M), U&WC, AGBP, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam for item No.8 of Annexure-I.

You are requested to start the work in consultation with. Manager (E/M), U&WC AGBP, NEEPCO, Bokuloni Charali and attend this office along with a Stamp Paper of Rs. 20.00 (rupees twenty) only within 7(seven) days from the issue of this work order for signing of formal agreement in NEEPCO F-2 form.

Please acknowledge receipt of this work order & convey your acceptance.

Thanking you.

Yours faithfully,


DGM (E/M), U&WC
AGBP, NEEPCO Ltd.,
Bokulani, Dibrugarh

NIO.

Memo No: AGBP/U&WC/T-6/2020-21/ 278-82

dtd. 04/01/2021

Copy forwarded for favour of kind information to:

1. The HOP, AGBP, NEEPCO Ltd., Bokulani. This is issued against the approval conveyed vide U.O.No. NEEPCO/HOP/1286 dtd 03/12/2020..
2. The DGM (E/M), AGBP , O/O the GM (E), AGBP, NEEPCO Ltd., Bokulani.
3. The DGM(E/M), MMW, AGBP, NEEPCO Ltd ,Bokuloni for kind necessary action.
4. The DGM (F&A), AGBP, NEEPCO Ltd ,Bokuloni. A Copy of the approval is enclosed herewith for reference please.
5. The DGM(E/M), Vig., AGBP, NEEPCO Ltd ,Bokuloni with a copy of the approval.

DGM(E/M)
U&WC/AGBP/NEEPCO LTDAC
RA

ANNEXURE-I
Items description and Prices

Sl.No	Name of the items	Unit	Qty.	Rate in Rs.	Total amount in Rs.
	11 KV AAAC covered conductor of size as per specification below: Cross section: 70 sq mm. Bare conductor diameter: 10.71mm. Inner semi conductive layer thickness: 0.3 mm. Inner XLPE covering thickness: 1.2 mm. Outer XLPE covering thickness: 1.1mm Lightening impulse withstand strength of XLPE layer: 100 KV Weight: 295 Kg/Km. Maximum load at 80 degree temp: 240 Amps. Minimum tensile strength: 20.56 KN. Maximum short circuit current in 1 sec: 6.61 KA.	Mtrs.	2800	262.48	734946.52
2	11 KV Polymeric Tension Insulator class 45 KN with clamps, nut and bolt make by Yamuna Power & Infrastructure Limited	Nos.	48	351.26	16860.69
3	11 KV Polymeric Pin Insulator with GI nuts and bolts, class 5 KN make by Yamuna Power & Infrastructure Limited	Nos.	24	396.65	9519.57
4	11 KV Tension hardware with clamps, nuts and bolts of best quality.	Nos.	48	658.62	31613.80
5 ²	Ties (Top Tie/side) for 11 KV class polymeric insulators of best quality.	Nos.	24	624.35	14984.51
6 ⁴	11 KV termination kit suitable for 70 sq mm MVCC by Yamuna Power Infrastructure Limited	Nos.	48	3073.56	147531.05
7 ⁹	11 KV Tension mid span joint suitable for 70 sq.mm MVCC of best quality.	Nos.	10	512.10	5120.97
8	Stringing of ACSR covered conductor with all accessories like fixing of insulators, tension insulators etc. (including loading and unloading of materials to site but excluding of civil works).	Job	1	344119.60	344119.60
A	TOTAL AMOUNT				1304696.71
B	Add GST @ 18%				234845.41
C	Grand total amount(A+B)				1539542.123

(Rupees fifteen lakh thirty nine thousand five hundred forty two and twelve paise) only.

DGM(E/M), U&WC

AM(E/M), U&WC

Organisation Details	Buyer Details
Type: Central PSU Ministry: Ministry of Power Department: NORTH EASTERN ELECTRIC POWER Corporation Limited Organisation Name:NORTH EASTERN ELECTRIC POWER Corporation Limited Office Zone: Assam Gas Based Power Plant Bokuloni Dibrugarh	Designation: DEPUTY GENERAL MANAGER EM Contact No.: 0374-2825228- Email ID: jitung.neepco@nic.in GSTIN: 18AAACN9991J3ZP Address: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786191, India

Financial Approval Detail	Paying Authority Details
IFD Concurrence: Yes Designation of Administrative Approval: HOP AGBP Designation of Financial Approval: HOP AGBP	Payment Mode: Internet Banking Designation: DEPUTY GENERAL MANAGER FINANCE Email ID: saratk.neepco@nic.in GSTIN: 18AAACN9991J3ZP Address: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, Dibrugarh, ASSAM-786191, India

Seller Details	
GeM Seller ID:	524D180000094287
Company Name:	ACTION CONSTRUCTION EQUIPMENT LIMITED
Contact No.:	09811157929
Email ID:	incometax@ace-cranes.com
Address:	DHUDHOLA LINK ROAD,VILLAGE DUDHOLA, PALWAL, HARYANA-121102, -
MSME verified:	No
GSTIN:	06AAACA6189P1Z5 , 06AAACA6189P1Z5

*GST / Tax invoice to be raised in the name of - Consignee

Product Details							
#	Item Description	Category Name	Model	HSN Code	Ordered Quantity	Unit	Price (Inclusive of all Duties and Taxes in INR)
1	forklifts	Forklifts-IS 6765-2003, IS 10517, IS 5154, IS 10000, IS 10002,	ACE AF50D	8427	1	pieces	1,595,000
Total Order Value (in INR)							1,595,000

Consignee Detail						
S.No	Consignee	Item	Lot No.	Quantity	Delivery Start After	Delivery To Be Completed By
1	Designation: - Email ID: mamanit.neepco@nic.in Contact: 0374-2825411- GSTIN: 18AAACN9991J3ZP Address: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786191, India	forklifts	-	1	08-Feb-2021	25-Mar-2021

Product Specification for forklifts		
Specification	Sub-Spec	Value
	Type of Motor	NA for engine operated
	Engine Capacity (BHP@rpm)	80
	Rated RPM	2300
	Engine Torque Nm@rpm	300
		Page: 235

1406

CONSTRUCTIONAL

No of Cylinders	4
Engine Cubic Capacity/Displacement (CC)	3532
Engine Cooling System	Liquid Cooled
No of speed forward	2
No of speed reverse	1
ForkLift Gradeability (%)	20
AC Traction Motor Capacity, (Kw)	NA
Capacity for AC Motor Pump, (Kw)	NA
AC/DC motor rating	NA for engine operated
DC motor operating voltge	NA for engine operated & AC motor
Standard load centre distance	DH/DV for Forklift for 5000 &6000 kg 600/600mm
Brake System	Hydraulic
Minimum ground clearance, (mm)	125
Lifting Stages	3
Lift Height (metres)	4 to 4.5 meters
Fork arm for fork lift truck	confirm to IS 6876 latest
Mounting dimensions for attachment	to the extent applicable IS 7525 latest
Make and model of offered fork lift	ACE AF50D
Max. fork spread (mm)	2000
Fork size (mm)	1220
Overall length (mm)	3155
Overall width (mm)	1990
Overall height raised (mm)	5600
Collapsed Height (mm)	2225
Free Lift Height (mm)	1550
Wheel base shall be declared by manufacturer (mm)	2000
Tyre Type	Solid
Mast tilt forward (in degrees)	6
Mast tilt backward (in degrees)	6
Mass of Truck (Kg)	7560
Forklifts instrument panel	NA for Diesel Engine operated
Instrument Panel for Diesel Operated Forklift	Fitted with Engine oil pressure gauge, Coolant temperature gauge, engine hour-meter & fuel level gauge and switch key for starting
Supply of spares by manufacturer atleast for a period of 10 years	yes
Tare weight of Forklift Truck, (Kg)	7560
Standard tool kit	yes
Light reflectors	yes
Rear view mirror	yes
Fork Extension Pair	No

	Fork Mounted Crane Attachment	No
	Carriage Mounted Crane Attachment	No
	Hydraulic Side shifter Attachment	No
	Parrot Beak attachment	No
	Load Back Rest	Yes
	Alternator shall be provided for charging the battery in case of diesel engine operated fork lift	yes
	Suitable battery charger for traction batteries	NA for Diesel Engine operated
	Head light two numbers, rear light one number and signal lights	yes
	Electric Horn., parking brake, rear towing hook/towing arrangement, adjustable cushioned driver seat and driver overhead guard` with steel reinforcement at the top for	yes
	Consummables: Spare filter kit for engine oil, transmission, hydraulic oil suitable for 4 services shall be provided	yes
	The Hydraulic Cylinders of any one of given Indian make may be used in the FLT. i) Dantal, ii) Wipro, iii)Fasto, iv)TAFE, v)Precission & vi)Canara or equivalent.	yes
GENERIC	Conformity to Indian Standrad	IS: 6765-2003 latest
	Operating Mode	Diesel Engine Operated
	Rated Capacity at Standard Lift Height and Load Centre (Kg)	5000
	Transmission	automatic
	Type of Drive	double
	Rating of Traction Battery (KW/H)	NA for Diesel Engine operated
PERFORMANCE	Minimum Ambient temperature upto which engine shall be able to start without the aid of cold starting device, (°C)	5
	Specific Fuel Consumption (g/kwh)	230
CERTIFICATION	ISI Marking	No
	BIS Licence Number	NA
	Stability testing	as per IS 4357 latest
	Acceptance criteria	as per IS 10517 latest
	Type approval certificate and confirmity of Production certificate from ARAI or other agency as approved by Government of India for latest smoke emmision norms	yes
	Test Report number & Date for Hydraulic cylinder	OR LATEST
	Name & address of lab where Hydraulic cylinder tested	DANTAL GURGAON
	Availability of complete & satisfactory test Report from Central govt/ NABL/ ILAC accredited laboratory to IS10517 latest (Appendix 'A') for Motor, to IS:5154 latest for Traction Battery, to IS 10000 (1 to 12) latest and IS 10002 latest for Diesel Engines whichever applicable.	yes
	Diesel Engine shall conforming to IS 10000 (1 to 12) latest and IS 10002 latest	yes
	Test certificate No. & Date	AALN0050- 08.02.2016
Name & address of lab where test conducted	ARAI PUNE	

Terms and Conditions

1. Special terms and conditions

1.1 Only bid /RA option will be available for buyer as these equipments are not standard and freight Intensive product.

1.2 Test reports if any, desired by buyer will be provided by seller at the time of supply.

1.3 Operational and maintenance contract if desired by buyer will be provided as per their requirement.

1.4 Delivery period will be 90 days (normal).

1.5 Only bid /RA option will be available for buyer as these equipments are not standard and freight Intensive product.

1.6 Test reports if any, desired by buyer will be provided by seller at the time of supply.

1.7 Operational and maintenance contract if desired by buyer will be provided as per their requirement.

1.8 Delivery period will be 90 days (normal).

2. General Terms and Conditions

2.1 This Contract between the Seller and the Buyer, is for the supply of the Goods and/ or Services, detailed in the schedule above, in accordance with the General Terms and Conditions (GTC) as available on the GeM portal (unless otherwise superseded by Goods / Services specific Special Terms and Conditions (STC) and/ or BID/Reverse Auction Additional Terms and Conditions (ATC), as applicable

2.2 Terms of delivery: Free Delivery at Site including loading/unloading. In respect of items requiring installation and / or commissioning and other services in the scope of supply (as indicated in respective product category specification / STC / ATC), and the cost of the same is also included in the Contract price.

2.2.1 Contracted goods should be delivered at the consignee or designated delivery location as per the working time of the buying organisation. Seller may get the same confirmed from consignee before scheduling delivery.

2.2.2 A copy of the contract should be available with the messenger / dispatching agency that delivers the Goods at consignee / delivery location (preferably pasted / attached outside the consignment / package) for easy reference and ease in delivery acceptance.

2.3 Delivery period: The Delivery Period/Time shall be essence of the Contract and delivery must be completed not later than such date(s). Any modification thereto shall be mutually agreed and incorporated in the Contract as per the provisions of the GTC.

2.4 Performance Security: If the Seller fails or neglects to observe or perform any of his obligations under the contract it shall be lawful for the Buyer to forfeit either in whole or in part, the Performance Security furnished by the Seller.

2.5 Taxes and Duties: Contract Prices are all inclusive i.e. including all taxes, duties, local levies / transportation / loading-unloading charges etc. Break up of GST shall be indicated by the Seller while raising invoice / bill on GeM. While submitting the bill / invoice Seller shall undertake that the Goods and Services Tax (GST) charged on this bill is not more than what is payable under the provision on the relevant Act or the Rules made there under and that the Goods on which GST has been charged have not been exempted under the GST Act or the Rules made there under and the charges on account of GST on these goods are correct under the provision of that Act or the rules made there under.

2.6 Octroi Duty and / or other local taxes: Contract Prices are all inclusive hence no reimbursement over and above the contract price(s) shall be allowed to seller towards payment of local taxes (such as levy of town duty, Octroi Duty, Terminal Tax and other levies of local bodies etc).

2.7 Limitation of Liability: The provisions of limitation of liability between Buyer and Seller as given in the GTC shall be applicable here.

2.8 Resolution of disputes: The provisions of DISPUTE RESOLUTION BETWEEN BUYER AND SELLER as given in the GTC shall be applicable here.

2.9 Liquidated Damages: If the Seller fails to deliver any or all of the Goods/Services within the original/re-fixed delivery period(s) specified in the contract, the Buyer will be entitled to deduct/recover the Liquidated Damages for the delay, unless covered under Force Majeure conditions aforesaid, @ 0.5% per week or part of the week of delayed period as pre-estimated damages not exceeding 10% of the contract value without any controversy/dispute of any sort whatsoever. In case, Service Level Agreement (SLA) is applicable the same shall be applicable for the Contract.

2.10 Financial Certificate:

2.10.1 The expenditure involved for this purpose has received the Sanction of the competent financial authority.

2.10.2 The funds are available under the proper head in the sanction budget allotment for the concern financial year.

2.10.3 I have been fully authorized by the department to sign the supply order or incur the liability of the Goods being ordered.

2.11 The bidder should submit a self declaration to the effect in bidder's official letter head that their agency have not been black listed by any Agency whatsoever till date.

3. Additional Terms and conditions

3.1 Availability of Service Centres: Bidder/OEM must have a Functional Service Centre in the State of each Consignee's Location in case of carry-in warranty. (Not applicable in case of goods having on-site warranty). If service center is not already there at the time of bidding, successful bidder / OEM shall have to establish one within 30 days of award of contract. Payment shall be released only after submission of documentary evidence of having Functional Service Centre.

3.2 Bidder Turn Over Criteria: The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year, should be as indicated in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the bidder is less than 3 year old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria.

3.3 Bidders can also submit the EMD with Payment online through RTGS / internet banking in Beneficiary name North Eastern Electric Power Corporation Limited Account No. 00000034098989892 IFSC Code SBIN0009143 Bank Name State Bank of India Branch address Bakulani Chariali.

Bidder to indicate bid number and name of bidding entity in the transaction details field at the time of on-line transfer. Bidder has to upload scanned copy / proof of the Online Payment Transfer along with bid.

1409

3.4 Bidder financial standing: The bidder should not be under liquidation, court receivership or similar proceedings, should not be bankrupt. Bidder to upload undertaking to this effect with bid.

3.5 Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

3.6 Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

3.7 Dedicated /toll Free Telephone No. for Service Support : BIDDER/OEM must have Dedicated/toll Free Telephone No. for Service Support.

3.8 Data Sheet of the product(s) offered in the bid, are to be uploaded along with the bid documents. Buyers can match and verify the Data Sheet with the product specifications offered. In case of any unexplained mismatch of technical parameters, the bid is liable for rejection.

3.9 End User Certificate: Wherever Bidders are insisting for End User Certificate from the Buyer, same shall be provided in Buyer's standard format only.

3.10 Experience Criteria: The Bidder or its OEM (themselves or through reseller(s)) should have regularly, manufactured and supplied same or similar Category Products to any Central / State Govt Organization / PSU / Public Listed Company for 3 years before the bid opening date. Copies of relevant contracts to be submitted along with bid in support of having supplied some quantity during each of the year. In case of bunch bids, the primary product having highest value should meet this criterion.

3.11 For fulfilling the experience criteria any one of the following documents may be considered as valid proof for meeting the experience criteria:

- a. Purchase Order copy along with Invoice(s) with self-certification by the bidder that supplies against the invoices have been executed.
- b. Execution certificate by client with order value.
- c. Any other document in support of order execution like Third Party Inspection release note, etc.

3.12 Installation, Commissioning, Testing, Configuration, Training (if any - which ever is applicable as per scope of supply) is to be carried out by OEM / OEM Certified resource or OEM authorised Reseller.

3.13 NET WORTH: Net Worth of the OEM should be positive as per the last audited financial statement.

3.14 OEM Turn Over Criteria: The minimum average annual financial turnover of the OEM of the offered product during the last three years, ending on 31st March of the previous financial year, should be as indicated in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the OEM is less than 3 year old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria. In case of bunch bids, the OEM of CATEGORY RELATED TO primary product having highest bid value should meet this criterion.

3.15 Over and above the normal Warranty terms as per GeM GTC, the successful bidder / OEM shall have to provide Comprehensive Warranty during the entire Standard warranty period as per contract. : The comprehensive warranty shall be covering the following scope Any kind of mechanical as well as electrical defects, like breakdown of forklift due to Engine, hydraulic system, breaks, electrical control system etc. within warranty period of 36 months (Upload an undertaking with the bid confirming compliance by the bidder if Bidder is taking onus of this compliance. In case OEM is taking onus of this compliance, OEM undertaking is to be uploaded along with Bidder undertaking)

3.16 Purchase preference to Micro and Small Enterprises (MSEs): Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1+ 15% of margin of purchase preference /price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for percentage of 100% of total value.

3.17 Preference to Make In India products (For bids less than 200 Crore):Preference shall be given to Class 1 local supplier as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. The minimum local content to qualify as a Class 1 local supplier is denoted in the bid document 50%. If the bidder wants to avail the Purchase preference, the bidder must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which no purchase preference shall be granted. In case the bid value is more than Rs 10 Crore, the declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or a chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in -India) order 2017 dated 04.06.2020. Only Class-I and Class-II Local suppliers as per MII order dated 4.6.2020 will be eligible to bid. Non - Local suppliers as per MII order dated 04.06.2020 are not eligible to participate. In case Buyer has selected Purchase preference to Micro and Small Enterprises clause in the bid, the same will get precedence over this clause.

3.18 Scope of supply (Bid price to include all cost components) : Supply Installation Testing Commissioning of Goods and Training of operators and providing Statutory Clearances required (if any)

3.19 Successful Bidder can submit the Performance Security in the form of Payment online through RTGS / internet banking also (besides PBG which is allowed as per GeM GTC). On-line payment shall be in Beneficiary name North Eastern Electric Power Corporation Limited Account No. 00000034098989892 IFSC Code SBIN0009143 Bank Name State Bank of India Branch address Bakulani Chariali. Successful Bidder to indicate Contract number and name of Seller entity in the transaction details field at the time of on-line transfer. Bidder has to upload scanned copy / proof of the Online Payment Transfer in place of PBG within 15 days of award of contract.

3.20 Successful bidder will have to ensure that adequate number of dedicated technical service personals / engineers are designated / deployed for attending to the

Service Request in a time bound manner and for ensuring Timely Servicing / rectification of defects during warranty period, as per Service level agreement indicated in the relevant clause of the bid.

1410

3.21 Supplier shall ensure that the Invoice is raised in the name of Consignee with GSTIN of Consignee only.

3.22 Timely Servicing / rectification of defects during warranty period: After having been notified of the defects / service requirement during warranty period, Seller has to complete the required Service / Rectification within 15 days time limit. If the Seller fails to complete service / rectification with defined time limit, a penalty of 0.5% of Unit Price of the product shall be charged as penalty for each week of delay from the seller. Seller can deposit the penalty with the Buyer directly else the Buyer shall have a right to recover all such penalty amount from the Performance Security (PBG). Cumulative Penalty cannot exceed more than 10% of the total contract value after which the Buyer shall have the right to get the service / rectification done from alternate sources at the risk and cost of the Seller besides forfeiture of PBG. Seller shall be liable to re-imburse the cost of such service / rectification to the Buyer.

3.23 The bidder is required to upload, along with the bid, all relevant certificates such as BIS licence, type test certificate, approval certificates and other certificates as prescribed in the Product Specification given in the bid document.

3.24 Upload Manufacturer authorization: Wherever Authorised Distributors are submitting the bid, Manufacturers Authorisation Form (MAF)/Certificate with OEM details such as name, designation, address, e-mail Id and Phone No. required to be furnished along with the bid.

3.25 Warranty period of the supplied products shall be 3 years from the date of final acceptance of goods or after completion of installation, commissioning & testing of goods (if included in the scope of supply), at consignee location. OEM Warranty certificates must be submitted by Successful Bidder at the time of delivery of Goods. The seller should guarantee the rectification of goods in case of any break down during the guarantee period. Seller should have well established Installation, Commissioning, Training, Troubleshooting and Maintenance Service group in INDIA for attending the after sales service. Details of Service Centres near consignee destinations are to be uploaded along with the bid

3.26 Without prejudice to Buyer's right to price adjustment by way of discount or any other right or remedy available to Buyer, Buyer may terminate the Contract or any part thereof by a written notice to the Seller, if:

- i) The Seller fails to comply with any material term of the Contract.
- ii) The Seller informs Buyer of its inability to deliver the Material(s) or any part thereof within the stipulated Delivery Period or such inability otherwise becomes apparent.
- iii) The Seller fails to deliver the Material(s) or any part thereof within the stipulated Delivery Period and/or to replace/rectify any rejected or defective Material(s) promptly.
- iv) The Seller becomes bankrupt or goes into liquidation.
- v) The Seller makes a general assignment for the benefit of creditors.
- vi) A receiver is appointed for any substantial property owned by the Seller.
- vii) The Seller has misrepresented to Buyer, acting on which misrepresentation Buyer has placed the Purchase Order on the Seller.

3.27 While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

Note: This is system generated file. No signature is required. Print out of this document is not valid for payment/ transaction purpose.

Contract



Contract No: GEM/511687775M03639
 Generated Date: 18 Sep 2021
 Bid/RA/PR No: GEM/2021/0/1398763

Organisation Details		Buyer Details	
Type:	Central PSU	Designation:	DEPUTY GENERAL MANAGER CH
Ministry:	Ministry of Power	Contact No:	0974-2825204-
Department:	NORTH EASTERN ELECTRIC POWER Corporation Limited	Email ID:	rsudhakar.nepco@gem.co.in
Organisation Name:	NORTH EASTERN ELECTRIC POWER Corporation Limited	GS/TIN:	
Office Zone:	Assam Gen. Board Power Plant Bokuleni Dibrugarh	Address:	AGBP, NEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786151, India

Financial Approval Detail		Paying Authority Details	
ICD Completion:	No	Payment Mode:	Internet Banking
Designation of Administrative Approval:	Chief General Manager	Designation:	DEPUTY GENERAL MANAGER FINANCE
Designation of Financial Approval:	Chief General Manager	Email ID:	sratik.nepco@gem.co.in
		GS/TIN:	16MAACH9993132P
		Address:	AGBP, NEPCO, Bokuloni, Dibrugarh, Assam, Dibrugarh, ASSAM-786151, India

Seller Details	
GeM Seller ID:	LEAE25000382754
Company Name:	Uttam Construction Equipments
Contact No:	09920000980
Email ID:	tenders.uttam@uttam.com
Address:	PLOT NO. 756, SECTOR 05, BALLARSAH INDUSTRIAL AREA, Ferozabad, HARYANA-123001.
HSDM verified:	Yes
MSE Social Category:	General
MSE Gender:	Male
GS/TIN:	06AH9P1186F22D, 16AH9P1786F22D

*GST / Tax invoice to be raised in the name of - Consignee

Product Details								
#	Item Description	Category Name	Model	HSN Code	Ordered Quantity	Unit	Lead Time(Days)	Price (Inclusive of all Duties and Taxes in INR)
1	Product Name: UTTAM CONSTRUCTION EQUIPMENT- UTTAM CONSTRUCTION EQUIPMENT Hydraulic Mobile Crane Lifting capacity 12 tonne Brand: UTTAM CONSTRUCTION EQUIPMENT-UTTAM CONSTRUCTION EQUIPMENT Brand Type: Un-mounted Brand Catalogue Status: GS/ verified catalogue Selling As: OEM	Hydraulic Mobile Crane	SHAKO 12	HSN 8427	1	pieces		1,899,300
Total Order Value (INR)								

Consignee Detail						
S.No	Consignee	Item	Lot No.	Quantity	Delivery Start After	Delivery To Be Completed By
1	Designation: Chief General Manager Email ID: sratik.nepco@gem.co.in Contact: 0974-2825204- GS/TIN: 16MAACH9993132P Address: AGBP, NEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786151, India	UTTAM CONSTRUCTION EQUIPMENT- UTTAM CONSTRUCTION EQUIPMENT Hydraulic Mobile Crane Lifting capacity 12 tonne		1	18-Sep-2021	12-Sep-2021

Product Specification for UTTAM CONSTRUCTION EQUIPMENT-UTTAM CONSTRUCTION EQUIPMENT Hydraulic

Mobile Crane Lifting capacity 12 tonne

1412

Specification	Sub-Spec	Value
Specifications	Clutch	Single plate heavy duty dry friction type clutch plate
	ROPE LENGTH	10
	AIRCLEANER	Heavy duty dry type
	Parking Brake	Mechanically actuated air over wheel
	Suspension	As per manufacturer's design
	Front Brake	Pneumatically assisted hydraulic brakes
	Front Tyre	11 x 20 x 16 PR (pneumatic, minimum 4 nos)
	Rated Power @ 2200 or 2400 RPM	42.5
	Engine	Four Cylinder Water Cooled Diesel Engine
	Lifting capacity	12
	Rear Brake	As per manufacturer's design
	Boom	3 part hydraulically operated
	Transmission	As per manufacturer's design
	Rear Tyre	11 x 20 x 12 PR minimum (pneumatic, minimum 2 nos)
	Hydraulic system	Wane type hydraulic pump, Control valve with built in pressure relief valve, hydraulic filter.
	Steering	Power steering, articulated hydraulically controlled
	Travel Speed	Min 25km/hr
	Load Moment	Hydraulic operated load fall hook block with built in safety brakes
	Electrical System	12 V single battery
	Turning Radius	6.3
Fuel tank capacity	45	
Boom type	Without Lattice Boom	
Certification and Standard	Conformity to IS-4213 Serial	Yes
Additional Features	Cabin	rear mounted fully enclosed wide view COX
	Safety System	Over load audio warning system Rope compensator for auto leveling, Safety brakes on hoist, Heat protective failure device, fire mounted cabin, Front and rear wheel guards
	Additional Control	Safe load indicator with hydraulic cut off, Over load & over load cut off, Front cutters with rectangular cross section, Hoist & tail lift assembly and reverse gear hoist, anti-slash reflectors, Hydraulic oil pressure gauge (1), Spark arrester should be present in exhaust system as per approval of PESO, Tach. v/s. RPM indicator, voltmeters, Tire elongation, Tach. Operator's Manual and Parts Catalogue should be provided by the manufacturer, Under view camera with LCD Screen
Test and Inspection	CEP Inspection and Testing	Manufacturer (OEM) should furnish all necessary information concerning the supply to tender
	Load Test Certificate	Manufacturer's load test certificate as per IS 4573 to be provided
Corrigendum		
1. Extended upto 2021-08-26 17:00:00		
Terms and Conditions		

General Terms and Conditions-

- 1.1 This Contract between the Seller and the Buyer, is for the supply of the Goods and/ or Services, detailed in the schedule above, in accordance with the General Terms and Conditions (GTC) as available on the GeM portal (unless otherwise superseded by Goods / Services specific Special Terms and Conditions (STC) and/ or BID/Reverse Auction Additional Terms and Conditions (ATC), as applicable.
- 1.2 Terms of delivery: Free Delivery at Site including loading/unloading. In respect of items requiring installation and / or commissioning and other services in the scope of supply (as indicated in respective product category specification / STC / ATC), and the cost of the same is also included in the Contract price.
- 1.2.1 Contracted goods should be delivered at the consignee or designated delivery location as per the working time of the buying organisation. Seller may get the same confirmed from consignee before scheduling delivery.
- 1.2.2 A copy of the contract should be available with the messenger / dispatching agency that delivers the Goods at consignee / delivery location (preferably pasted / attached outside the consignment / package) for easy reference and ease in delivery acceptance.
- 1.3 Delivery period: The Delivery Period/Time shall be essence of the Contract and delivery must be completed not later than such date(s). Any modification thereto shall be mutually agreed and incorporated in the Contract as per the provisions of the GTC.
- 1.4 Performance Security: If the Seller fails or neglects to observe or perform any of his obligations under the contract it shall be lawful for the Buyer to forfeit either in whole or in part, the Performance Security furnished by the Seller.
- 1.5 Taxes and Duties: Contract Prices are all inclusive i.e. including all taxes, duties, local levies / transportation / loading-unloading charges etc. Break up of GST shall be indicated by the Seller while raising invoice / bill on GeM. While submitting the bill / invoice Seller shall undertake that the Goods and Services Tax (GST) charged on this bill is not more than what is payable under the provision on the relevant Act or the Rules made there under and that the Goods on which GST has been charged have not been exempted under the GST Act or the Rules made there under and the charges on account of GST on these goods are correct under the provision of that Act or the rules made there under.
- 1.6 Octroi Duty and / or other local taxes: Contract Prices are all inclusive hence no reimbursement wear and above the contract price(s) shall be allowed to seller towards payment of local taxes (such as levy of town duty, Octroi Duty, Torakhal Tax and other levies of local bodies etc).
- 1.7 Limitation of Liability: The provisions of limitation of liability between Buyer and Seller as given in the GTC shall be applicable here.
- 1.8 Resolution of disputes: The provisions of DISPUTE RESOLUTION BETWEEN BUYER AND SELLER as given in the GTC shall be applicable here.
- 1.9 Liquidated Damages: If the Seller fails to deliver any or all of the Goods/Services within the original/re-fixed delivery period(s) specified in the contract, the Buyer will be entitled to deduct/recover the Liquidated Damages for the delay, unless covered under Force Majeure conditions otherwise, @ 0.5% per week or part of the week of delayed period as pre-estimated damages not exceeding 10% of the contract value without any controversy/dispute of any sort whatsoever. In case, Service Level Agreement (SLA) is applicable the same shall be applicable for the Contract.
- 1.10 Financial Certificate:
- 1.10.1 The expenditure involved for this purpose has received the sanction of the competent financial authority.
- 1.10.2 The funds are available under the proper head in the sanction budget allotment for the concern financial year.
- 1.10.3 I have been fully authorized by the department to sign the supply order or incur the liability of the Goods being ordered.
- 1.11 The bidder should submit a self declaration to the effect in bidder's official letter head that their agency have not been black listed by any Agency whatsoever till date.

2. Additional Terms and conditions-

- 2.1 IMPORTED PRODUCTS: In case of imported products, OEM or Authorized Seller of OEM should have a registered office in India to provide after sales service support in India. The certificate to this effect should be submitted.
- 2.2 Scope of supply (Bid price to include all cost components) - Only supply of Goods
- 2.3 Availability of Service Centres: Bidder/OEM must have a Functional Service Centre in the State of each Consigner's Location in case of carry-in warranty. (Not applicable in case of goods having onsite warranty). If service center is not already there at the time of bidding, successful bidder / OEM shall have to establish one within 30 days of award of contract. Payment shall be released only after submission of documentary evidence of having Functional Service Centre.
- 2.4 Timely Servicing / rectification of defects during warranty period: After having been notified of the defects / service requirement during warranty period, Seller has to complete the required service / rectification within 15 days time limit. If the Seller fails to designate service / rectification with defined time limit, a penalty of 0.2% of Unit Price of the product shall be charged as penalty for each week of delay from the seller. Seller can deposit the penalty with the Buyer directly also the Buyer shall have a right to recover all such penalty amount from the Performance Security (PSG). Cumulative Penalty cannot exceed more than 10% of the total contract value after which the Buyer shall have the right to get the service / rectification done from alternate sources at the risk and cost of the Seller besides forfeiture of PSG. Seller shall be liable to reimburse the cost of such service / rectification to the Buyer.

Note: This is system generated file. No signature is required. Print out of this document is not valid for payment/ transaction purpose.

Contract | अनुबंध



Contract No | अनुबंध क्रमांक: GEMC-511687749634350

Generated Date | अनुबंध तिथि: 09-Jun-2023

Bid/RA/PBP No. | बोली/आरए/पीबीपी संख्या: GEM/2022/B/2506351

Organisation Details | संगठन विवरण	Buyer Details | खरीदार विवरण
Type | प्ररूप: Central PSU Ministry | मंत्रालय: Ministry of Power Department | विभाग: NORTH EASTERN ELECTRIC POWER Corporation Limited Organisation Name | संगठन का नाम: NORTH EASTERN ELECTRIC POWER Corporation Limited Office Zone | कार्यालय क्षेत्र: Assam Gas Based Power Plant Bokuloni Dibrugarh	Designation | पद: DEPUTY GENERAL MANAGER EM Contact No. | संपर्क नंबर: 0374-2825220- Email ID | ईमेल आईडी: binitad.neepco@nic.in GSTIN | जीएसटीआईएन: 18AAACN9991J3ZP Address | पता: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786191, India

Financial Approval Detail | वित्तीय स्वीकृति विवरण	Paying Authority Details | भुगतान प्राधिकरण विवरण
IFD Concurrence | आईएफडी सहमति: No Designation of Administrative Approval | प्रशासनिक अनुमोदन का पदनाम: HOP, AGBPS Designation of Financial Approval | वित्तीय अनुमोदन का पदनाम: Head of Plant, AGBPS	Role: PAO Payment Mode | भुगतान का तरीका: Internet Banking Designation | पद: IN CHARGE FINANCE Email ID | ईमेल आईडी: rahulg.neepco@nic.in GSTIN | जीएसटीआईएन: 18AAACN9991J3ZP Address | पता: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, Dibrugarh, ASSAM-786191, India

Seller Details | विक्रेता विवरण	
GeM Seller ID | जेम विक्रेता आईडी: WW0P220006563664 Company Name | कंपनी का नाम: M/S ECO CLEAN Contact No. | संपर्क नंबर: 09864018703 Email ID | ईमेल आईडी: ecoclean.guwahati@gmail.com Address | पता: 23, INDUSTRIAL AREA, MRD ROAD, BAMUNIMAIDAN, Kamrup, ASSAM-781021, - MSME Registration number | एमएसएमई पंजीकरण संख्या: UDYAM-AS-03-0013514 MSE Social Category | एमएसई सामाजिक श्रेणी: OBC MSE Gender | एमएसई लिंग श्रेणी: Male GSTIN | जीएसटीआईएन: 18ADJPN3804D3Z0	

*GST / Tax invoice to be raised in the name of | जिसके नाम के पक्ष में GST/TAX इनवॉइस पेश किया जाएगा - Consignee

Delivery Instructions | वितरण निर्देश: Price break up for the work is 1. Supply, Erection, Testing & Commissioning of 75 KLD MBBR Technology STP is Rs. 38,77,136.00 with GST. 2. O&M Expenses for 3 years is Rs. 3,00,000.00 with GST. 3. Price of Mandatory Spares is Rs. 200,000.00 with GST

Product Details | उत्पाद विवरण						
#	Item Description | आइटम विवरण	Ordered Quantity | आइटम विवरण	Unit | इकाई	Unit Price (INR) | इकाई मूल्य (INR)	Tax Bifurcation (INR) | कर विभाजन (INR)	Price (Inclusive of all Duties and Taxes in INR) | मूल्य (INR में सभी शुल्क और कर सहित)
1	Product Name | उत्पाद का नाम: Unbranded RCC Multiple/Separate Tank Sewage/Effluent Treatment Plant 1 year Brand | ब्रांड: NA Brand Type | ब्रांड प्रकार: Unbranded Catalogue Status | कैटलॉग की स्थिति: Catalogue not verified by OEM Selling As | कैसे बेचा जा रहा है: Reseller not verified by OEM Category Name & Quadrant | श्रेणी का नाम और चतुर्थांश: Sewage/Effluent Treatment Plant (Q3) Model | मॉडल: EC25 HSN Code | एचएसएन कोड: HSN not specified by seller	1	pieces	4,377,136.5	NA	4,377,136.5
Total Order Value | कुल ऑर्डर मूल्य (in INR)						4,377,136.5

Consignee Detail | परेषिती विवरण						
S.No | क्र.सं.	Consignee | परेषिती	Item | वस्तु	Lot No. | लॉट नंबर	Quantity | मात्रा	Delivery Start After | दिनांक के बाद डिलीवरी शुरू करना है	Delivery To Be Completed By | वितरण पूरा कब तक करना है
1	Designation | पद: - Email ID | ईमेल आईडी: rubudas.neepco@nic.in Contact | संपर्क: 0374-2825204- GSTIN | जीएसटीआईएन: - Address | पता: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786191, India	Unbranded RCC Multiple/Separate Tank Sewage/Effluent Treatment Plant 1 year	-	1	09-Jun-2023	07-Sep-2023

Product Specification for Unbranded RCC Multiple/Separate Tank Sewage/Effluent Treatment Plant 1 year

Specification | विनिर्देश	Sub-Spec | उप-विनिर्देश	Value | मूल्य
Sewage/Effluent Inlet Parameters	Inlet Oil & grease	10
	Inlet COD, mg/l	10
	Inlet pH	5.5
	Inlet BOD, 5 days @ 20 deg.C, mg/l	10
	Inlet Suspended solids, mg/l	10
	Mechanical Design of Plant	Working plus Standby
	Construction of collection Tank included scope of work	Yes

TYPE	Type of Tank Construction	RCC
	Construction of shed included scope of work	Yes
	Technology of Treatment	MBR,MBBR,FAB,FAB,SBR,Electrocoagulation,Johkasou
	Capacity per day(in KLD)	75
	Internal coating of Tank	FRP
	Type of Plant	ETP
	Construction of base included included in scope of work	Yes
	Thickness of MS Sheet/ RCC Wall/100% FRP	10 millimeter
	Type of Tank	Multiple/Separate Tank
	Type of Installation	Underground
Product Water Parameters	Outlet COD, mg/l	10
	Outlet pH	7
	outlet BOD, 5 days @ 20 deg.C, mg/l	10
	outlet Suspended solids, mg/l	10
	outlet Oil & grease	10
Mechanical Units	Air Blower Capacity	10 kiloWatt
	Lifting pump Capacity (HP)	10
	Make of Air Blower	M/S ECO CLEAN
	Number of Lifting Pump	2
	Number of Air Blowers	2
	Filter Feed Pump Capacity	50 horsepower
	Sludge Transfer Pump Capacity	50 horsepower
	Number of Filter Feed Pump	2
	Power Consumption of Each Air Blower, kWh	50
	Make of Lifting pump Capacity	M/S ECO CLEAN
	Make of Sludge Transfer Pump Capacity	M/S ECO CLEAN
	Make of Filter Feed Pump Capacity	M/S ECO CLEAN
Filtration	Dosing Tank Capacity	1000 liter
	Filter Type	FRP
	Dosing Tank Type	HDPE
Electrical	Electric Control Panel included in the scope of work	Yes
	Electric Cables included in the scope of work	Yes
Instruments	Other Items provided	certifications, licenses and test reports
	Digital Flow Display Type	Integral,Remote
	Material	SS316
	Connection of DFM	NA
	Diameter	50 mm
WARRANTY AND SERVICES	Onsite Warranty	1 year
Installation and Commissioning	With Installation and Commissioning	Yes
	Without Installation and Commissioning	No
CERTIFICATION	Should submit the copies of all the certifications, licenses and test reports to the buyer along with supplies	Yes
	Type of lab which carried out Test of Complete Product to prove the conformity of product as per specification	OEM,Govt Lab
	Name of the Lab and Address (May indicate 'NA' if not applicable)	ABNS SCIENTIFIC SERVICES
	Test Report No and Date (May indicate 'NA' if not applicable)"	TC88172000000082F Date 18/11/2020
	Certification - Empanelment of Technology for Use under Swachh Bharat Mission	No

Note | टिप्पणी: Seller has given an undertaking that it has made arrangements for getting the stores from an authorized distributor / dealer / channel partner of the OEM of the offered product. At the time of delivery of goods, Seller will provide necessary chain documents (in the form of GST Invoice) to prove that the supplied goods are genuine and are being sourced from an authorized distributor / dealer / channel partner of the OEM. In case of any complaint about genuineness of the supplied products, Seller shall be responsible for providing genuine replacement supplies.

Buyer Defined Additional Specification for | खरीदार परिभाषित अतिरिक्त विशिष्टता के लिए Unbranded RCC Multiple/Separate Tank Sewage/Effluent Treatment Plant 1 year

Specification | विनिर्देश	Value | मूल्य
Capacity & Type of STP:	Capacity: 75 KLD, Type: MBBR
1. Coarse Screen Chamber: 2. Equalization cum Pre-aeration Tank:	1. Capacity: 5 KL, 01 (one) no. , MOC: Cement Concrete Chamber with SS screen 2. Capacity: 50 KL, 01 (one) no. , MOC: RCC
1. Pressure Sand Filter: 2. Activated Carbon Filter:	1. Capacity: 8 KL per hour, 01 (one) no. , MOC: FRP 2. Capacity: 8 KL per hour, 01 (one) no. , MOC: FRP
1. Hypo Tank: 01 (one) no. 2. Operation & Maintenance after Installation and Commissioning 3. Mandatory Spares	1. Capacity: 100 KL, 01 (one) no. , MOC: HDPE 2. 3 (three) years 3. List of spares to be submitted.
Design Specification in place of any value	Specified in additional terms and conditions under the heading of Technical Specification

Corrigendum | सुद्धिपत्र

1. Extended Upto | तक बढ़ाया गया : 2022-10-18 16:00:00
2. Extended Upto | तक बढ़ाया गया : 2022-10-25 16:00:00

Buyer added Bid Specific Additional Scope of Work | खरीदार द्वारा जोड़ी गई बोली का विशिष्ट अतिरिक्त कार्य

S.No | क्र.सं	Document Title | दस्तावेज़ का शीर्षक	Description | विवरण	Applicable i.r.o. Items | लागू आईआरओ सामान
1	O&M Contract and Warranty View	Full comprehensive operation & maintenance Contract of the plant including supply of consumables as required for 36 (thirty-six) months commencing immediately after commissioning. The analysis report of treated sewage is to be submitted to Manager (Safety), F&S Division on every month. The report should comply with our requirement. However, the contractor shall have to guaranteed/warranted the supplied equipment including all accessories for satisfactory performance for a period of 12 months fro	Sewage/Effluent Treatment Plant(1)

ePBG Detail | ईपीबीजी विवरण

Advisory Bank | सलाहकार बैंक :	State Bank of India
ePBG Percentage(%) | ईपीबीजी प्रतिशत (%) :	3.00
The bidder shall furnish ePBG as applicable as per bid's terms and conditions | बोली लगाने वाले को बोली के नियमों और शर्तों के अनुसार लागू ईपीबीजी प्रस्तुत करना होगा	

Terms and Conditions | नियम और शर्तें

1. General Terms and Conditions-

- 1.1 This contract is governed by the [General Terms and Conditions](#), conditions stipulated to this Product/Service as provided in the Marketplace.
- 1.2 This Contract between the Seller and the Buyer, is for the supply of the Goods and/ or Services, detailed in the schedule above, in accordance with the General Terms and Conditions (GTC) unless otherwise superseded by Goods / Services specific Special Terms and Conditions (STC) and/ or BID/Reverse Auction Additional Terms and Conditions (ATC), as applicable

2. Buyer Added Bid Specific Terms and Conditions-

2.1 Generic.

Actual delivery (and Installation & Commissioning (if covered in scope of supply)) is to be done at following address

Assam Gas Based Power Station (AGBPS) ,
North Eastern Electric Power Corporation Limited (NEEPCO Ltd.)
P.O. Bokuloni Chariali (Near Dullajjan)
Dist: Dibrugarh
Assam-786 191
.

2.2 Generic.

Without prejudice to Buyer's right to price adjustment by way of discount or any other right or remedy available to Buyer, Buyer may terminate the Contract or any part thereof by a written notice to the Seller, if:

- The Seller fails to comply with any material term of the Contract.
- The Seller informs Buyer of its inability to deliver the Material(s) or any part thereof within the stipulated Delivery Period or such inability otherwise becomes apparent.
- The Seller fails to deliver the Material(s) or any part thereof within the stipulated Delivery Period and/or to replace/rectify any rejected or defective Material(s) promptly.
- The Seller becomes bankrupt or goes into liquidation.
- The Seller makes a general assignment for the benefit of creditors.
- A receiver is appointed for any substantial property owned by the Seller.
- The Seller has misrepresented to Buyer, acting on which misrepresentation Buyer has placed the Purchase Order on the Seller.

2.3 Generic.

While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

2.4 Generic.

After award of contract - Successful Bidder shall have to get Detailed Design Drawings approved from buyer before starting fabrication. Successful Bidder shall submit Detailed Design Drawings for Buyer's approval, within 15 days of award of contract. Buyer shall, either approve the drawings or will provide complete list of modification required in the drawings within 7 days. Seller shall be required to ensure supply as per approved Drawings with modifications as communicated by Buyer. If there is delay from buyer side in approval of drawing- the delivery period shall be refixed without LD for the period of delay in approval of Drawing.

2.5 Generic.

Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

2.6 Generic.

Experience Criteria: The Bidder or its OEM (themselves or through reseller(s)) should have regularly, manufactured and supplied same or similar Category Products to any Central / State Govt Organization / PSU / Public Listed Company for 3 years before the bid opening date. Copies of relevant contracts to be submitted along with bid in support of having supplied some quantity during each of the year. In case of bunch bids, the primary product having highest value should meet this criterion.

2.7 Generic.

Installation, Commissioning, Testing, Configuration, Training (if any - which ever is applicable as per scope of supply) is to be carried out by OEM / OEM Certified resource or OEM authorised Reseller.

2.8 Generic.

In case the bidder is not able to furnish its audited financial statements on standalone entity basis, the unaudited unconsolidated financial statements of the bidder can be considered acceptable provided the bidder furnishes the following further documents on substantiation of its qualification:

- Copies of the unaudited unconsolidated financial statements of the bidder along with copies of the audited consolidated financial statements of the Holding Company.
- A certificate from the CEO/CFO of the Holding Company as per the format enclosed in the bid documents stating that the unaudited unconsolidated financial statements form part of the consolidated annual report of the company.
- In case where audited results for the last financial year as on the date of Techno Commercial Bid Opening are not available, the financial results certified by a practicing Chartered Accountant shall be considered acceptable. In case, Bidder is not able to submit the Certificate from practicing Chartered Accountant certifying its financial parameters, the audited results of three consecutive financial years preceding the last financial year shall be considered for evaluating the financial parameters. Further, a certificate would be required from the CEO/CFO as per the format enclosed in the bidding documents stating that the financial results of the Company are under audit as on the date of Techno-Commercial Bid Opening and the Certificate from the practicing Chartered Accountant certifying the financial parameters is not available.

Note: (i) Other income shall not be considered for arriving at annual turnover.

2.9 Generic.

1. The Seller shall not assign the Contract in whole or part without obtaining the prior written consent of buyer.
2. The Seller shall not sub-contract the Contract in whole or part to any entity without obtaining the prior written consent of buyer.

3. The Seller shall, notwithstanding the consent and assignment/sub-contract, remain jointly and severally liable and responsible to buyer together with the assignee/ sub-contractor, for and in respect of the due performance of the Contract and the Sellers obligations there under.

2.10 Generic

Upload Manufacturer authorization: Wherever Authorised Distributors are submitting the bid, Manufacturers Authorisation Form (MAF)/Certificate with OEM details such as name, designation, address, e-mail Id and Phone No. required to be furnished along with the bid.

2.11 Certificates:

ISO 9001: The bidder or the OEM of the offered products must have ISO 9001 certification.

2.12 Past Project Experience:

For fulfilling the experience criteria any one of the following documents may be considered as valid proof for meeting the experience criteria:

- Purchase Order copy along with Invoice(s) with self-certification by the bidder that supplies against the invoices have been executed.
- Execution certificate by client with order value.
- Any other document in support of order execution like Third Party Inspection release note, etc.

2.13 Past Project Experience:

The Bidder / OEM (themselves or through reseller(s)), should have executed project for supply and installation / commissioning of same or similar Category Products during preceding 3 financial years (i.e. current year and three previous financial years) as on opening of bid, as per following criteria:

- Single order of at least 35% of estimated bid value; or
- Two orders of at least 20% each of estimated bid value; or
- Three orders of at least 15% each of estimated bid value.

Satisfactory Performance certificate issued by respective Buyer Organization for the above Orders should be uploaded with bid. In case of bunch bids, the Category related to primary product having highest bid value should meet this criterion

2.14 Buyer Added Bid Specific ATC:

Buyer Added text based ATC clauses

E-Tender under SINGLE STAGE TWO BID system with 180 (one hundred and eighty) days validity are invited from reputed and experienced contractors for **Design, Engineering, Manufacturing, Supply, Transit Insurance, Transportation, Delivery, Erection, Testing & Commissioning of 75 KLD Sewage Treatment Plant (STP) with MBBR technology at 291 MW Assam Gas Based Power Station, NEEPCO Ltd., Bokuloni Chariali, District Dibrugarh, Assam-786191.**

1.0 Qualifying Criteria:

- The intending bidders must have experience in Design, Engineering, Manufacturing, Supply, Delivery, erection and Testing & Commissioning of Sewage Treatment Plant (STP) of minimum capacity of 75 KLD.
- Similar works should have been carried out by the intending bidder in the last 7 years and tenderer should have at least completed 3 similar works valued at Rs. 19.00 lakh each, or 2 similar works valued at Rs. 24.00 lakh each or 1 similar work valued at Rs. 38.00 lakh.
- Minimum average annual turnover of the bidder, in the best three financial year out of the last 5 (five) financial years ending 31st March 2022 should not be less than Rs. 218.00 Lakh.
- Documentary evidence in support of the above must be submitted along with the bid.
- The bidder shall furnish copies of the following document with Techno-commercial Bid:

(i) Registration Certificate for GST

(ii) PAN (Permanent Account Number) for Income Tax

(iii) Solvency Certificate from any Nationalized Bank

(iv) Valid work permit/Firm/Company registration

2.0 procedure/steps for payment of (BID FEE, Security Deposit, Performance Bank Guarantee etc.):

The procedure/steps for payment by SB-COLLECT of State Bank of India (for payment of (BID FEE, Security Deposit, Performance Bank Guarantee etc.) in to NEEPCO's (AGBPS) SBI Account is as follows:

1.	Visit "On linesbi.com"
2.	Go for "SB COLLECT" icon on top
3.	Read Accept the terms & condition and proceed
4.	Select "Assam" against State of Corporation
5.	Select "PSU" against type of Corporation & go to NORTH EASTERN ELECTRIC POWER CORPORATION LTD" then submit
6.	Select "AGBP parties" & submit
7.	Feed Necessary information in the appropriate boxes
8.	Payment through "Internet Banking" SBI Branch, SBI Buddy or Card Payment etc.
9.	Print Copies of receipt and submit

3.0 EARNEST MONEY DEPOSIT:

Earnest Money as mentioned in the tender shall be deposited in the form as mentioned above. Copies of payment receipt may be uploaded.

3.1 The Bidder registered as Micro / Small Enterprise are exempted from paying bid Fee, EMD etc. subject to submission of valid and relevant document / certificate.

4.0 NEEPCO reserves the right to extend the last date and time for submission of Bid.

5.0 NEEPCO reserve the right to reject any or all bids or to annul the bidding process and reject all the bids for any justified and genuine grounds without thereby incurring any liability to the affected bidders nor does it have any obligation to inform the bidders of the grounds for such action.

6.0 General information:

Assam Gas Based Power Station is located in the Dibrugarh District of Assam State, about 500 Kms from Guwahati by road. The nearest rail head is Duliajan/Tinsukia, about 17 Kms/35 Kms from Project site. The nearest Airport is at Dibrugarh and it is about 60 Kms away from Power Station. The power station is also connected by road.

Our site address and address for all purposes regarding the tender process is as follows:

Assam Gas Based Power Station (AGBPS),
North Eastern Electric Power Corporation Limited (NEEPCO Ltd.)
P.O. Bokuloni Chariali,
(Near Duliajan)
Dist: Dibrugarh, Assam-786 191

7.0 Qualifying requirement of bidders

A. Technical: -

- i. The intending bidders must have experience in Design, Engineering, Manufacturing, Supply, Delivery, Erection, Testing & Commissioning of Sewage Treatment Plant (STP) of minimum capacity of 75 KLD.
- ii. Similar works should have been carried out by the intending bidder in the last 7 years and tenderer should have at least completed 3 similar works valued at Rs. 19.00 Lakh each, or 2 similar works valued at Rs. 24.00 lakh each or 1 similar work valued at Rs. 38.00 lakh.

B. Financial: -

Minimum average annual turnover of the bidder, in the best three financial year out of the last 5 (five) financial years ending 31st March 2022 should not be less than Rs. 218.00 Lakh. Audited Annual Report and balance sheets for the last three financial years are to be submitted in support of the same.

- Details, including year-wise value of work executed, clients, and proof of satisfactory completion of work and satisfactory operation should be furnished in the Schedule of Similar works (Schedule-I).
- Bidder should possess all tools & tackles and technical manpower/support required for execution of the works included under this specification and shall furnish the documentary evidence in support of the same Schedule-II and Schedule-III.
- Bidders shall have sound financial capacity and should submit copies of their audited Annual Reports and balance sheet for the last 3 (three) years and the latest Banker's certificate indicating amount in support of solvency alongwith credit facilities currently available and latest GST clearance certificates.
- The bidders should also submit copy of valid PAN, GST Certificate from appropriate Authorities.
- Further, the bidder shall provide satisfactory evidence concerning the following:

7.1 The above stated requirement is minimum and the Purchaser reserves the right to request for any additional information and also reserves the right to reject the proposal of any Bidder, if in the opinion of Purchaser, the qualification data is incomplete or the bidder is found not qualified to satisfactorily perform the works.

7.2 Notwithstanding anything stated above, the Purchaser reserves the right to assess the bidder's capability and capacity to perform the work, should the circumstances warrant such an assessment in the overall interest of the Purchaser.

8.0 Language of Bid

The bid prepared by the Bidder and all correspondences and documents relating to the bid exchanged by the Bidder and the Corporation shall be in English. Supporting documents and printed literature furnished by the bidder with the bid may be in another language provided they are accompanied by an appropriate and correct translation into English. For the purpose of interpretation of the bid and for all future purposes, only English version will prevail.

9.0 Performance Guarantee.

Within 30 (thirty) days from the date of issue of Letter of Intent / Award, the Contractor shall furnish a Bank Guarantee from a Nationalized Bank for an amount equal to 3 (three) percent of the contract value by way of guarantee for the due and faithful performance of the Agreement and for the due and faithful performance of the letter of intent/award along with the other terms and conditions agreed to. The Bank guarantee shall be initially valid for such period to cover ninety days after the warranty period as per Agreement. The bank guarantee format is given in Annexure-II of this bid document.

10.0 Agreement

- i. After issue of the Letter of Intent/Award and on acceptance by the Contractor, the Corporation shall prepare the Agreement on stamped paper and the Contractor will be informed for signing of the Agreement on a notified date. Alternatively, at the option of the Corporation, a detailed order in plain paper will be issued in favour of the Contractor.
- ii. The Contractor shall be required to sign the Contract Agreement in 3 (three) copies, along with appropriate Power of Attorney and other requisite materials. Unless and until a formal Agreement is prepared and executed / Detailed order issued, the Letter of Intent/ Award read in conjunction with the bidding documents will constitute a binding contract.

11.0 Assignment and subletting of Contract:

The Contractor shall not assign or sublet or transfer the contract or any part thereof without the prior consent in writing of the Engineer-in-charge. Any assignment, subletting/subcontracting without prior written approval of the Engineer-in-charge shall be void.

12.0 Liquidated damage:

Time is the essence of the contract. If the performance of the contract is delayed beyond the dates stipulated in the contract due to reasons attributable to the Contractor, the Corporation shall, without prejudice to his right, recover the following damages for breach of the contract: -

- i. Reduce the contract price by 1/2 % (half percent) per week or part thereof of delay in completion time, subject to a maximum of 10% (ten percent) of the contract price.
- ii. Execute or authorize the execution of the work departmentally or through any other agency without any notice to the Contractor at the risk and cost of the Contractor. The decision of the Corporation in this regard shall be final and binding upon the Contractor. However, the above action shall be taken without canceling the contract in respect of work not yet due for execution, or
- iii. Cancel the entire contract or a portion thereof and, if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the contract, the Corporation may ignore the rates quoted by him for respective work even though the lowest for executing through other agency.

Where action is taken under sub-clause (ii) or sub-clause (iii) above for failure to complete the work, the Contractor shall be liable for any loss, which the Corporation may sustain on that account. However, the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be at the entire discretion of the Corporation. It shall not be necessary for the Corporation to serve a notice of such execution on the Contractor.

13.0 Force Majeure:

- i. If either Contractor or Corporation (hereafter called as party) is temporarily unable by reason of force majeure or the laws or regulations of India to meet any of its obligations under this Agreement and if such party gives to the other party written notice of the event within 7(seven) days after its occurrence, such obligations of the party as it is unable to perform by reason of the event shall be suspended for as long as the force majeure condition continues.
- ii. The Corporation or his authorized representative on receipt of notification shall ascertain the facts and extent of the delays and suitably extend the time for completing the work or stage of work where, in his judgment the findings of facts justify an extension. The period of extension of time shall be determined by the Corporation or his authorized representative after taking into consideration the nature of the work delayed and practicability of its execution during the period of extension.
- iii. Although the time for completion of works shall be suitably extended as indicated in 13.2 above, such extension shall not result in any financial claim of the Contractor against the Corporation on any account whatsoever.
- iv. Neither party shall be liable to the other party for loss or damage sustained by the other party arising from any event referred to in clause or delays arising from such event.
- v. The terms "Force Majeure", as employed herein shall mean acts of God, acts of public enemy, war, insurrection, riots, epidemics, landslides, and any other similar events beyond the control of either party and which by exercise of due diligence neither party is able to overcome.

14.0 Inspection and test:

- i. Upon completion of the various phases of work or at a convenient time during the progress of work, work executed by the Contractor, shall be checked, tested and inspected. Any defects pointed out by the Engineer-in-charge shall be corrected by the Contractor at no additional cost.

All checking and testing procedure shall be performed by the Contractor as directed by the Engineer-in-charge.

- ii. The Contractor shall provide all labour, tools, instruments and supervision and shall be responsible for conducting pre-commissioning tests on all equipments, as per relevant standards.
- iii. After re-assembly/ re-erection of the Unit, pre-commissioning tests shall be performed by the Contractor under the supervision of the Engineer-in-charge.
- iv. During testing and trial run of the Unit, the responsibilities for operation of the equipment under test will be that of the Corporation but the Contractor shall depute adequate number of skilled workmen, supervisors and Engineers as per requirement of NEEPCO, for running repair and maintenance to ensure that any defect noticed during the trial run is rectified immediately.

15.0 Settlement of dispute:

- i. Except as otherwise specifically provided in the Contract, all disputes concerning questions of fact arising under the contract shall be decided by the Engineer-in-charge subject to a written appeal by the Contractor to the Engineer-in-charge, whose decision shall be final to the parties hereto.
- ii. Any dispute of differences including those considered as such by any of the parties arising out of or in connection with the contract shall be, to the extent possible, settled amicably between the parties. If the dispute could not be amicably settled between the Engineer-in-charge and the Contractor, then the same should be referred to the Corporation prior to proceedings for arbitration.
- iii. If amicable settlement cannot be reached, then all disputed issues shall be settled by arbitration as provided in the clause ARBITRATION.

16.0 Arbitration.

- i. Except where otherwise provided, if at any time, any question of a dispute or difference of opinion whatever shall arise between the Contractor and the Corporation upon or in relation thereto or in connection with this contract, either of the parties may give to the other notice in writing, of the existence of such questions, disputes or differences and if the matter is not settled amicably by and between the parties and on rejection, such matter of dispute or difference of opinion shall be referred to the Arbitration strictly in accordance with the provision contained in the Arbitration and Conciliation Act 1996 (Act. No. 26 of 1996), and any amendment thereto and any rules made there under and to such other order or orders, instruction issued

ed by the Government of India time to time in this connection.

- ii. No dispute or difference of opinion, whatever, shall be referable to Arbitration after the expiry period of 1 (one) year from the date when such dispute or difference of opinion arose.

The Contractor shall ensure that the work under the contract shall continue during the Arbitration Proceedings and dispute and no payment due from or payment by the Corporation shall be withheld on account of such proceedings except to the extent that may be in dispute.

- iii. If any dispute or difference of any kind whatsoever shall arise between the Corporation and the Contractor, arising out of the contract for the performance of the works, whether during the progress of the work or after its completion, or whether before or after the termination, abandonment or breach of the contract, it shall be in the first place, be referred to and settled by the Corporation or its authorized representative who, within a period of 30 (thirty) days after being requested by the Contractor to do so, give written notice of his decision to the Contractor.

- iv. Save as hereinafter provided, such decision in respect of every matter so referred shall be final and binding upon the parties until the completion of the works and shall forthwith be given effect to by the Contractor who shall proceed with the works with all due diligence, whether he or the Corporation requires arbitration as hereinafter provided or not.

- v. If after the Corporation has given written notice of his decision to the parties, no claim to arbitration has been communicated to him by the Contractor within 30 (thirty) days from the receipt of such notice, the said decision shall become final and binding on the parties.

In the event of the Corporation failing to notify his decision as aforesaid within 30 (thirty) days after being requested or in the event of either the Corporation or the Contractor being dissatisfied with any such decision or within 30 (thirty) days after the expiry of the first mentioned period of 30 (thirty) days, as the case may be, either party may by written notice to the other party require that the matter in dispute be referred to arbitration as herein provided.

- vi. All disputes or differences in respect of which the decision, if any, of the Corporation has not become final or binding as aforesaid, shall be settled by arbitration in the manner hereinafter provided. The arbitral tribunal shall consist of a sole arbitrator to be appointed by the Chairman and Managing Director of the Corporation or by his duly authorized representative out of a panel of names of three arbitrators, proposed by him and selected by the other party.

The arbitrator appointed shall have no power to award interest on any claim referred to arbitration. The venue of arbitration shall be Guwahati.

The expense of Arbitration shall be paid as may be determined by the Arbitrators.

The Arbitrator shall have the full powers to review and/or revise any decision, opinions, directions, certification or valuation of the Corporation in consonance of the contract, and neither party shall be limited in the proceedings before such Arbitrators to the evidence or arguments put before the Corporation for the purpose of obtaining the said decision.

- vii. No decision by the Corporation or his authorized representative in accordance with the foregoing provisions shall disqualify him as being called as witness or giving evidence before the Arbitrators in any matter whatsoever relevant to the dispute or difference referred to the Arbitrators aforesaid. During the settlement of disputes and arbitration proceedings, both parties shall be obliged to carry out their respective obligations under the Contract.

- viii. No claims for interest or damages on whatsoever count will be entertained by the Corporation with respect to any money or balance which may be lying with the Corporation owing to any dispute, difference or misunderstanding between the Corporation and the Contractor.

17.0 Decision of Engineer-in Charge.

- i. In respect of all matters which are left to the decision of the Engineer-in-charge, including the granting or withholding of certificates, the Engineer-in-charge shall, if required to do so, give in writing a decision thereon and the reasons for such decisions.
- ii. If in the opinion of the Contractor, the decision of the Engineer-in-charge is not in accordance with the meaning and intent of the contract, the Contractor may file with the Engineer-in-charge, a written objection to the decision within 7 (seven) days after receipt of the same. However, in the process, that Contractor shall continue to execute the work as per instruction of the Engineer-in-charge. Failure to file an objection within the allotted time will be considered as acceptance of the decision of the Engineer-in-charge and the decision shall become final and binding.
- iii. The Corporation's decision and filing of the written objection thereto shall be a condition precedent to the right to request for Arbitration. It is in the intent of the Agreement that there shall be no delay in the execution of the works and the decision of the Engineer-in-charge as rendered, shall be promptly observed.

18.0 Suspension of work:

- i. The Corporation reserves the right to suspend and reinstate execution of the whole or any part of the works. Order for suspension or reinstatement of the works will be issued by the Engineer-in-charge to the Contractor in writing. Payments due till date of suspension shall be released by the Corporation.
- ii. Any necessary and demonstrable costs incurred by the Contractor as a result of such suspension of the works will be paid by the Corporation, provided that such costs are substantiated to the satisfaction of the Engineer-in-charge. The Corporation shall not be responsible for any liabilities if suspension or delay is due to some default on the part of the Contractor or his Sub-Contractor.

19.0 Guarantee / Warranty.

- i. For a period of 12 (twelve) calendar months from the date of successful commissioning (called the warranty period), the Contractor shall remain liable to replace any defect and/or rectify any damage/deficiency that may develop or remained undetected in the equipment/works of his own or those of his sub Contractors. Such defects and/or damage shall be repaired or replaced as per the decision of the Engineer-in-charge and solely at the cost of the Contractor. The replaced defective parts will be returned to the Contractor at his own expense, unless otherwise arranged. No repairs or replacement shall normally be carried out by the Engineer-in-charge when the equipment is under the erection / supervision of the Contractor's engineers. If, during the period of warranty any portion of the equipment/works is found defective and is rectified/replaced, the provision of this clause shall apply to the portion of the equipment so replaced/rectified until expiration of 3 (three) months from the date of such replacement/rectification. The rectification/replacement/repairs shall be done at the shortest possible time to minimize the loss of the Corporation and as mutually agreed to. If any defects are not remedied within a reasonable time, the Corporation may proceed to do the work through any other agency at the Contractor's risk and expenses, but without prejudice to any other rights which the Corporation may have against the Contractor.
- ii. In the event of emergency where, in the judgment of the Engineer-in-charge, delay would cause serious loss or damage, repairs, replacement, rectification, adjustment etc. may be done

by the Engineer-in-charge or by any other agency chosen by the Engineer-in-charge at the cost of the Contractor and without any advance notice to the Contractor. However, the Contractor will be notified promptly and he shall assist the Corporation/other agency employed for necessary corrections. This shall not relieve the Contractor from any of his liability under the terms of the contract.

- iii. The repair or new parts will be furnished and erected free of cost by the Contractor. If any repair is carried out on his behalf at the site, the Contractor shall bear the cost of such repair/replacement.
- iv. In case of defective parts which are not repairable at site but are essential for the operation of the equipment, the Contractor and the Engineer-in-charge shall mutually agree to an improvised arrangement to be made by the Contractor to ensure continued plant operation and to a programme of replacement or renewal which will minimize interruption/dislocation to the maximum extent in the operation of the equipment. The cost of transportation and insurance of defective parts from site and of replacement will be borne by the Contractor.

20.0 Spares and consumables:

- i. All tools and consumables to be arranged by the contractor under the contract will strictly conform to their standard specification and will have to be inspected by the Engineer-in-charge prior to putting to use.
- ii. The Contractor will provide the Engineer-in-charge with all the addresses and particulars of his sub-suppliers while placing the order on vendors for consumables/ items/components/equipment covered under the Contract.

21.0 Payment.

- ii. The payment to the Contractor for performance of works under the Contract will be made by the Corporation as per the guidelines and conditions specified herein.
- iii. L1 bidder have to submit the Breakup of prices as per PRICE SCHEDULE (attached herewith) after finalization of bid.

21.1 Terms of Payment:

- i. Supply, Delivery, Erection, Testing and Commissioning: 100% payment for Supply, Delivery, Erection, Testing and Commissioning shall be released after commissioning and successful test run of the system for 7 (seven) days.
- ii. Annual Maintenance Contract: 100% Payment payable for a period of 1 (one) year shall be released on yearly basis after completion of the year.
- iii. Payment of Supply, Delivery, Erection, Testing and Commissioning along with mandatory spares (if any) will be made on GeM.
- iv. Payment for the AMC will be made outside GeM. Only the payment of 22.1 (i & iii) will be made on GeM.

21.2 Bill in triplicate, along with work completion certificate, shall be submitted to the Sr. Manager (Fire & Safety) for releasing payment.

21.3 All bank charges shall be to the contractors account.

22.0 Facilities to be provided by the Corporation

22.1 Accommodation:

Temporary accommodation for the Contractor's personnel shall be provided by the Corporation. For the purpose, the Contractor should submit a list of personnel proposed to be deployed for execution of the works at site.

22.2 Tools and equipment:

Except in case where the Owner's express permission is applied for and received in writing, no use of the Corporation's plant facilities, shall be made by the Contractor or his employees.

The Corporation shall not be responsible or held liable for any damage to person or property consequent upon the use, misuse or failure of any construction tools and equipment used by the Contractor or any of his sub-Contractors, even though such construction tools and equipment may be furnished, rented or loaned to the Contractor or any of his sub-Contractors. The acceptance and/or use of any such construction tools and equipment by the Contractor or his sub-Contractors shall be construed to mean that the Contractor accepts all responsibility for and agrees to indemnify and save the Corporation from any and all claims for said damages resulting from said use, misuse or failure of such construction tools and equipment.

23.0 Cleanliness

The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc., during the period of contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work area at least once in a day. All rubbish and scrap materials shall be stacked or disposed in a place to be identified by the Engineer-in-Charge. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.

Wastes should be identified and separated into bio-degradable and non-bio-degradable type. The same should be stacked or disposed as per instructions of the Engineer-in-charge.

24.0 Completion of Contract

Time is the essence of the Contract. The Completion Period for the entire scope of work is 4 (four) months. The Contractor shall provide full programme of the supply and work in detail and completion schedule of activities. Strict adherence to the completion schedule shall be the essence of the contract..

25.0 Data to be furnished by the Contractor.

The logbooks for the work and those of machinery shall be properly maintained and any information on the operation and maintenance of machinery shall be furnished to the Engineer-in-charge or his authorized representative, when required. Any other information of a similar nature, which may be required, shall also be furnished.

26.0 Cleaning up of the work site

Upon completion of the work, the Contractor shall remove from the vicinity of the work all plants, buildings, rubbish, unused materials, concrete forms and other like materials belonging to him or used during construction and, in the event of his failure to do so, the same will be removed by the Corporation at the expense of the Contractor and the same shall be recovered from his dues.

27.0 Engineer's Supervision

To eliminate delays and avoid disputes and litigation it is agreed between the parties to the contract that matter and question shall be referred to the Engineer-in-charge and his decision given in writing shall be implemented by both the parties.

The work shall be performed under the direction and supervision of the Engineer in Charge.

28.0 Safety

Prevention of all types of accidents is the responsibility of the Contractor. The Contractor shall arrange and adopt all comprehensive safety measures and codes in every stage of works at his own cost and his employees and workmen shall follow all safety measures, procedure, rules and regulations vigorously at all times. The Contractor, at his own cost, shall train his people about safety measures, codes, procedure rules and regulations. The Contractor shall be solely responsible for all losses and / or damages arising out of any lacking in this respect and any resultant accident.

29.0 Removal of improper works and materials

According to instruction of the Engineer-in-charge, the Contractor shall, at his own expense, remove from the site: -

- (a) All materials which are not required for the work and which are supplied by the Contractor.
- (b) All defective materials supplied by the Contractor and which have been rejected by the Engineer-in-charge.
- (c) Resultants of any defective works which have been rejected by the Engineer-in-charge.

30.0 Subletting of work

No part of the work shall be sublet by the Contractor directly or indirectly to any body without prior permission in writing of the Engineer-in-charge.

31.0 Quality assurance plan / quality control

The bidder shall strictly adhere to the quality management and procedures according to the latest standards, codes, norms and prevailing practices and according to the instructions outlined in the specification and of the engineer-in-charge during the execution of the contract.

32.0 Extra Work:

The Contractor shall have to execute such items of work, which, in the opinion of the Engineer-in-charge is unavoidable for proper execution of work and for proper performance of the plant. Suitable time extension shall be given for execution of such extra work.

Schedules as provided in this Bid document shall be duly filled in by the bidder.

FORM: - 1

REGISTER OF WORKMEN

1. Name and address of the Contractor/sub Contractor

2. Agreement No.

Sl. No.	Identity Card No. of worker	Name and surname of the worker (fill in category wise)	Age & sex	Father's/ husband's name	Nature of employment/ designation	Details of wages & other allowances paid	Permanent home address of employees (vill and dist)	Present address	Date of commencement of employment	Date of termination or leaving of employment	Details wages & allowances last drawn	Signature or thumb impression of the employees	Affix attested copy of passport size photo of worker	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Note:

1. The Contractor shall furnish a copy of the register of workmen to the Engineer -In- Charge of the work for permanent record in his Office.
2. Column No. 12 to be filled in by Corporation on receipt of details of termination from the Contractor.
3. Copies of register with photographs of workman shall be sent to the Engineer in charge.

SPECIFICATIONS FOR WORKS TO BE EXECUTED

TECHNICAL SPECIFICATIONS FOR 75 KLD SEWAGE TREATMENT PLANT

1. SCOPE

1.1 This specification covers the Design, Manufacture, Shop Assembly, Shop Testing at Manufacturer's Works before dispatch, Supply, Delivery at site, Freight, Insurance, Loading, Unloading, Handling at site, Erection, Testing and Commissioning of 75 KLD Sewage Treatment Plant (MBBR type) as specified hereinafter with all accessories and auxiliaries and spares for three years satisfactory operation and maintenance at Assam Gas Based Power Station, No. 3 Bokuloni Village, Dist: Dibrugarh, Assam as detailed in the Schedule of Requirements of this specification.

The scope of works shall include but not limited to the following:

1.1.1 Design of Sewage Treatment Plant: - Design shall essentially include but not limited to the following:

- i) Process Design.
- ii) Preparation of general arrangement drawing with necessary information.
- iii) Selection of all mechanical and electrical equipment like pumps, motors, pipes, sleeves, valves, switchgear, cable etc.
- iv) Preparation of detail engineering drawings.

- 1.1.2 Supply and Installation of Mechanical and Electrical Equipment like automatic bar screens, raw sewage transfer pumps, all mechanical and electrical equipment for the reactor, sludge recycling / lifting pumps, plant room, drainage pumps, filters, disinfecting units etc. as described in the specification.
- 1.1.3 Major civil works like construction of underground tank, equipment foundation etc. The Contractor will have to provide detail drawings regarding the requirement of civil works.
- 1.1.4 Interconnecting Pipes: All interconnecting pipe works should be MS (medium duty) with outer epoxy painted (with applicable colour code) starting from screen chamber to discharge header of the treated Effluent transfer plant including making arrangement for STP bypass and surplus effluent disposal, supplying and fixing all pipe sleeves in the civil works is also included in the scope of works.
- 1.1.5 Electrical Works: Pump control panel and all inter connecting power and control cabling for pumps, drives etc. interlocking of dosing system etc. including installation of electrical earthing arrangement.
- 1.1.6 MS structural works for the walkways, ladders, pipe supports, manhole covers etc.
- 1.1.7 Testing and commissioning of the Plant including supply of consumables for completion of Commissioning Activities of the plant.
- 1.1.8 Training of the personnel of the Employer for operation and maintenance of the Plant.
- 1.1.9 Full comprehensive operation & maintenance of the plant including supply of consumables as required for 36 (thirty-six) months commencing immediately after commissioning. However, the contractor shall have to guarantee/warranted the supplied equipment including all accessories for satisfactory performance for a period of 12 months from the date of commissioning of the plant.
- 1.1.10 The contractor shall submit detail Operation & maintenance Manual (Soft & hard copy) to the Corporation.

2. BASIC PARAMETERS

The following basic parameters are to be considered for the designing:

i	Nature of Waste Water	Domestic sewage including water from toilets and kitchens from the colony area.
ii	Expected daily flow	100 M ³ / day
iii	Average flow rate for primary and secondary treatment	5 M ³ / hr
iv	Tertiary Treatment	5 M ³ / hr
v	Basic	Multi grade sand filtration, activated carbon filter, Chlorine disinfection system

3. Expected Raw Waste

Characteristic	Value
pH	9.5
BOD	350 mg/litre
Suspended solid	400 mg/litre
COD	750 mg/litre
Oil & Grease	Upto 100 mg/litre

4. Desired Treated Effluent Characteristics

Characteristic	Value
pH	6.5 to 8.5
BOD	Less than 10 mg/litre

Suspended solid COD	Less than 10 mg/litre Less than 50 mg/litre
Oil & Grease	Upto 1 mg/litre
Colour and Odour	Treated effluent for flushing shall be aesthetically acceptable and odour free.

5. **Reuse of Treated Effluent:** Shall be used for WC flushing of administrative building of this power station.
6. **Statutory Requirement:** Effluent quality shall meet the requirements of Assam Pollution Control Board and Central Pollution Control Board.
7. **Site Condition:** Considering the site constraint, the tenderer shall carefully design the system so that minimum space is utilized. However, the tenderer may inspect the site before submission of bid.
8. **DRAWINGS AND INSTRUCTION MANUALS**
- 8.1 The tenderer shall submit with the tender relevant drawings with illustrated and descriptive literature.
- 8.2 In addition to above, the tenderer may supply any other drawings, which in his opinion / purchaser's opinion is required to describe the equipment in full details.
- 8.3 Required number of the instruction manuals covering instructions for installation and maintenance check tests shall be supplied by the contractor as a part of this contract.
9. **GUARANTEED AND TECHNICAL PARTICULARS**
- 9.1 Guaranteed and technical particulars as per Schedule of Requirement given in **Schedules** shall be furnished along with the tender. Particulars which are subject to guarantee shall be clearly marked. Any tender lacking complete information in this respect is likely to be rejected.
10. **ERECTION, TESTING AND COMMISSIONING**
- 10.1 The receipt, storage and handling of materials at site is in the scope of the bidder. Temporary space for storage at site shall be provided by the Corporation. All civil works for the purpose of erection of the STP shall be in the scope of the bidder. All consumables required for commissioning shall be under the scope of the bidder.
11. **GUARANTEE:**
- Entire STP shall be guaranteed for satisfactory performance for a period of 12 months from the date of Commissioning. All breakdown and defects during this period shall be attended and components shall be replaced by the bidder at free of cost. The replaced part shall also be guaranteed for 12 months with effect from the date of replacement.
12. **MAINTENANCE CONTRACT:**
- Full comprehensive operation & maintenance Contract of the plant including supply of consumables as required for 36 (thirty-six) months commencing immediately after commissioning. The analysis report of treated sewage is to be submitted to Manager (Safety), F&S Division on every month. The report should comply with our requirement.
- However, the contractor shall have to guaranteed/warranted the supplied equipment including all accessories for satisfactory performance for a period of 12 months from the date of commissioning of the plant.
13. **COMPLETENESS OF EQUIPMENT**
- All fittings and accessories for the specified equipment though may not have been specifically mentioned in the specification but are usually necessary for completeness of the above system, shall be deemed to be covered by the specification and shall be indicated and furnished by the contractor without any charges.
14. **DEVIATIONS**
- Any deviations from specifications shall be separately listed with proper justification as per proforma given in schedule-IV in the absence of which it will be presumed that the provisions of the specifications are fully complied with by the tenderer.
15. **SIMILAR INSTALLATIONS**
- The tenderer shall furnish as per **schedule-I & V** a list of similar equipment supplied by him giving the details of customer, capacity of installation, value of order and year of commissioning.
16. **COMPLETION PERIOD**

The entire scope under this specification should be completed **within 4 (four) months** from the date of issue of Letter of Intent. The bidder shall furnish the schedule of deliveries and erection with the technical bid.

17. PRICES

The tenderer is to quote prices as per the **PRICE SCHEDULE** for Supply, Delivery, Erection, Testing and Commissioning of the system and Annual Maintenance Contract of the system for 3 years. For mandatory spares, IF ANY, the tenderer is to quote the prices at a lot. It is mandatory to submit the list of mandatory spares along with technical bid.

TECHNICAL SPECIFICATION OF STP 75 KLD (MBBR TYPE)

Bidder shall furnish the required information about the STP offered for execution of the work.

1. Coarse Screen Chamber

No. of Units	1 No
Capacity	5KL
MOC Screen Chamber	Cement Concrete Chamber with SS Coarse Screen

2. Equalization cum pre-aeration tank

No. of Units	1 No
Capacity	50 KL
MOC	RCC

3. Air Blower (suitable for aeration)

No. of Units	2 No (1w+1s)
Capacity	100 CFM (Minimum)
Design Head	The bidders are to furnish
Type	
RPM	
Drive	
Make	

4. Effluent Feed Pumps (Suitable for continuous duty)

No. of Units	2 No (1w+1s)
Capacity	6 KL/Hr. x 8 M head (Minimum)
Design Head	The bidders are to furnish
Type	
MOC	
Drive	
Make	

5 -Filtrate feed Pump:

No. of Units	2 No (1w + 1s)
Capacity	6 KL/hr. x 8 M head (Minimum)
MOC	The bidders are to furnish
Drive	
Make	

6 -MBBR Reactors

No. of Units	2 No
MOC	The bidders are to furnish

7 -Tube Settler

No. of Units	1 No
Capacity	13m ³ /hr
MOC	The bidders are to furnish

9- Pressure Sand Filter

No. of Units	1 No
Capacity	8 KL/hr. (Minimum)
Size	800x 1800 HOS (mm)
MOC	FRP

10 -Activated Carbon filter

No. of Units	1 No
Capacity	8 KL/hr. (minimum)
Size	800 x 1800 HOS (mm)
MOC	FRP

11- Dosing system

No. of Units	1 No
The Bidders are to offer the detail specification of the offered system.	

12- HYPO Tank

Capacity	100 liters
No. of Units	1 No
MOC	HDPE

22 - Filtration Media

Capacity	800 kg
Size	4/8, 8/16, 16/32

14- Activated Carbon

Capacity	200 kg
ID value	600

15-Tube DECK media

Capacity	4.5-meter cube
Size	150 x 750 mm
MOC	The bidders are to furnish
Make	

16- MBBR media

Capacity	5-meter cube/hr.
MOC	The bidders are to furnish
Make	

17 - Disinfection Unit

Capacity	6 LPH
Quantity	1 No
MOC	The bidders are to furnish
Make	

18- Pressure Indicator

No. of Unit	The bidders are to furnish
Type	
Make	

19- Flow Meter

No. of Unit	The bidders are to furnish
Type	
Make	

20. Motor Control Centre (M.C.C.):

No. of Unit	The bidders are to furnish
Type	

21. Cabling& Earthing:

--	--

Cabling	As per site requirement
Type	As per site requirement

Annexure-I

FORM- B: UNDERTAKING FOR BIDDERS WHO ARE REGISTERED AS MICRO AND SMALL ENTERPRISES

A. I/We confirm that the provision of Micro and Small Enterprise are applicable to us and our Organization falls under the definition of following category:

- i) [] – Micro Enterprises
- ii) [] – Small Enterprises

Please tick the appropriate option box [] and attach relevant documents/certificates issued by (District Industries Centre or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board, or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of Micro, Small & Medium Enterprises) as evidence of their applicability of Micro and Small Enterprises

B. I/We also undertake to inform the change in this status as aforesaid during the currency of the Contract, if any.

Dated:

Signature of Bidder

ANNEXURE -II

Proforma of Bank Guarantee for Contract Performance

(To be stamped in accordance with Stamp Act)

Ref.....

Bank Guarantee No.....

Date

To,

.....
.....

Dear Sir,

In consideration of the North Eastern Electric Power Corporation Ltd.; (hereinafter referred to as the "Purchaser" which expression shall unless repugnant to the context or meaning thereof include its successors, administrators or and assigns) having awarded to M/s with its Registered/Head Office at

(hereinafter referred to as the "Contractor" which expression shall unless repugnant to the context or meaning thereof include its successors, administrators or and assigns) a contract by issue of Purchaser's Letter of Intent No dtdand the same having been unequivocally accepted by the Contractor resulting in a "Contract" valued at Rs (Rupees.....)

only for
(scope of the Contract)

and the Contractor having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire Contract equivalent to 10 (ten) percent of the said value of the Contract to the Purchaser.

We
(Name and address of the Bank)

having registered Office at (hereinafter referred to as the "Bank" which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors or and assigns) do hereby guarantee and undertake to pay the purchaser, on demand any and all money payable by the Contractor to the extent of as aforesaid at any time upto (day/month/year) without any demur, reservation, contest, recourse or protest and/or without any reference to the Contractor. Any such demand made by the Purchaser on the Bank shall be conclusive and binding notwithstanding any difference between the Purchaser and Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other Authority. The Bank undertakes not to revoke this guarantee during its currency without previous consent of the Purchaser and further agree that the guarantee herein contained shall continue to be enforceable till the Purchaser discharges this guarantee.

The Purchaser shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee from time to time to extend the time for performance of the contract by the Contractor. The Purchaser shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Purchaser and the Contractor or any other course or remedy or security available to the Purchaser. The Bank shall not be released of its obligations under these presents by any exercise by the Purchaser of its liberty with reference to the matters aforesaid or any of them or by reason or any other acts of omission or commission on the part of the Purchaser or any other indulgence shown by the Purchaser or by any other matter or thing whatsoever which under law would, but for this provision, have the effect of relieving the Bank.

The Bank also agrees that the Purchaser at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor in the first instance without proceeding against the Contractor and not withstanding any security or other guarantee the Purchaser may have in relation to the Contractor's Liabilities.

The liability or obligation of the Bank under this guarantee bond shall not be affected or suspended by any dispute between the purchaser and the supplier and the payment under this guarantee bond need not wait till the disputes are decided by a Competent Court or Tribunal or any other authority and that any payment made by the bank to the purchaser under the guarantee bond shall be deemed to have been rightfully and lawfully made.

Lastly the Bank also assures that the guarantee bond will not be discharged due to the change in the constitution of the bank or the contractor.

Notwithstanding anything contained herein above our liability under this guarantee is restricted to Rs..... (Rupees.....) only and it will remain in force upto and including.....and shall be extended from time to time for such periods as may be advised by the Purchaser who is the beneficiary under this guarantee and in the event if the Contractor fails to comply such extension within the validity period, this shall be treated as a claim by the purchaser on the Bank.

Dated this day of200 at

Witness

.....
(Signature).....

(Signature)

.....
(Name)

(Name)

Designation with

Bank Stamp.....

Authority as per Power

Of attorney No.....

.....
(Official Address)

Dated

- Note; (1) This sum shall be ten percent (10%) of the "Contract Price".
- (2) The date of validity of this Bank Guarantee will be ninety (90) days after the end of the warranty period or as specified in the Contract.
- (3) The BG shall be submitted preferably from a Nationalized Bank

SCHEDULE-I

SCHEDULE OF SIMILAR WORKS

The bidder shall furnish below a list of similar works executed by him

SN	Name of Work	Value of order	Customer	Year of Execution

Signature of Tenderer
Name & Stamp

SCHEDULE-II

SCHEDULE OF TOOLS AND TACKLES

Bidder shall insert the required information on the tools and tackles which will be made available at site for execution of the work.

Description of Tools and tackles	Make/Model	Quantity

--	--	--

(Signature of the Bidder)
Name & Stamp

SCHEDULE-III

SCHEDULE OF PERSONNEL/ MANPOWER TO BE DEPLOYED

Bidder shall insert the required information regarding personnel/ manpower proposed to be deputed for the work.

Designation / Trade	No. of persons

--	--

(Signature of the Bidder)
Name & Stamp

SCHEDULE -IV

SCHEDULE OF DEVIATION FROM SPECIFICATION

Unless specifically mentioned in this schedule, the bid shall be deemed to conform to the Corporation's specification.

SN	Clause no.	Details of Deviation	Justification for Deviation

Certified that the above listed deviations and exceptions are exhaustive and the contract shall be executed as per tender specifications excepting for above deviations and exceptions in the event of placing an order on us.

(Signature of the Bidder)
Name & Stamp

SCHEDULE-V

SCHEDULE OF WORKS CURRENTLY IN HAND

The bidder shall furnish below a list of works which are currently being executed by him

SN	Name of Work	Value of order	Customer	Place of Execution

--	--	--	--	--

Signature of Tenderer
Name & Stamp

SCHEDULE- VI

Current Litigation History

Bidders, or each of the Partners of a joint venture, should provide information on current litigation and/or arbitration. A separate sheet should be used for each Partner of a joint venture.

Name of client, cause of litigation and subject of dispute	Disputed Amount (current value)	Litigation going on since (moyr)
1	2	3

(Signature of the Bidder)
Name & Stamp

PRICE SCHEDULE:

SCHEDULE OF PRICES FOR SUPPLY, DELIVERY, ERECTION, TESTING AND COMMISSIONING AND OPERATION & MAINTENANCE FOR A PERIOD OF 3 (THREE) YEARS

(To be quoted in figures and words)

Sl no	Item Description	Qty.	Ex-work Price		GST	Transportation Charges		Insurance Charges		Total FOR Destination Price
			Unit Rate in Rs.	Total in Rs.	Rs.	Unit Rate in Rs.	Total in Rs.	Unit Rate in Rs.	Total in Rs.	Total in Rs
1	2	3	4	5	6	7	8	9	10	11
1	Supply, Delivery, Erection, Testing & Commissioning	Lot								
2	Operation & Maintenance for 3 yrs	1				---	---	---	---	
3	Mandatory Spares, if any (List of mandatory spares is to be submitted)	Lot				---	---	---	---	

GST shall be indicated clearly.

Any other information:

Signature of bidder

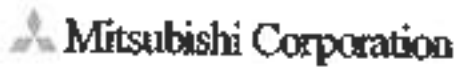
Name

Stamp

- Note:**
1. If the bidder is eligible for any concessional taxes and duties, they should invariably mention this in the bid on or before the date of opening of price bid, the bidder should confirm any change in this regard. The price bids would be evaluated on the basis of information supplied by the bidder and hence the actual payment of taxes and duties shall be limited to the extent mentioned in the bid or in subsequent confirmation.
 2. If the bidder did not mention the price(s) of any item, then his offer may either be considered as incomplete or will be loaded by the highest price quoted by the other bidder for that item.
 3. For all items, prices should be quoted in the above schedule based on the Schedule of requirement.
 4. In addition to filling up of this schedule, the tenderer shall attach separately a detail list of materials he is supplying along with their item wise prices.

Note: This is system generated file. No signature is required. Print out of this document is not valid for payment/ transaction purpose.

नोट: यह सिस्टम जनरेटेड फाइल है। कोई हस्ताक्षर की आवश्यकता नहीं है। इस दस्तावेज़ का प्रिंट आउट भुगतान/लेनदेन उद्देश्य के लिए मान्य नहीं है।



3-1, MARUNOUCHI 2-CHOME, CHYODAI-KU, TOKYO 100-8006, JAPAN

ESTIMATE

No. XAF-NEEPCO-M4616U265-SP-R1
 Messrs. North Eastern Electric Power Corporation Ltd.
 (A Govt. of India Enterprise)
 Assam Gas Based Power Project
 P.O.Bokuloni Charall - 786 191 Dist. Dibrugarh (Assam)

Date: 11-Jun-18

In reply to NEEPCO's letter No. NEEPCO/AGBP/PEM/Q&M-12/2018-1976 dated on June 8, 2018.
 We provide you with our estimate for the goods described below on the following basis:

- 1. Terms of Delivery FCA JAPAN
- 2. Time of Shipment Below mentioned
- 3. Port of Shipment Japanese airport or seaport
- 4. Port of Destination Indian airport or seaport
- 5. Payment Below mentioned
- 6. Packing Air-worthy packing or Sea-worthy packing
- 7. Manufacturer Mitsubishi Electric Corporation
- 8. Remarks Below mentioned

Description of Goods	Quantity	Unit Price	Amount FCA JAPAN (in Japanese Yen)
INDIANEEPCO Protection Relay Board & Voltage Sensors for 415V MCC Panels			
Modification Parts and Voltage Sensor	1 LOT	-	¥79,226,200
-Details are as per the attached-			
TOTAL :			¥79,226,200

Terms and Conditions

1. Time of Shipment :

Delivery time of the above parts is ten (10) months on FCA Japan basis, after Seller's receipt of purchase order and the relative irrevocable letter of credit opened by Buyer acceptable to Seller, subject to availability of vessel and approval of Japanese Government for export, if necessary.

2. Terms of Payment :

100% Contract amount shall be paid by an irrevocable, confirmed, and non-restricted Letter of Credit payable at sight draft to be opened in favor of Mitsubishi Corporation, Tokyo (Attn: ENY/XA-F) with validity long enough to cover Time of Shipment stipulated in Clause 1 above plus at least 21 days for Seller's bank negotiation.

LC shall be confirmed by a first class bank in Europe or U.S.A. or Japan acceptable to Seller.

LC opening charge, confirmation charge and all bank charges outside Japan, including collection charges and stamp duties, if any, shall be paid by Buyer.

Any amendment charges which will be required due to the reason not attributable to Seller shall be borne by Buyer

Please indicate following points in LC without fail:

- 1) "Attn: ENY/XA-F section"
(We have more than 450 independent sections and LC might not reach right section in time without such indication).
- 2) Port of shipment: Any Japanese airport /seaport.
- 3) Partial shipment: Permitted
- 4) Transshipment: Permitted


Mitsubishi Corporation

3-1, MARUHOCHO 2-CHOME, CHUOH-KU, TOKYO 100-8584, JAPAN

L/C has to be opened subject to the Uniform Customs and Practice for Documentary Credit of the International Chamber of Commerce (2007 revision) Publication No. 600.

Note : Please request L/C opening bank to appoint any of the following banks as advising bank at the time of opening L/C.

- MUFJ bank, Ltd Head Office (swift code : BOTKJPJT)
- Sumitomo Mitsui Banking Corporation, Tokyo (swift code : SMBCJPJT)
- Mizuho Bank, Ltd Head Office (swift code : MHCBJPJT)

*This request is for the appoint of advising bank and the above banks shall not be restricted as a negotiating bank.

3. Estimated Packing Data :

L*W*H(mm) = 2,200*2,200*120, G/W 550kg * 8 cases (modification parts except PC)

L*W*H(mm) = 700*700*700, G/W 100kg * 2 case (PC for maintenance)

L*W*H(mm) = 700*600*500, G/W 15kg * 2 carton (voltage Sensor)

4. Inspection :

Manufacturer's factory inspection prior to shipment shall be deemed as the.

Third Party's inspection fee and Customer's witness inspection fee are not included in above price.

5. Offer Validity :

This quotation is valid until August 31, 2018, thereafter subject to Seller's confirmation.

Sellers receipt of written order confirmation issued by Buyer

6. Effective Date of the Contract

Effective date of the contract is the date on which Seller accepts Buyer's purchase order and receives the letter of credit acceptable for Seller.

7. Remarks :

- 1) Delivery term is FCA Japan base. Seller's price is not including marine insurance and freight from Japan to site which shall be arranged by Buyer.
- 2) Taxes and/or duties to be incurred outside of Japan shall be borne and paid by Buyer, if applicable.
- 3) Seller's prices mentioned above are quoted under the condition that all of the items and quantity offered shall be ordered in one lot at the same time within the validity period. In case of partial order, prices shall be re-quoted.
- 4) The terms and conditions which are not specified in this quotation shall be discussed and mutually agreed before signing the contract.

8. Others :

- 1) For Upgrading Protection Relay Board & Voltage Sensors for 415V MCC Panels, Rental Testing Equipment and Technical Advisors are required which please refer to our separate Estimate No. XAF-NEEPCO-M4616U285-RT-R1 and XAF-NEEPCO-M4616U285-TA-R1
- 2) For NEPS's portion, each relevant estimate for Consumables, Engineering Fee and Technical Advisor Fee, will be provided separately
- 3) We confirmed that there are 12 voltage sensors in the drawing. However, we quoted 18 pcs of voltage sensors including spare parts.
- 4) Reference documents are as below.

Propose of partial up-grade for generator and transformer protection relay : JEJQ-170468-5005

Unit Data Sheet Drawing No..

92JNH044A2B03, 92JNH044B2B03, 92JNH044C2B03, 92JNH044D2B03

Unit Table Drawing No.:

92JNH044A2D01, 92JNH044B2D01, 92JNH044C2D01, 92JNH044D2D01

MITSUBISHI CORPORATION


M. OSHIMA
General Manager
Power Systems International Dept.
New Energy & Power Generation Division

INDIA/NEEPCO Assam P/S Protection Relay Board & Voltage Sensors for 415V MCC Panels

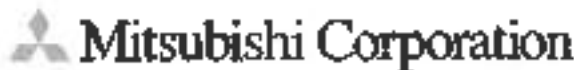
- 1 Protection Relay Board & Voltage Sensors for 415V MCC Panels
 1-1 Modification Parts

Item No	Name of Equipment	Q'ty		Unit Price (JPY)	Total Price (JPY)
1	Protection Relay (G60)	4	lot	¥9,135,700	¥36,542,800
2	Protection Relay (T60)	4	lot	¥5,481,400	¥21,925,600
3	Protection Relay (AS4V)	4	lot	¥365,400	¥1,461,600
4	Modification Materials	2	lot	¥5,795,200	¥11,590,400
5	PC For Maintenance	2	lot	¥1,468,700	¥2,939,400

1-2 Voltage Sensors for 415V MCC Panels

Item No	Name of Equipment	Q'ty		Unit Price (JPY)	Total Price (JPY)
1	Voltage Sensor (SDV-FH5 DC125V)	36	pc	¥132,400	¥4,766,400

FCA Japan Total	¥79,226,200
-----------------	-------------



3-1, MARUNOUCHI 2-CH-OME, CHIYODA-KU, TOKYO 100-8086, JAPAN

ESTIMATE

No. XAF-NEEPCO-M4616U265-0-V5-TA-R1

Date: 11-Jun-18

Messrs. North Eastern Electric Power Corporation Ltd.

(A Govt. of India Enterprise)

Assam Gas Based Power Project

P.O. Bokuloni Chariali - 786 191 Dist. Dibrugarh (Assam)

In reply to NEEPCO's letter No. NEEPCO/AGBP/PEM/COM-12/2018-19/76 dated on June 6, 2018,

We provide you with our estimate for the goods described below on the following basis:

1. Terms of Delivery : -
2. Time of Shipment : -
3. Port of Shipment : -
4. Port of Destination : -
5. Payment : Below mentioned
6. Packing : -
7. Manufacturer : Mitsubishi Electric Corporation (MELCO)
8. Remarks : Below mentioned

Description of Goods	Quantity	Unit Price	Amount (in Japanese Yen)
INDIA/NEEPCO			
<u>Partial Up-grade for Generator and Transformer Protection Relay</u>			
1. Estimated Technical Advisory Fee for 415V MCC Panels Protection Relay update & Voltage Sensors	1 LOT	-	¥10,064,000
2. Estimated Expense (Details as per attached sheet)	1 LOT	-	¥4,200,000
Estimated Total :			¥14,264,000
TDS 10%			△¥1,006,400
Net Receivable :			¥13,257,600

Terms and Conditions

1. Time of Shipment :

Not Applicable

2. Terms of Payment :

Technical Advisory fee shall be paid by an irrevocable, confirmed, and non-restricted Letter of Credit payable at sight draft to be opened in favor of Mitsubishi Corporation, Tokyo (Attn : ENY/XA-F) with validity long enough for our bank negotiation.

L/C shall be opened within one and a half (1.5) months after Seller acknowledged Buyer's Purchase Order but before dispatch of the Technical Advisers with 120% of above estimated amount taking into consideration of the amount gaining after actual invoicing after work completion.

L/C shall be confirmed by a first class bank in Europe or U.S.A. or Japan acceptable to Seller.


L/C opening charge and all bank charges outside Japan, including collection charges and stamp duties, if any, shall be paid by Buyer.

Any amendment charges which will be required due to the reason not attributable to Seller shall be borne by Buyer.

Please indicate following points in L/C without fail:

- 1) "Attn: ENY/XA-F section"

(We have more than 450 independent sections and L/C might not reach right section in time)


Mitsubishi Corporation

3-1, MARUNOUCHI 2-CHOME, CHIYODA-KU, TOKYO 100-8008, JAPAN

without such indication).

L/C has to be opened subject to the Uniform Customs and Practice for Documentary Credit of the International Chamber of Commerce (2007 revision) Publication No. 600.

Note : Please request L/C opening bank to appoint the either following bank, as an advising bank at the time of opening L/C and request them to issue opened L/C instead of restricted L/C.

- MUFG bank, Ltd Head Office (swift code : BOTKJPJT)
- Sumitomo Mitsui Banking Corporation, Tokyo (swift code : SMBCJPJT)
- Mizuho Bank, Ltd Head Office (swift code : MHCBJPJT)

*This request is for the appointment of advising bank and the above banks shall not be restricted as a negotiating bank.

L/C opening charge and other bank charges in India shall be borne and paid by Buyer. Bank charges outside India shall be borne by Seller.

3. Offer Validity :

This quotation is valid until August 31st, 2018, thereafter subject to Seller's confirmation, Seller's receipt of written order confirmation issued by Buyer.

4. Remarks :

- 1) The above "Estimated Technical Advisory Fee" is calculated on estimation basis as per the attached sheet, and is NOT Lumpsum fixed price.
- 2) The above quoted price is inclusive of only TDS 10% for Fee for Technical Service (FTS) based on the India-Japan Tax Treaty. Any other Taxes and/or Duties to be levied in India including but not limited to Sales Tax, Service Tax shall be to Buyer's account.
- 3) The above "Estimated Technical Advisory Fee" is calculated on normal working 8 hours and overtime working 2 hours per day. TA fee of Saturday, Sunday, local holiday and traveling day shall be object for calculation.
- 4) The inspection record work and the report meeting are included in the scope of Technical Advisory work and shall be object for calculation.
- 5) The starting day of the work schedule is estimated from Monday basis.
- 6) The estimated day and time is calculated based on our manufacturer's recommended schedule as enclosed herewith.
- 7) Technical Advisor shall be dispatched subject to arrangement of required Visa. Necessary documents for application of Visa should be issued by Buyer.
- 8) Other conditions shall be as per attached "CONTRACT FOR DISPATCHING TECHNICAL ADVISER".
- 9) The desired dispatch schedule shall be advised by Buyer before 3 (three) months of it.
- 10) The terms and conditions which are not specified in this quotation shall be discussed and mutually agreed before signing the contract.
- 11) This Estimate is for Technical Advisors for replacement/modification of the parts offered under our Estimate No.XAF-NEEPCO-M4616U265-SP-R1. Test Equipments offered under Estimate No.XAF-NEEPCO-M4616U265-RT-R1 shall be required for such replacement/modification work.

MITSUBISHI CORPORATION



M. KOHAMA
General Manager

Power Systems International Dept.
New Energy & Power Generation Division

E&OE

NEEPCO

Dispatching Technical Adviser for NEEPCO Assam P.S Protection relay update & voltage sensors for 415V MCC Panels

	Item	QUANTITIES/ RATE/ AMOUNT	Daily Allowance	Normal working Mandays	Overtime charge	RT Airfare (actual base)	TOTAL AMOUNT (JY)
1	TST Modification & Testing TA 10MD x 2RT	Quantities	8	20	0	4	
		Rate(JY)	136,000	136,000	22,000	700,000	
		Amount(JY)	1,088,000	2,720,000	0	2,800,000	6,608,000
2	Generator Assembly TA 19MD + 1RT	Quantities	8	38	0	2	
		Rate(JY)	136,000	136,000	22,000	700,000	
		Amount(JY)	1,088,000	5,168,000	0	1,400,000	7,656,000
	TOTAL	Amount(JY)	2,176,000	7,888,000	0	4,200,000	14,264,000

TOTAL (JY)

₹14,264,000

ESTIMATE

No. XAF-NEEPCO-M4616U265-RT-R1

Date: 11-Jun-18

Messrs. North Eastern Electric Power Corporation Ltd.

(A Govt. of India Enterprise)

Assam Gas Based Power Project

P.O. Bokuloni Chariali - 786 191 Dist. Dibrugarh (Assam)

Reference is made to our Estimate No. XAF-NEEPCO-M4616U265-SP-R1.

In reply to NEEPCO's letter No. NEEPCO/AGBP/PEMO&M-12/2018-18/76 dated on June 8, 2018,

We provide you with our estimate for the goods described below on the following basis:

- | | |
|------------------------|---|
| 1. Terms of Delivery | Below mentioned |
| 2. Time of Shipment | Below mentioned |
| 3. Port of Shipment | Below mentioned |
| 4. Port of Destination | Below mentioned |
| 5. Payment | Below mentioned |
| 6. Packing | Air-worthy packing |
| 7. Manufacturer | Mitsubishi Electric Corporation (MELCO) |
| 8. Remarks | Below mentioned |

Description of Goods	Quantity	Unit Price	Amount
INDIA/NEEPCO			(in Japanese Yen)
<u>Protection Relay Board Update & Voltage Sensors for 415V MCC Panels</u>			
Rental Fee of Testing Equipment (4 months Lumpsum Rental Fee)	1 LOT		¥6,915,400
-Details are as per the attached-			
Gross Total :			¥6,915,400
TD\$ 10% for RENTAL FEE :			▲ ¥691,540
Net Receivable Total			¥6,223,860

Terms and Conditions**1. Terms of Delivery :**

Rental Fee is estimated based on the following delivery terms.

Seller shall be responsible for and bear the cost of delivering the Rental Equipment under FOB Japanese Airport (Incoterms 2010).After used, Buyer shall be responsible for and bear the cost of delivering the Rental Equipment by Airfreight under CIF Osaka Airport (Incoterms 2010).

All the costs of delivering under CIF basis shall be on Buyer's account except for Import Consumption Tax to be imposed by Japan Customs, which shall be on Seller's account.

2. Time of Shipment :

Seller shall prepare and ship the Rental Equipment based on the inspection schedule which will be mutually agreed, subject to Seller's receipt of purchase order and the relative irrevocable letter of credit opened by Buyer acceptable to Seller.

3. Terms of Payment :

100% Contract amount shall be paid by an irrevocable, confirmed, and non-restricted Letter of Credit payable at sight draft to be opened in favor of Mitsubishi Corporation, Tokyo (Attn : ENYXA-F) with validity long enough to cover Time of Shipment stipulated in Clause 1 above plus at least 21 days for Seller's bank negotiation.

LC shall be confirmed by a first class bank in Europe or U.S.A. or Japan acceptable to Seller.

LC opening charge, confirmation charge and all bank charges outside Japan, including collection charges and stamp duties, if any, shall be paid by Buyer.

Any amendment charges which will be required due to the reason not attributable to Seller shall be borne by Buyer.

Please indicate following points in L/C without fail:

- 1) "Attn: ENYXA-F section"
(We have more than 450 independent sections and L/C might not reach right section in time without such indication).
- 2) Port of shipment: Any Japanese Airport
- 3) Partial shipment: Permitted
- 4) Transshipment: Permitted

L/C has to be opened subject to the Uniform Customs and Practice for Documentary Credit of the International Chamber of Commerce (2007 revision) Publication No. 600.

Note : Please request L/C opening bank to appoint any of the following banks as advising bank at the time of opening L/C.

- MUFJ bank, Ltd Head Office (swift code : BOTKJPJT)
- Sumitomo Mitsui Banking Corporation, Tokyo (swift code : SMBCJPJT)
- Mizuho Bank, Ltd Head Office (swift code : MHCBJPJT)

*This request is for the appoint of advising bank and the above banks shall not be restricted as a negotiating bank.

4. Estimated Packing Data :

L*W*H(mm) = 1,500*1,100*900, G/W 80kg * 2 carton

5. Inspection :

Manufacturer's factory inspection prior to shipment shall be deemed as final.

Third Party's inspection fee and Customer's witness inspection fee are not included in above price

6. Offer Validity :

This quotation is valid until August 31, 2018.

7. Effective Date of the Contract

Effective date of the contract is the date on which Seller accepts Buyer's purchase order and receives the letter of credit acceptable for Seller.

8. Remarks :

- 1) Seller's price is inclusive of 10% Tax Deduction at Source (TDS) for Fee for Technical Service (FTS) as per provision of India-Japan Tax Treaty. In case you require our Tax residence Certificate for application to the tax treaty, please inform us.
Any other Taxes and/or Duties to be levied in India including but not limited to Sales Tax, Service tax, if applicable, shall be to the account of the Buyer.
Upon your settlement of payment, please send us the copy of TDS certificate immediately.
- 2) Seller's prices mentioned above are quoted under the condition that all of the items and quantity offered shall be ordered in one lot at the same time within the validity period. In case of partial order, prices shall be re-quoted.
- 3) The terms and conditions which are not specified in this quotation shall be discussed and mutually agreed before signing the contract.

9. Others (for Rental Tools) :

- 1) This Estimate is for Rental Equipment for replacement/modification of the parts offered under our Estimate No. XAF-NEEPCO-M4616U265-5P-R1. Technical Advisors offered under Estimate No. XAF-NEEPCO-M4616U265-TA-R1 shall be required for such replacement/modification work.
- 2) Rental Fee is the Lumpsum price for four (4) months. Therefore, Buyer is required to return the Rental Equipment within such period after the relevant work completed. Even if the rental period is less than four (4) months, please return it within 1 week after completion date of relative works. Rental period starts from the date when Seller completes the delivery of the Rental Equipment on FGA Japanese Airport basis (i.e. Air Waybill Date), until the date when the Rental Equipment returned to CIF Osaka Airport (i.e. Arrival Date at Osaka Airport).
In case the rental period exceeds the aforesaid period, Seller shall charge additional fee for JPY 433,000 - per week.
- 3) The above estimated amount is net receivable and does not include followings which shall be on Buyer's responsibility and account :
 - All transportation fee and Marine Insurance Premium from Japanese Airport to Buyer's site, and from Buyer's site to Osaka Airport
 - All the costs for acquisition of permission for temporary importation and re-exportation of Rental Equipment, which occur in India.
 - All the cost for temporary importation and re-exportation (customs clearance fee, any taxes and/or duties, etc.) which occur in India.
 - All the cost of re-importation (customs clearance fee, import duties, etc.) which occur in Japan, except for the Import Consumption Tax to be imposed by Japan Customs which shall be on Seller's account.
- 4) Shipping documents as mentioned below shall be sent to Seller immediately after Buyer arranged the return shipment.
 - INVOICE
 - PACKING LIST
 - AIR WAYBILL
- 5) Buyer is responsible to all losses and damages on Rental Equipment during the rental period and Buyer has to take out insurance to cover all losses and damages at Buyer's cost.
The amount to be insured shall be informed by Seller
In case any damage is founded at the time of receipt, please inform Seller immediately

MITSUBISHI CORPORATION



M. KOHAMA
 General Manager
 Power Systems International Dept.
 New Energy & Power Generation Division

E. & O.E.

INDIA/NEEPCO Assam P/S Protection relay board & Voltage Sensors for 415V MCC Panels

Test Equipment (2 months Lumpsum Rental Fee)

Item No.	Name of Equipment	Type	Qty	Rental Fee for 2Month (JPY)
1	Digital Multimeter	TY720(VIEW)	2 pc	¥242,000
2	Megger	MY40-01 (VIEW)	1 pc	¥145,800
3	Phase Rotation Meter	RST-2 (FUJI)	1 pc	¥36,400
4	Relay Tester	AS-288 (NF) / LCA33-03(FUJI)	1 pc	¥6,066,200
5	Phase Angle Meter	CDM-330 (KDK)	1 pc	¥424,600
Total Rental Fee				¥6,915,400

I	<p>Design and Approval for maintenance of such Batteries and charging them, including the design of requirements in accordance with the design and safety standards.</p> <p>Design Approval, Supply, Installation, Testing and Commissioning of the following: a) Float Charger and Float cum Boost Charger; b) Charger of Make/Chain Etc. suitable for charging of new 125Vdc 545Ah cell type YBP14 Make/Exide/Platts Lead Acid Battery Bank; c) Battery System; d) Maintenance of Battery Charger. Estimated cost of job Rs. 10,00,000/- (Ten million rupees) including 10% contingency and 10% overheads and 10% profit, whichever is required completing in all respects for GBS at AGIP, NEPTCO Ltd.</p>	<p>Yes</p> <p>100%</p>
II	<p>Design Approval, Supply, Installation, Testing and Commissioning of the following: a) Float Charger and Float cum Boost Charger; b) Charger of Make/Chain Etc. suitable for charging of new 125Vdc 545Ah cell type YBP14 Make/Exide/Platts Lead Acid Battery Bank; c) Battery System; d) Maintenance of Battery Charger. Estimated cost of job Rs. 10,00,000/- (Ten million rupees) including 10% contingency and 10% overheads and 10% profit, whichever is required completing in all respects for GBS at AGIP, NEPTCO Ltd. The Inverter shall meet all the technical requirements consisting of Static Switch, Manual Bypass Switch, Status Signals, Alarms LEDs, Metering etc. as stated in existing system. Estimated cost of job Rs. 10,00,000/- (Ten million rupees) including 10% contingency and 10% overheads and 10% profit, whichever is required completing in all respects for GBS at AGIP, NEPTCO Ltd.</p>	<p>Yes</p> <p>100%</p>
III	<p>Design Approval, Supply, Installation, Testing and Commissioning of the following: a) Float Charger and Float cum Boost Charger; b) Charger of Make/Chain Etc. suitable for charging of new 125Vdc 545Ah cell type YBP14 Make/Exide/Platts Lead Acid Battery Bank; c) Battery System; d) Maintenance of Battery Charger. Estimated cost of job Rs. 10,00,000/- (Ten million rupees) including 10% contingency and 10% overheads and 10% profit, whichever is required completing in all respects for GBS at AGIP, NEPTCO Ltd.</p>	<p>Yes</p> <p>100%</p>
IV	<p>Design Approval, Supply, Installation, Testing and Commissioning of the following: a) Float Charger and Float cum Boost Charger; b) Charger of Make/Chain Etc. suitable for charging of new 125Vdc 545Ah cell type YBP14 Make/Exide/Platts Lead Acid Battery Bank; c) Battery System; d) Maintenance of Battery Charger. Estimated cost of job Rs. 10,00,000/- (Ten million rupees) including 10% contingency and 10% overheads and 10% profit, whichever is required completing in all respects for GBS at AGIP, NEPTCO Ltd.</p>	<p>Yes</p> <p>100%</p>

- 1.1 Mandatory Spares: The bidder is to provide the amount of spares for the duration of the project as specified in the Bill of Materials including, but not limited to, the following:
 - 1.2 12V Battery (except components) INPUT SOURCE SUPPLEMENT CONTROL CARD ASSEMBLY, METER CARD ASSEMBLY, AC 12V, (SOLD IN LOT CARD ASSEMBLY)
 - 1.3 24V Battery (except components) CONTROL CARD ASSEMBLY, METER CARD ASSEMBLY, DC 24V, (SOLD IN METER CARD ASSEMBLY)
 - 1.4 EXHAUSTIVE AC DISCHARGE TEST SYSTEM (SOLD IN LOT CARD ASSEMBLY)
 - 1.5 Technical service support: You are obligated to ensure the availability of technical assistance in the field during the project. You shall be responsible for all direct and indirect costs of such assistance.
 - 1.6 Availability of Spares: You shall ensure that all spares are provided in accordance with the requirements of the contract and that you shall be responsible for the availability of such spares. You shall ensure that the spares are available for the duration of the project.
 - 1.7 The Bidder shall provide complete documentation and training for the project and shall be responsible for the maintenance and operation of the equipment.
- 1.2 Prices: The Bidder shall provide complete documentation and training for the project and shall be responsible for the maintenance and operation of the equipment.
- 1.3 Taxes and Duties: The Bidder shall be responsible for all taxes and duties applicable to the project.

1. Terms of Payment

For Supply

- a. The Bidder shall provide all materials and components for the project and shall be responsible for the maintenance and operation of the equipment.
- b. The Bidder shall be responsible for all taxes and duties applicable to the project.

For Erection, Testing and Commissioning

- 1.1 The Bidder shall be responsible for the erection, testing and commissioning of the project and shall be responsible for the maintenance and operation of the equipment.
- 1.2 The Bidder shall be responsible for all taxes and duties applicable to the project.
- 1.3 The Bidder shall be responsible for the availability of technical assistance in the field during the project.
- 1.4 The Bidder shall be responsible for the availability of spares for the duration of the project.
- 1.5 The Bidder shall be responsible for the maintenance and operation of the equipment.

5. Security Deposit: The Bidder shall have to submit Performance, Price Guarantee or Security Deposit of 10% of the contract price within 10 days of the award of the contract.

Knowledge, training, permits, inspection and other costs shall be included in the Bidder's Proposed Price. The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits and for obtaining the required permits.

12. Delivery Period

Delivery period is defined as the period of time from the date of the Bidder's receipt of the Bidder's Proposed Price to the date of the Bidder's receipt of the Bidder's Proposed Price. The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

- 12.1 Delivery period is defined as the period of time from the date of the Bidder's receipt of the Bidder's Proposed Price to the date of the Bidder's receipt of the Bidder's Proposed Price.

Commissioning Period. The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

- 12.2 **Guarantee Warranties.** The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

12.3 **Liquidity Damage.** The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

- 12.4 **Insurance.** The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

12.5 **Other.** The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

12.6 **Other.** The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

13. **Bid Validity.** The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

14. **Submission of Drawings.** The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

15. **Operational Manual.** The Bidder shall be responsible for obtaining the required permits and for obtaining the required permits.

- 12. Pre-dispatch inspection and testing: Testing of equipment, equipment inspection and testing shall be done by the contractor and the contractor shall be responsible for the maintenance and repair of the equipment.
- 13. Dispatch assistance: The contractor shall be responsible for providing assistance to the customer at the time of dispatch.
- 14. Compliance: The contractor shall be responsible for ensuring that all equipment and personnel comply with all applicable laws, regulations, and standards.
- 15. Payment authority: The contractor shall be responsible for ensuring that all payments are made in accordance with the terms of the contract.
- 16. Court of competent jurisdiction: Any dispute arising out of or in connection with this contract shall be referred to the jurisdiction of the court at New Delhi, India.
- 17. Indemnification: The contractor shall be responsible for indemnifying and holding harmless the customer from and against all claims, damages, losses, and expenses, including reasonable attorneys' fees, arising out of or in connection with this contract.

[Handwritten Signature]
 Date: 12/12/2024
 Name: Mr. A. B. C.
 Title: Director of Operations

Ref: NEEPCO/AGBP/PEM/Q&M-7/11-12/ 244

Date: 18/2/12

To,
M/S Namrup Sales Corporation
P.O. Paibagar- 786623 (Near Gurudwara)
Namrup
Dist. Dibrugarh, ASSAM

FAX: 0374-2500695

Sub: Forwarding of Purchase Order No. 39NBB157 dtd. 13-02-2012 for supply of "220V 600AH Tubular Lead Acid Battery Bank" for AGBP, NEEPCO Ltd. Bokulom

Ref: - 1. Your offer No. BQ/MP/QN/11-12/195 dtd. 23-11-2011.
2. Our letter No. NEEPCO/AGBP/PEM/Q&M-7/11-12-202 dtd. 17-12-2011
3. Your letter No. MP/11-12/NEEPCO/01 dtd. 23-12-2012

Dear Sir,

With reference to the above, we are forwarding here with a Purchase Order No. 39NBB157 dtd. 13-02-2012 for supply of the following Battery Bank as per specification, prices and terms & conditions given below:-

Sl.	Description	Qty	Rate/Rs	Amount(Rs)
01	2V 1600-116J0H cell	110	15840.00	17,42,400.00
	Less Trade Discount @2%			34,848.00
	Discounted Price			17,07,552.00
02	TRIT Connector for 220V 600AH Battery Bank	1	16,500.00	16,500.00
03	Sulphuric Acid for 220V 600AH Battery Bank	1	37,950.00	37,950.00
	Total			17,62,002.00
	Less scrap value of old cell @ Rs.215.00 x 110 cells			1,33,650.00
	Total			16,28,352.00

(Rupees Sixteen Lakh Twenty eight thousand Three hundred Fifty two) only.

Terms & Conditions:

- Price: -The prices mentioned above shall remain "FIRM" till completion of delivery of the materials. The prices are Ex-godown Guwahati basis and inclusive of packing and forwarding.
 - Freight & Transit insurance:-The above materials shall be dispatched through any bank approved transporter. Freight charges from Guwahati to AGBP site will be paid extra at actual rates, production of documentary evidence. Transit insurance shall be covered under your open general transit insurance policy to be borne by you.
 - Taxes and Duties: Applicable VAT will be paid extra at actual present rate of VAT is @13.5%.
- Terms of Payment: -100% payment with taxes and duties at actual shall be released within 15 days on receipt of the materials at AGBP Site in full and good condition and against submission of following dispatch documents:
 - Bill in triplicate.
 - Packing list
 - Lorry receipt or consignment note.
 - Guarantee certificate.
 - Bank account details for payment through RTGS or NEFT.
- Delivery: - Delivery of the materials shall be made within 3 (Three) months from the date of receipt of this P.O. i.e. within 1-05-2012
- Guarantee / Warranty: - The Battery Bank shall be guaranteed for manufacturing defects for a period of 12 (twelve) months from the date of commissioning or 18 (eighteen) months from the date of supply whichever is earlier.

5. **Consignee :-** Sr. Manager (DM), MM Wing,
AGBP, NEEPCO Ltd.
PO: Bokuloni Chariali,
Dist: Dibrugarh, Assam (Pin: 786 191)
6. **Rejection of defective materials :-** If the materials are found defective at the time of receipt, same shall be rejected and the suppliers have to replace the same at their cost.
7. **Paying Authority :-** The Manager (F&A)
AGBP, NEEPCO Ltd
PO: Bokuloni Chariali-786 191
Dist: Dibrugarh (Assam).

Kindly acknowledge the order.

Thanking you

Yours faithfully,



Sr. Manager (E), PFM
For and on behalf of GM & HOP of
AGBP, NEEPCO Ltd., Bokuloni.

Copy to:

M/s Exide Industries Ltd.
C/o A.I. & C. Co
Near Car Char, GS Road,
Gareyhat, Diphoo,
Guwahati-781 005, Assam

NIO:

Memorandum no: NEEPCO/AGBP/PEM/O&M-17/0-11/245-249 Dt: 13/2/12

Copy to:

1. The Head of Project, AGBP. for kind information please. This is issued as per his approval conveyed vide memo no: NEEPCO/HOP/W-1218/205 / dt:08-02-2012
2. The DGM (E/N), AGBP for kind information please.
3. The Sr. Manager (E), MMW: for kind information please.
4. The Manager (F&A), AGBP: for kind information please. Photocopy of the Approval enclosed
5. The DM (CI), Vig. Wing. for kind information please.

o/c



Sr. Manager (E), PFM
AGBP, NEEPCO Ltd., Bokuloni.

Ref: NEIPCO/AGRI/PEMA/234-711-17

Date:

To:

M/s Exide Industries Ltd
C/o A.J & Co
GS Road, Near Car Ghya
Ganeshguri, Dispur
Guwahati-781005

Sub: Work Order for installation and commissioning / Charge-discharge of 220 V DC (Type-1100011-100AH) battery bank of Exide make

Ref: 1. Your offer No. UD/SER/12-13/001 dtd. 18/05-2012

2. Our PO. 395/01157 dtd. 13/02-2012 forwarded vide NEIPCO/AGRI/PEMA/234-711-12/244 dtd. 13/02/2012

Dear Sir

With reference to above, the Corporation is pleased to place this work order with you for supervision of erection and commissioning of 220V DC (Type-1100011-100AH) battery bank by deputed your service personnel as per terms and conditions mentioned below.

Terms and Conditions:

1. Lump sum supervision charge of RS.50,000.00(Rupees fifty thousand) only shall be paid for the above work. The charge is exclusive of Service Tax @ 12.36% which will be paid extra at the time of payment.
2. You are requested to depute your service personnel for the subject work within 30 days of receipt of this order.
3. Rent free accommodation shall be provided to your service personnel at AGRI Guest House.
4. **Payment terms:** 100% payment shall be released after successful completion of the erection & commissioning work and clearance for charging the battery bank subject to submission of the following documents:
 - a. Bill in triplicate
 - b. Bank details cum receipt as sample attached.
5. **Payng authority: Manager (E&A)**

AGRI, NEIPCO Ltd
PO. Bakulna, Charale-780 191
Dist. Dibrugarh, Assam

Kindly acknowledge receipt of the order.

Thanking you.

Yours faithfully

Sr. Manager (E&A)
For & On behalf of GRI & HOP
AGRI, NEIPCO Ltd

NDP

Slno No. NEIPCO/AGRI/PEMA/234-711-17-50,

Date: 6/6/12

Copy to:

1. The HOP, AGRI
2. DGM (E&A), AGRI
3. Manager (E&A), AGRI
4. O&A, Vig Wing

For kind information please, this is issued as per the approval conveyed vide No. NEIPCO/HOP/W-1213/452 dtd. 01/06/2012

For kind information please,

For kind information please. Photocopy of the approval attached herewith

For information please

Sr. Manager (E&A)
AGRI, NEIPCO Ltd

No. NEEPCO/AGBP/PEM/O&M-07/17-18/39NEG033/88 Dtd.07.06.2017

To,

M/S Namrup Sales Corporation,
Namrup, P.O:Parbatapur, Dist:Dibrugarh
Assam (786623)

Email:

DOCUMENT/68

Sub: Supply and Work order for Design, Manufacturing, Supply, Retrofitting, Testing and Commissioning of Battery Banks, Charger, Inverter etc. at AGBP, NEEPCO Ltd

- Ref 1 NIT No: NEEPCO/AGBP/PEM/O&M-07/16-17/02 dtd. 05.12.2016 (Tender Id: 21702).
 2. NEEPCO/AGBP/PEM/O&M-07/16-17/320 dtd 23.12.2016 (Corrigendum-1)
 3. NEEPCO/AGBP/PEM/O&M-07/16-17/335 dtd 03.01.2017 (Corrigendum-2)
 4. NEEPCO/AGBP/PEM/O&M-07/16-17/353 dtd 11.01.2017 (Corrigendum-3)
 5. Your offer vide Ref No: NSC/16-17/AGBP/20 dtd.16.01.2017.
 6. Request for clarification vide NEEPCO/AGBP/PEM/O&M-07/16-17/427 dtd.14.02.2017.
 7. Your clarifications vide Ref.No: NSC/16-17/AGBP/42 dtd.23.03.2017
 6. NEEPCO/AGBP/PEM/O&M-07/16-17/527 dtd. 25.03.2017
 7. Request for justification of price NEEPCO/AGBP/PEM/O&M-07/2017-18/26 dtd.26.04.2017
 8. Your clarification & justification of price vide NSC/17-18/AGBP/03 dtd.04.05.2017
 9. Our LOI No. NEEPCO/AGBP/PEM/O&M-07/17-18/44 dtd.09.05.2017.

Dear Sir,

With reference to above, the corporation is pleased to place this order for Design, Manufacturing, Supply, Retrofitting, Testing and Commissioning of Battery Banks with IRIT, MS Stand and acid as per IS. 1652-2013 (or latest amendment). Charger, Inverter as per schedule of requirement of technical specification as specified in the NIT and disposal through buy back of old existing battery bank of MHI Gas Turbine Generators (GTG) & Gas Buser Station (GBS) at AGBP, NEEPCO LTD, Bokuloni Chariali, Dibrugarh, Assam, PIN: 786 191.

1. SCOPE OF CONTRACT :

The Scope of Supply & Works to be executed as per this tender and the terms and conditions including mandatory spares shall be as follows:

Sl. No.	Scope of Work	Unit	Quantity
I	Supply, Installation, Testing & Commissioning of 2(two)sets of 125Volt, 535AH, cell type YHP11, Make/Exide Plate Lead Acid Flooded Stationary Battery Bank in Transparent SAN container for critical standby application (High Discharge Performance) consisting each cell of 2V conforming to IS 1652-2013 (or latest amendment) with Plate positive plates, pasted negative plates, lids, vent plugs, separators, bolts and nuts, cell insulators, inter-cell connectors, dry and uncharged along with MS Stand, IRIT, Acid with non-returnable container and accessories, battery terminal jelly etc Suitable for replacement of Existing System (500Ah Tubular Lead Acid Battery); Dimensions of Battery Room etc. as stated in as stated in NIT i.e. annexure-I, A (single line diagram) and conforming as per requirement of technical specifications (Annexure-II) of NIT whatever required to complete the battery bank in all respects for MHI GTGs at AGBP.	Set	2(two)
II	Fitting and Accessories for maintenance of each battery bank consisting items indicated in schedule of requirements in Annexure - I - of this tender and as per standard code.	Set	2(two)
III	Design, Manufacturing, Supply, Delivery including Installation, Testing & Commissioning at site 2(two) sets of Float Charger and Float cum Boost Charger (200 Amps) of Make/Chutbi Elec suitable for charging of new	Set	2(two)

	125Volt 535AH, cell type YHP11, Make: Exide Plante Lead Acid Battery Bank, Existing System; Dimensions of Battery Charger as stated in NIT i.e. annexure-1, IA (single line diagram) and conforming as per requirement of technical specifications (Annexure-II) of NIT whatever required completing in all respects for GTGs at AGBP, NEEPCO Ltd.		
IV	Design, Manufacture, Supply, Delivery including Installation, Testing & Commissioning of 2(two) sets of 4 KVA, 110V AC Inverter of Make: Chhabi Elec. suitable for 125Volt, 535AH, cell type YHP11, Make: Exide, Plante Battery Bank, new charger i.e. Float Charger and Float cum Boost Charger of Make: Chhabi Elec. and compatible with the Existing System; Dimensions of Inverter as stated in NIT and conforming as per requirement of technical specifications of NIT whatever required completing in all respects for GTGs at AGBP, NEEPCO Ltd. The Inverter shall meet all the technical requirements consisting of Static Switch; Manual Bypass Switch; Status Signals; Alarms LEDs; Metering etc. as stated in existing system.	Set	2(two)
V	Supply, Installation, Testing & Commissioning of 1(one) set of 220Volt, 175Ah, Cell Type YKP15 Make: Exide Plante Lead Acid Flooded Stationary Battery Bank in Transparent SAN container for critical standby application (High Discharge Performance) consisting each cell of 2V conforming to IS 1052-2013 (for latest amendment) with Plante positive plates, pasted negative plates, lids, vent plugs, separators, bolts and nuts, cell insulators, inter-cell connectors, dry and uncharged along with MS Stand, IRT, Acid with non-returnable container and accessories, battery terminal jelly etc. Suitable for replacement of Existing System (170Ah Tubular Lead Acid Battery); Dimensions of Battery Room as stated in NIT and conforming as per requirement of technical specifications of NIT whatever required completing the battery bank in all respects for GBS at AGBP, NEEPCO Ltd.	Set	1(one)
VI	Fitting and Accessories for maintenance of each battery bank consisting items indicated in schedule of requirements in Annexure - II of this tender and as per standard code	Set	1(one)
VI:	Design, Manufacture, Supply installation, Testing & Commissioning of Float Charger and Float cum Boost Charger of Make: Chhabi Elec. 2x100 (40 Amps) suitable for charging of (new battery) 220Volt, 175Ah Cell Type YKP15 Plante, Make: Exide Lead Acid Battery Bank; Existing System; Dimensions of Battery Charger as stated in as stated in NIT and conforming as per requirement of technical specifications of NIT whatever required completing in all respects for GBS at AGBP, NEEPCO Ltd.	Set	1(one)
VIII	Disposal through buy back of the existing old 2(two) sets 125 V, 500Ah (cell 60 no/set), Furukawa Tubular Plated Lead Acid Batteries in the battery bank of AGBP, P.S. site (Dismantling of the old batteries in the battery bank and disposal as per statutory guide lines. Collection of the old batteries from Power Station site and draining of acid as required from the old batteries shall be in the Scope of the contractor).	Set	2 (two) Total cell=120 nos.
IX	Disposal through buy back of the existing old 1(one) set 220V DC, 170Ah (cell 106 no/set), Furukawa Tubular Plated Lead Acid Batteries in the battery bank of AGBP, P.S. site (Dismantling of the old batteries in the battery bank and disposal as per statutory guide lines. Collection of the old batteries from Power Station site and draining of acid as required from the old batteries shall be in the Scope of the contractor).	Set	1(one); Cell=106 nos.

- 1.1 **Mandatory Spares:** The bidder need to provide one unit/set of following mandatory spares of reputed make as specified in the NIT/offer including fuses of equivalent ratings for each items and suitable for the equipment's to be supplied.
- 1.2 125V Battery Charger components: AC INPUT SURGE SUPPRESSOR; CONTROL CARD ASSEMBLY; SYSTEM CARD ASSEMBLY DC 125V; ISODRIVER CARD ASSEMBLY.
- 1.3 220V Battery Charger components: CONTROL CARD ASSEMBLY; SYSTEM CARD ASSEMBLY DC 125V; 220VDC MULTI-ALARM CARD ASSEMBLY; DC 24V Timer
- 1.4 4 KVA Inverter: AC Capacitor 75µF, 370V AC; AC Capacitor 15µF, 370V AC; DC Capacitor 8, 200µF, 200V DC or its equivalent.
- 1.5 **Technical service support:** You are requested to ensure/confirm the availability of technical man power at NER so that technical assistance can be availed in short notices as already stated in NIT.
- 1.6 **Availability of Spares:** You have ensured availability of spares for life periods of equipment's to be supplied under the scope of contract and shall have to submit manufacturer's undertaking during submission of drawings that the spares for the supplied items shall be available for at least 15 fifteen years from the date of placement of LOA.
- 1.7 The Bidder shall also provide complete documentation, onsite training and testing to equipment at site to accrue technical knowledge, smooth operation and maintenance the new equipment.

2. **Prices:** The Price are on F.O.R/AGRP, NERPCO, Bokuloni basis. Total price of items for supply and works shall be Rs. 1, 67, 80,848.00 (Rupees one core sixty seven lakh eighty thousand eight hundred forty eight) only including all charges towards Freight & transit insurance and Taxes & Duties. The detailed schedule of items and prices are mentioned at Annexure-1, attached herewith. The quoted prices shall remain FIRM till successful completion of works. The supplier shall arrange for and take full responsibility during transit and comply with necessary safety measures as called for relevant Act/Regulations.

3. **Taxes and Duties:** All Applicable taxes and duties i.e. VAT@15% & Service tax @15% are inclusive. However, the Taxes and duties shall be applicable as per government norms at the time of execution.

4. **Terms of Payment:**

For Supply:

- a) 100% of F.O.R/F.O.B. at AGRP along with applicable taxes & duties for Supply items shall be paid within 30 days after receipt of material's in full and good condition at site and submission of BG @10% of the Contract Price valid for the period of 90 days from date of expiry of guarantee/warranty period.
- b) Part payment for part delivery against supply of one full set of 125VDC Battery Bank shall be allowed.

For Erection, Testing and Commissioning:

c) 100% charges along with 100% service taxes shall be paid within 30 days after successful commissioning of works as detailed in "Scope of Contract".

The payment shall be released against submission of following documents:

- i) Bill/ Invoice in triplicate
- ii) Guarantee/warranty certificate.
- iii) Test Certificates & relevant drawings.
- iv) Bank account details for e-payment.
- v) Job completion certificate.

However, Installation, Testing and Commissioning shall be done in phase manner depending on clearance for availing shutdown of Units. Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time.

5. **Security Deposit:** The bidder shall have to submit Performance Bank Guarantee as Security Deposit @10% of the Contract Price valid for a period of 90 days from the date of expiry of

1461
Guarantee/warranty periods as per our prescribed format as enclosed. The Security Deposit have to submit within a period of 30 days from the date issue of Contract Order.

6. Delivery Period:

- i. Delivered periods of Battery within 3(three) months from the date of issue of the Purchase Order. Considering forthcoming overhauling of GTG#3 in the month of June/July-2017, effort should be given to supply at least one full set of 125VDC Battery Bank within shortest possible time considering urgent nature of works
- ii. Delivered periods of Battery Charger and Inverter within 5(five) months from the date receipt of approved drawing.

7. Commissioning Period: The entire works Installation, Testing and Commissioning are to complete within 60 (sixty) days from the date of receipt at store (at HEDPCO Ltd., Bokuloni)

However, installation, testing and commissioning shall be done in phase manner depending on clearance for availing shut down of units. Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time.

B. Guarantee/Warranty: The materials supplied shall be warranted / guaranteed as per manufacturer's norms or for a period of 18 months from the date of despatch or 12 months from the date of successful commission whichever is earlier against manufacturing defect/ defective workmanship. The successful bidder shall supply the materials to the satisfaction of the Engineer-in-charge. Defective materials shall be replaced/ rectified by the supplier at free of cost immediately on intimation from this end.

i) **Liquidity Damage:** Time is the essence of the Contract. If the performance of the Contract is delayed due to the reason attributed to the Contractor, the Purchaser shall without prejudice to his right to recover damages for breach of the Contract: Reduce the Contract price by 1/2 % (half percent) per week or part thereof of delay in completion of time subjected to maximum of 10% of the contract price

ii) Execute or authorize the execution of work departmentally or through any other agency without any notice to the Contractor at the risk and cost of the Contractor. The decision of the Purchaser shall be final and binding upon the Contractor. However, the above action shall be taken without cancelling the contract in respect of work not yet due to execution. Or

iii) Cancel the entire Contract or portion thereof and if so desired, execute or authorize the execution of the work departmentally or through any other agency at the risk and cost of the Contractor. If the Contractor had defaulted in the performance of the Contract, the Purchaser may ignore the rates quoted by him for respective work even though the lowest, for execution through other agency

iv) Where action is taken under sub-clause (ii) or (iii) above to failure to complete the work, the Contractor shall be liable for any loss, which the Purchaser may sustain on that account. But the Contractor shall not be entitled to any gain on such execution and the manner and method of such execution shall be in the entire discretion of the Purchaser. It is not necessary for the Purchaser to serve a notice of such execution of the Contractor.


9. Bid Validity: The bid/offer shall be valid till successful completion of works under scope of contract.

10. Submission of Drawings: The contractor shall submit the Drawing, Documentation and BOM within 2(weeks) from the date of awarding the contract for approval of the purchaser. The contractor shall furnish general layout diagram to accommodate the batteries with necessary fitting and fixings in the existing battery room at AGBP Power House

11. Operational Manual: The supplier / contractor shall provide 5 (five) sets of Operation and Maintenance manual of the Battery, Battery Charger, Inverter of good quality in hiding conditions

along with equipment. The manuals shall clearly indicate the installation methods, checkups and tests to be carried out for testing the equipment and maintenance procedure.

- 12. **Pre dispatch inspection and Testing.** Testing of the materials as per relevant standard shall be carried at contractor's works. The tests shall be performed in presence of the Corporation's representative. For deputation of an authorized representative for inspection and to witness such tests advance intimation at least 15 days ago prior to the tests shall be given to the Corporation. The test certificates are to be forwarded for approval of the purchaser.
- 13. **Dispatch clearance:** No materials shall be dispatched without inspection or his authorized representative or otherwise given dispatch clearance by the purchaser in writing to the Supplier.
- 15. **Consignee:** The all materials as per schedule of items along with necessary accessories for completing the job shall be delivered FOR AGBP site at the address i.e. Sr. Manager (E/M), MMW, AGBP/NEEPCO Ltd. Bokuloni, Dist: Dibrugarh, Assam, Pin - 786191.
- 16. **Paying authority:** The Sr. Manager (F), AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam
- 17. **Court of competent jurisdiction:** Any legal action taken or proceeding initiated or any of the terms of the agreement shall be only in the jurisdiction of local court of this Power Station area in Dibrugarh, Assam
- 18. **The Bidder/Firm will not relief from the responsibility of scope of contract whatever required in all respect to complete the works successfully as already stated and agreed.**


 (Dibbarathin Baisya)
 Senior Manager (E/M),
 Plant Electrical Maintenance,

MO
 Memo No. NEEPCO/AGBP/PEM/O&M-7/2017-18/89-94 Dated.07.06.2017

Copy to

- 1. The P.O., AGBP, NEEPCO Ltd., Bokuloni- for kind information please. This is as per approval conveyed U.O. NEEPCO/HOP/282 Dated. 09/05/2017
- 2. The DGM (E/M), AGBP, NEEPCO Ltd., Bokuloni- for kind information please.
- 3. The Sr. Manager (E/M), MMW, AGBP, NEEPCO Ltd., Bokuloni- for information please.
- 4. The Sr. Manager (Fin), F & A Wing, AGBP, NEEPCO Ltd., Bokuloni- for information please.
- 5. The Manager (Civil), Vigilance Wing, AGBP, NEEPCO Ltd., Bokuloni- for information please.


 Senior Manager (E/M),
 Plant Electrical Maintenance,

Handwritten notes:
 14
 1/11/17
 1/11/17



ISO: 9001 – 2015
ISO: 14001 – 2015
OHSMS: 45001 – 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(मिनी रत्ना, श्रेणी १, भारत सरकार का उद्यम)

North Eastern Electric Power Corporation Limited,

(Mini Ratna Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख

Assam Gas Based Power Plant,

डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)



No. NEEPCO/AGBP/PEM/2020-21/O&M-05/ 260

Dated 17/10/2020

To,

M/S Mitsubishi Corporation,
Power Systems International Office,
New Energy and Power Generation Division,
3-1, Marunouchi, 2-Chome, Chiyoda-Ku,
Tokyo – 100-8086, Japan.

Sub: NEEPCO/AGBP – Purchase order for supply of Spare Parts and consumables for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2 (Model No. MW251B)

- Ref:
1. Our letter No. NEEPCO/AGBP/PEM/O&M-05/2019-20/353 Dated 05/09/2019
 2. Your Technical document submitted vide E-mail Dated 05/11/2019 (No. JEJQ-190454-W050).
 3. Our Letter Ref. No. NEEPCO/AGBP/PEM/O&M-05/2019-20/278 Dated 20/11/2019.
 4. Your offer No. JEJQ-190454-W050 submitted vide E-mail Dated 29/11/2019
 5. Our letter No. NEEPCO/AGBP/O&M-05/2019-20/410 Dated 18/12/2019
 6. Your revised offer No. JEJQ-190454-W050. Rev.A submitted vide E-mail Dated 27/12/2019
 7. Our E-mail Dated 23/01/2020.
 8. Your Revised Offer Ref. No. JEJQ-190454-W050 SP R1 Dtd. 27/01/2020 forwarded vide E-mail Dated 30/01/2020
 9. Our letter No. NEEPCO/AGBP/O&M-05/2019-20/487 Dated 31/01/2020
 10. Your letter No. XAF-NEEPCO-M4616X578-SP R2 Dated 05/02/2020 (**Revised offer**)
 11. Our letter No. NEEPCO/AGBP/PEM/O&M-05/2019-20/565 Dated 05/03/2020
 12. Your letter No. ENY/XA-F802 Dated 11/03/2020 received vide E-mail Dated 11/03/2020.
 13. Your Letter Ref. No. ENY/XA-F844 Dtd. September 17, 2020 against validity of Offer

Dear Sir,

With the above reference, the Corporation is pleased to place this Purchase Order for supply of following spare part/consumables for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2 as per following terms & conditions:

Terms & Conditions:

1. Scope:

The scope shall include supply of spare parts and consumables for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2 as per the Schedule of Item and Prices (Annexure-I) enclosed along with this order on **FOB, Japan** basis.

2. Schedule of Item & Prices:

Description of Goods	Qty.	Unit Price (¥)	Amount FCA Japan (In Japanese Yen)
Consumable Material's (REAMER BOLT & NUT FOR EXCITER COUPLING OF SIZE ø 24) (Item No. 74 of Price List AWRC-19-172-1)	14 Pcs	38,000	¥ 532,000

The prices for supply of spare part/consumables for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2 as detailed above is **JPY 532,000 (Japanese Yen Five Hundred Thirty Two Thousand) only on FCA, Japan**, which shall remain firm till completion of supply. The prices are including packing and forwarding but excluding freight, insurance and any tax, duty or levy that may be imposed in India, which, if applicable, shall be paid by NEEPCO at actual. Freight charges will be paid by NEEPCO at actual in Indian Rupees at the time of delivery of the spares at Indian Port directly to the carrier against raising of bills. All taxes, charges, duties etc, leviable outside India shall be to your account only. No agency commission is payable by us.

3. **Terms of Payment:**

100% contract price shall be made in Japanese Yen by an irrevocable, confirmed and non-restricted Letter of Credit to be established for the full amount in favour of Mitsubishi Corporation, Tokyo, (ATTN: ENY/XA-F) confirmed by a first class bank in Japan or Europe or USA, acceptable to Mitsubishi Corporation and payable at sight draft to be opened in favour of Mitsubishi Corporation, Tokyo, against presentation of shipping documents and with sufficient validity to cover contractual time of shipment plus 21 days for negotiation but within validity of L/C. Any amendment charges which will be required due to the reason not attributable to seller shall be borne by buyer. Part payment against part shipment is allowed.

4. **Insurance:**

Insurance during transit to cover transit risks from Japanese airport/port of origin to NEEPCO's warehouse at AGBP site shall be covered under NEEPCO's **open marine Policy No. 200400212010000024 with National Insurance Company Limited, Ginoria Mansion, Chirwapatty Road, Tinsukia, Assam, PIN - 786125, (Fax No. 0374 - 2337191; Phone No. 0374 - 2331230)**. NEEPCO shall settle any claim directly with the underwriters. A copy of the insurance policy shall be provided to Mitsubishi Corporation for arranging shipment upto Kolkata. Supplier should give prior intimation in writing to the above mentioned underwriters as well as the consignee the exact date of shipment of the materials to ensure insurance coverage against transit risks.

5. **Delivery Period:**

Shipment of the items under **Annexure-I** shall be made within 5 (Five) months on FCA Japan and for Option Item: 7 Months on FCA Japan from the date of receipt of order or opening of relative irrevocable letter of credit acceptable to Mitsubishi Corporation whichever is later. Partial shipment shall be allowed. However, Mitsubishi Corporation will be requested to complete the delivery of materials as soon as possible so that the work can be started as per schedule.

6. **Packing:**

Manufacturer's standard export packing shall be applied.

7. **Port of Destination:**

Airport, Kolkata.

8. **Inland Transportation:**

Inland transport from Kolkata Airport to the Plant Site including port clearance shall be responsibilities of NEEPCO. The Corporation here will pay Air freight charges in Indian Rupees. Your documents like Airway bill should indicate "Freight to pay" or "Freight to collect".

9. **Custom Clearance:**

The responsibility of custom clearance shall lie with NEEPCO. The "Coordinator, NEEPCO, Kolkata" shall take all necessary action towards arranging custom clearance expeditiously so that no demurrage charge is involved.

10. **Warranty Period:**

All the materials supplied shall be warranted against any defect of design, material, manufacturing or faulty workmanship for a period of 12 (twelve) months after arrival to the site (from the date of receiving inspection) or 18 (eighteen) months after FOB, whichever comes earlier.

11. **Rejection of Defective Materials:**

If the materials are found defective at the time of receipt, the same shall be rejected and the supplier shall replace the same at their own cost. Transportation cost for the replacement of the materials will be borne by the supplier.

12. **Consignee:**

The materials shall be received by the Coordinator, Kolkata, NEEPCO, DS-1, Maniktola Civic Centre, 1/16, VIP Road, CIT Scheme No. VII M, P.O.: Kankurgachi, Kolkata-700 054 who will thereafter forward the same to the ultimate consignee as detailed below.

The DGM (E/M) Material Management Wing

Assam Gas Based Power Plant, NEEPCO,

P.O. Bokuloni, District: Dibrugarh, Assam (INDIA). PIN: - 786191.

[Handwritten signature]
2/17/2020

13. Shipping Document

Shipping documents shall include:

- i. Mitsubishi Corporation's Invoice
- ii. Packing list
- iii. Proof of shipment
- iv. Certificate of Origin
- v. Copies of Airway Bills

Copies of shipping documents shall be forwarded in advance to the ordering authority with copies to:

- i) The "Coordinator, Kolkata" NEEPCO, DS-I, Maniktola, 1/16, VIP Road, CIT Scheme No. VII M, P.O. Kankurgachi, Kolkata – 700 054
- ii) The Head Of Project, Assam Gas Based Power Plant, NEEPCO Ltd., Bokuloni, Dist – Dibrugarh, Assam, PIN: 786 191
- iii) The CGM (F) CT, NEEPCO Ltd., Brockland Compound, Lower New Colony, Shillong – 793 003
- iv) The ultimate consignee as mentioned above under clause No. 12.

14. Address for correspondence:

All correspondences in respect of this order shall be made with –
 The Chief General Manager &
 Head of Project,
 Assam Gas Based Power Plant, NEEPCO Ltd.,
 No.3 Bokuloni Village,
 Dist. Dibrugarh, Assam, PIN – 786191.
 (Fax No. 0374-2825349/2825217)

Kindly acknowledge receipt of this Purchase order and convey your acceptance.

Thanking you.

Encl: As stated above

Yours faithfully,



For & on behalf of
 CGM (E/M) & Head of Project
DGM (E/M), PEMC, AGBP
 NEEPCO Ltd., Bokuloni
 Dist: Dibrugarh, Assam (India)



ISO: 9001 – 2015
ISO: 14001 – 2015
OHSMS: 45001 – 2018

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कार्पोरेशन लिमिटेड

(मिनी रत्ना, श्रेणी १, भारत सरकार का उद्यम)

North Eastern Electric Power Corporation Limited,

(Mini Ratna Category - I, Govt. of India Enterprise)

असम गैस बेस्ड पावर प्लांट, का. संयंत्र प्रमुख

Assam Gas Based Power Plant,

डिब्रुगढ़, असम, Dist. Dibrugarh (Assam)

1467



No. NEEPCO/AGBP/PEM/2020-21/O&M-05/229

Dated 10.09.2021

To,

M/S Mitsubishi Corporation,
Power Systems International Office,
New Energy and Power Generation Division,
3-1, Marunouchi, 2-Chome, Chiyoda-Ku,
Tokyo – 100-8086, Japan.

Sub: Amendment of Purchase order for supply of Spare Parts and consumables for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2(Model No. MW251).

Ref:

1. Our P.O. No. NEEPCO/AGBP/PEM/2020-21/O&M-05/251 & 260 dated 17.10.2020.
2. Your email dated 19.10.2020.
3. Our email dated 20/10/2020.
4. Our email dated 07/01/2021 to confirm acknowledgement of PO.
5. Your email dated 08/01/2021 enclosing letters.
6. Your Letter No. MCY/XA-F902 dated 31/05/2021 conveyed via email dtd.04/06/2021 requesting to remove the item (cooling fan) from PO.
7. Our email dated 21/06/2021 against your email dtd.04/06/2021
8. Your email dated 25/06/2021 against our email dated 21/06/2021 regarding cooling fan.
9. Our email dated 07/7/2021 to carry out overhauling works.
10. Your email dated 02/08/2021 for web meeting on August 4th 2021.
11. Our email dated 12/08/2021 intimating abstract of correspondences.
12. Your email dated 16/08/2021 & 17/08/2021 regarding pending issues and for LC Amendment.
13. Your email dated 01/09/2021 requesting to remove Cooling fan motor from PO and intimating cargo is ready to ship out.
14. Our email dated 01/09/2021 by assuring to remove Cooling Fan from PO and with confirmation to ship out the materials.
15. Your email dated 07/09/2021 requesting to remove 2(two) items "Life Diagnosis" from PO and to include in TA Service Order.
16. Our email dated 08/09/2021 for consideration against your email dtd.07/09/2021 and intimation to completed works in line with overhauling of Gas Turbine.
17. Our email dated 09/09/2021 against your email dated 09/09/2021.
18. Your email dated 10/09/2021 with Price Breakup.

Dear Sirs,

With reference to the above, the Corporation is pleased to amend the Purchase Order No. NEEPCO/AGBP/PEM/2020-21/O&M-05/251 dated 17/10/2020 placed for supply of Spare Parts and consumables for Major Inspection of Generator and Electrical Equipment of MHI make Gas Turbine Unit # 2(Model No. MW251) as follows:

[Handwritten Signature]
10/09/2021

1. The items stipulated under the Sl. No. 1-1 and 1-2 of "1-6 Parts for Life Diagnosis and Major Inspection for Generator Transformer" enclosed with the Purchase Order No. 251 dated 17.10.2020, was considered in the Order based on your Offer. However, it has been requested to include the said items in the Technical Advisory Services Order No. 267 Dated 17.10.2020, being the Items service in nature.
2. The Cooling Fan Type KBW3-54 (Item at Sl. No. 2.B of "1-6 Parts for Life Diagnosis and Major Inspection for Generator Transformer" of Purchase Order No. 251 dated 17.10.2020 has been deleted as requested, since the item is not compatible with Energy efficient Motor regulation imposed in India.
In view of the above, the "Annexure-I" and "1-6 Parts for Life Diagnosis and Major Inspection for Generator Transformer" enclosed with the order No. 251 dated 17.10.2020 are hereby amended and may please be read as per "Annexure-I (Amendment)" and "1-6 Parts for Life Diagnosis and Major Inspection for Generator Transformer (Amendment)" enclosed herewith.

Considering the above changes, the revised FOB price of the Purchase Order may please be read as JPY 18,768,100.00 (Japanese Yen Eighteen Million Seven Hundred Sixty-Eight Thousand One Hundred) only.

The other Terms & Conditions of the Purchase Order placed vide No. NEEPCO/AGBP/PEM/2020-21/O&M-05/251 Dated 17.10.2020 shall remain same. Kindly acknowledge receipt of this order and convey your acceptance.

Enclosed:

1. Annexure-I (Amendment)
2. 1-6 Parts for Life Diagnosis and Major Inspection for Generator Transformer (Amendment).

Yours faithfully,

For & on behalf of
CGM (E/M) & Head of Project
DGM (E/M), PEMC, AGBP
NEEPCO Ltd., Bokuloni
Dist: Dibrugarh, Assam (India)

NIO

Memo No. NEEPCO/AGBP/PEMC/2021-22/O&M-05/230-237

Dated 10-09-2021

Copy to:

1. The Director (Tech), NEEPCO Ltd., Shillong - for favour of kind information.
2. The Executive Director (O&M), NEEPCO Ltd., Shillong - for kind information.
3. The CGM & HOP, AGBP, NEEPCO Ltd., Bokuloni- for favour of kind information.
4. The GM (Fin) CT, NEEPCO Ltd., Shillong for kind information and necessary action.
5. The GM (Fin), AGBP, NEEPCO Ltd., Bokuloni, for information please.
6. The DGM (E/M) (Vigilance Wing), AGBP, NEEPCO Ltd., Bokuloni, for kind information.
7. The DGM (E/M), MMW, AGBP, NEEPCO Ltd., Bokuloni, for information please.
8. The Coordinator, NEEPCO Ltd., DS-I, Maniktola Civic Centre, CIT Scheme No. VII M 1/16, VIP Road, P.O. Kankurgachi, Kolkata – 700 054 – for information and necessary action please.

For & on behalf of
CGM (E/M) & Head of Project
DGM (E/M), PEMC, AGBP

उप महा प्रबंधक (तंत्र),
Deputy General Manager (E/M)
प्लांट इलेक्ट्रिकल मैटेनेंस कॉम्प्लेक्स,
Plant Electrical Maintenance Complex,
एजीबीपी, नीपको, बोकुलनी
AGBP NEEPCO Bokuloni

Annexure-I (Amendment)**Schedule of Items & rates against Supply Parts for Major overhaul of GTG U #2, at Assam Gas Based Power Plant, NEEPCO Ltd, Assam (India)**

Sl. No.	Description of Goods	Quantity	Unit Price	Amount FCA Japan as per Offer XAF-NEEPCO-M4616X578-SP- R2 Dtd. 5-Feb 20 (In Japanese Yen)
1.1	Consumable Materials for Generator Exciter as Per price list AWRC-19-172-1 (One item Sl. No. 74 of the Final Offer is dropout)	1 Set	-	3,859,700.00
1.2	Sheet for Rotor Pull out as per Price List (AWRC17-159A)	1 Set	-	3,320,000.00
1-4	Parts for Stator Winding Inspection (Air cooled Generator) as per price list AWRC18-111A)	1 Set	-	521,400.00
1-5	IPB Parts for Generator Inspection as per price list (R42802-0)	1 Set	-	1,441,900.00
1-6	Parts for Life Diagnosis and Major Inspection for Generator Transformer (M4616X578-R2)	1 Set	-	609,300.00
1-7	Special Tools (Fan Guide Support)	1 Lot	-	557,800.00
2	Recommended Parts (Option)	1 Set		8,458,000.00
	A) Total Cost of Spares (FOB Price)			18,768,100.00

[Handwritten Signature]
21/09/2021

उप महा प्रबंधक (वि/वि)
Deputy General Manager (E/M)
प्लांट इलेक्ट्रिकल मैटेनेंस कॉम्प्लेक्स,
Plant Electrical Maintenance Complex,
एनईपीसी, नीपको, बोक्सलनी,
Assam NEEPCO Bokulani

1-6 Parts for Life Diagnosis and Major Inspection for Generator Transformer (Amendment)

M4616X578-R2 (Revised)

1. Life diagnosis for Generator TR as per Price List (ET2164) (Amendment)

No.	Item	Qty	Discounted Rate	Total JPY
1.1	Insulation oil analysis - Disolve gas Analysis (DGA) -Characteristics (Breakdown voltage, Moisture content, Acid value)	The item deleted from this Purchase order and included in TA Service Order		
1.2	Life diagnosis by Frufral method			
1.3	Oil sampling container	1 set	29,612.00	29,612.00
1.4	Sampling adapter	2 pcs	5,794.00	11,588.00
	* Analysis by MELCO Ako factory	Sub Total		41,200.00

2. Major Inspection of Generator TR (Amendment)

No.	Item	Qty	Unit JPY	Total JPY
2.1	Gasket (O-ring) & bolt for Terminal box of protective devices & aux. equipment	1 Set	456,500.00	456,500.00
2.2	Silica gel (2kg/can) for dehydrating filter breather	2 pcs	9,200.00	18,400.00
2.3	Silicon-oil (200mL/bottle) for for dehydrating filter breather	1 pc	4,900.00	4,900.00
2.4	Liquid Gasket (Sealant)	1 Set	27,400.00	27,400.00
2.5	Consumable (Waste rug, Adhesive tape and Brush)	1 Set	60,900.00	60,900.00
2.8	Cooling fan type KBW3-54	Item deleted from this Purchase Order		
		Sub Total		568,100.00
		Grand Total		609,300.00

[Handwritten signature]
07/09/2021

उप महा प्रबन्धक (वि. व.)
Deputy General Manager (E/M)
महानगर इलेक्ट्रिकल मटेरियल कॉम्प्लेक्स
Plant Electrical Maintenance Complex
सिंधीपट्टी पोस्टको बोकुलानी
157000, B.K. 157000



ISO 14001 : 2015
ISO 9001 : 2015
ISO 45001 : 2018

ISO 1219 for Compliance in Electric

नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191



Ref. No. No. NEEPCO/AGBP/PEM/O&M/05-19-20/494

Date: Date: 06.01.2020

To,

M/S BHAGAT HEAVY ELECTRICALS LTD.
SPARES & SERVICE BUSINESS GROUP - EASTERN REGION
DJ-91, 3RD FLOOR, KARUNAMATAVAI, SECTOR-II
SALT LAKE CITY, KOLKATA-700091

And Attn: • K B SUT. Sr. DGM, BHEL, ANBG, KOLKATA

Subj - Detailed Order for supply of Servicing spares of Gas Turbine Generator (Sl. No. 1284 & 1285)-
AGBP, NEEPCO Ltd.

- Ref:-
1. Our enquiry letter no. NEEPCO/AGBP/PEM/O&M/05-19-20/494 dated: 31-01-2019
 2. Your letter no. SSSSC-03/01-GK/D/0695 Dated 11-07-2019,
 3. Your email dated: 31 Aug 2019
 4. Our letter for clarification vide NEEPCO/AGBP/PEM/O&M/05-19-20/354 dated: 07-09-2019
 5. Our email dated: 16th Oct 2019
 6. Your reply vide email dated: 21-10-2019
 7. Our email asking clarification dated: 23-10-2019
 8. Our email asking clarification dated: 01-11-2019
 9. Your reply vide email dated: 21-11-2019
 10. Our email asking clarification dated: 18-12-2019
 11. Your reply vide email dated: 23-12-2019
 12. LOI vide NEEPCO/AGBP/PEM/O&M/05-19-20/433 dated: 24-12-2019
 13. Your reply vide email dated: 26-12-2019
 14. Our email regarding terms of payment dated: 21-01-2020
 15. Your reply vide email dated: 22-01-2020
 16. Our email regarding terms of payment dated: 29-01-2020
 17. Your acceptance vide email dated: 03-02-2020

Dear Sirs,

With reference to above, the Corporation is pleased to issue this purchase order for supply of Servicing spares for Gas Turbine Generator (Make: M/S BHEL, Sl. No. 1284 & 1285) and Exciter (Make: M/S BHEL, Type: TLR 4422-3063) as per the following specifications, prices and terms & condition.

Terms & Conditions:

1. **Scope:** - The scope will include supply of the materials as per Annexure-I including packing & forwarding as per Annexure-II
2. **Price:** - The basic price for supply of the materials shall be for an amount Rs. 11,29,50,000 (Rupees Forty One Lakh Twenty Nine Five Hundred Ten only) and shall remain "FIRM" till completion of delivery of the materials. The above price is FOR Ex-Works BHEL, HYDERABAD basis, inclusive of packing and forwarding and exclusive of GST, Freight Insurance and all other taxes.
3. **GST:** All taxes and duties which will be applicable at the time of dispatch shall be paid extra. Present rate ISG is 18%, HSN code: 85030010

4. **Freight and Insurance:** - You are requested to send the materials through any bank approved/reputed transporter **freight prepaid door delivery basis**. The freight charges shall be reimbursed at actual on submission of documentary evidence.
- Transit insurance shall be covered under NEEPCO's Open Marine Transit Insurance policy with M/s National Insurance Co. Ltd., Chhatrapati Road, Finsukia, (Assam). Therefore, you are requested to intimate the details of the commitment to the undersigned immediately on booking of the consignment for arrangement of necessary transit insurance.
5. **Terms of Payment:** 100% payment along with all taxes and duties shall be paid against submission of dispatch documents through bank (SBI, BANK OF INDIA, IFSC Code SBIN0009143) and bank charges shall be to respective accounts.
6. **Delivery Period:** - 12 (Twelve) months (5 work) BHEL Hyderabad from the date of receipt of tech-specimen/fully clear order.
7. **E-Way Bill (Road Permit):** E-way bill may be generated by the supplier. Our (Assam Gas Based Power Plant) GSTIN and PAN is 'BBAACN9991J329 and AAACN999'. No responsibility will be taken for issuance of E-way bill by the purchaser.
8. **Test & inspection:** - Tests shall be tested as per standard at BHEL.
9. **Consignee:** - DGM (E&A)
AGBP, NEEPCO Ltd.
PO: Bokulour Chariali, 786101
Dist: Dibrugarh, Assam
10. **Guarantee / Warranty:** - The above materials shall be guaranteed against faulty design, material or workmanship for a period of 12 (twelve) months from the date of commissioning or 18 months from the date of dispatch whichever is earlier.
11. **Rejection of defective materials:** - If the materials are found defective at the time of receipt, the same shall be rejected and the supplier have to replace the same at their cost.
12. **Paying Authority:** - DGM (E&A)
AGBP, NEEPCO Ltd.
PO: Bokulour Chariali, 786101
Dist: Dibrugarh, Assam

Kindly acknowledge the receipt of this order and confirm your acceptance thereof.

Thanking you,

Yours faithfully,

DGM (E&A)
AGBP, NEEPCO Ltd.

$$\begin{aligned} \text{Cost For 1 unit} &= \text{Rs. } 41.29 \text{ lakh} \\ &+ \text{Rs. } 30.25 \text{ lakh} \\ &\underline{\hspace{1.5cm}} \\ &= \text{Rs. } 71.54 \text{ lakh.} \end{aligned}$$

$$\begin{aligned} \text{For 5 units} &= 5 \times \text{Rs. } 71.54 \text{ lakh.} \\ &= \text{Rs. } 357.7 \text{ lakh.} \end{aligned}$$

$$\text{GST @ 18\%} = \text{Rs. } 64.38 \text{ lakh.}$$

$$\text{Total (5 units)} = \text{Rs. } 422.08 \text{ lakh. (for 5 units)}$$

$$\text{Total (4 units)} = \text{Rs. } 337.664 \text{ lakh (for 4 units)}$$

$$\text{R/O} = \underline{\text{Rs. } 340.00 \text{ lakh (for 4 units)}}$$



ISO 14001:2015
ISO 9001:2015
ISO 45001:2018

Over 1250 No. Completed on Electric

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)



NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

E-mail : agbp.bokuloni@gmail.com

Ref. No

Date

No. NEEPCO/AGBP/PEM/O&M-05/20-21/39NCA153/449

Date-10/02/2021

To,

M/S BHARAT HEAVY ELECTRICALS LTD.
SPARES & SERVICE BUSINESSES GROUP- EASTERN REGION
DJ-9/1, 3RD FLOOR, KARNAMAYEE, SECTOR-II
SALT LAKE CITY, KOLKATA - 700091

Kind Attn: - S N Das, BHEL, SSBG, KOLKATA

Sub: - Detailed Order for supply of Servicing spares of Gas Turbine Generator (Sl. No. 1284 & 1285)-
AGBP, NEEPCO Ltd.

- Ref: - 1. Our enquiry letter no. NEEPCO/AGBP/PEM/O&M-5/20-21/310 dated. 17-11-2020.
2. Your offer no. PS/SSBG-KOL/JFYU/GKD/0098 Dated 09/12/2020.
3. Our letter for clarification vide. NEEPCO/AGBP/PEM/O&M-05/20-21/372 dated. 28-12-2020
4. Our email dated. 27th Jan 2021
5. Your clarification vides email dated. 27-01-2021

Dear Sirs,

With reference to above, the Corporation is pleased to issue this purchase order for supply of Servicing spares for Gas Turbine Generator (Make: M/s BHEL, Sl. No. 1284 & 1285) and Exciter (Make: M/s BHEL, Type: EL R 44/22-30/4-3) as per the following specification, prices and terms & condition.

Terms & Conditions:

1. **Scope** - The scope will include supply of the materials including packing & forwarding as per Annexure-1
2. **Price** - The basic price for supply of the materials shall be for an amount Rs. 30,25,430.00 (Rupees Thirty Lakh Twenty-Five Thousand Four Hundred Thirty) only and shall remain "FIRM" till completion of delivery of the materials. The above price is FOR Ex-Works BHEL, HYDERABAD basis, inclusive of packing and forwarding and exclusive of GST, Freight, insurance and all other taxes.
3. **GST**: All taxes and duties which will be applicable at the time of dispatch shall be paid extra. Present rate ISGT is 18%. HSN code: 85030010
4. **Freight and Insurance** - You are requested to send the materials through any bank approved/reputed transporter **freight prepaid door delivery basis**. The freight charges shall be reimbursed at actual on submission of documentary evidence.

Transit insurance shall be covered under NEEPCO's Open Marine Transit Insurance policy with M/s National Insurance Co. Ltd, Charvapatty Road, Tinsukia, (Assam) Therefore, you are requested to intimate the details of the consignment to the undersigned immediately on booking of the consignment for arrangement of necessary transit insurance.

(Signature)
10/02/2021

5. **Terms of Payment:** 100% payment along with all taxes and duties shall be paid against submission of dispatch documents through bank (SBI, BAKULANI CHARALI, IFSC Code SBIN0009143) and bank charges shall be to respective accounts.
6. **Delivery Period:** - 12 (Twelve) months (Ex works BHEL Hyderabad) from the date of receipt of techno-commercially clear order.
7. **E-Way Bill (Road Permit):** E-way bill may be generated by the supplier. Our (Assam Gas Based Power Plant) GSTIN and PAN is '18AAAACN9991J32P' and 'AAACN9991'. No responsibility will be taken for issuance of E-way bill by the purchaser.
8. **Test & Inspection:** - Items shall be tested as per standard at BHEL.
9. **Consignee:** - DGM (E/M), MM Wing,
AGBP, NEEPCO Ltd.
PO: Bakuloni Chariali, -786191
Dist: Dibrugarh, Assam
10. **Guarantee / Warranty:** - The above materials shall be guaranteed against faulty design, material or workmanship for a period of 12 (Twelve) months from the date of commissioning or 18 months from the date of dispatch whichever is earlier.
11. **Rejection of defective materials:** - If the materials are found defective at the time of receipt, the same shall be rejected and the suppliers have to replace the same at their cost.
12. **Paying Authority:** - DGM (F&A),
AGBP, NEEPCO Ltd.
PO. Bakuloni Chariali, -786191
Dist. Dibrugarh, Assam

Kindly acknowledge the receipt of this order and confirm your acceptance thereof.

Thanking you,

Yours faithfully,


DGM (E/M), MM Wing
AGBP, NEEPCO Ltd.



नॉर्थ इस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सङ्घात् खास संस्था)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.
(A Govt. of India Enterprise)

Assam Gas Based Power Plant

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 101
E-mail: ayba.bokuloni@nepcoindia.com



Ref. No. NEEPCO/AGBP/PEM/O&M-05/2021-22/ 483

Date: 25/3/2022

To,

BHARAT HEAVY ELECTRICAL LIMITED
HEAVY POWER EQUIPMENT PLANT,
RAMCHANDRAPURAM
HYDERABAD-502032

Sub: Detailed Work Order for Technical Advisory Services for Major Overhauling and Testing of Generator and exciter of Gas Turbine # 5 (Type TARI 800 26P) at AGBPS, NEEPCO Ltd., PO, Bokuloni Chariali, Dibrugarh, Assam. (Kathalguri)

- Ref: 1. Our Enquiry vide NEEPCO/AGBP/PEM/O&M-05/2021-22/182 dtd. 13.08.2021
2. Your offer vide HY/ES/21FSSQ905084/2021-22 dtd. 20.08.2021
3. Our letter for clarification vide NEEPCO/AGBP/PEM/O&M-05/2021-22/339 dtd. 18.12.2021
4. Your reply vide email dtd. 18.01.2022, 1142Hr
5. Our email dtd. 18.01.2021, 1343Hr
6. Your reply dtd. 18.01.2021 1529Hr

Dear Sirs,

With reference to above, the Corporation is pleased to place this Work Order for Technical Advisory Services for Major Overhauling and Testing of Generator and exciter of Gas Turbine # 5 (Type TARI 800 26P) as per the following rate and terms & conditions.

1. **SCOPE:** Bharat Heavy Electrical Limited (BHEL) shall conduct complete overhauling of the subject generator and exciter by deputing required Technical Advisors and Manpower. Complete overhauling will include dismantling, overhauling, servicing, re-assembly, re-erection, testing and re-commissioning of the unit. Detailed scope of work is as detailed in Annexure-I.
2. **Rate:** The Complete charge for the subject work is Rs. 65,00,000.00 (Rupees Sixty five Lakh) only. The Taxes and Duties shall be paid extra at actual and shall be as per prevailing govt rules. Present rate of GST is 18%. **THE PRICE SHALL REMAIN FIRM TILL THE COMPLETION OF THE WORK.**
 - a) **Idling Charges:** If for any reason beyond BHEL's control, viz. non-availability of spares, consumables, equipment to be overhauled and connected auxiliaries etc. the work prolongs beyond the stipulated period, extra charges will be levied for the extended period of works as below:

(Handwritten signature)

- i. BHEL Service Engineer: Rs. 70,000.00 per 8 hours per person
- ii. Vendor Charges: Rs. 1,50,000.00 per day

In case, quarantine is applicable at our state, Idle charge will be applicable as per offer for the team.

- b) **Demobilization and remobilization charges:** One-time demobilization and mobilization charges are included in the price. Post 1 demobilisation and mobilization, if during the course of work, interruption of work exceeding one week is anticipated for reasons not attributable to M/s BHEL, M/s BHEL can withdraw their personal along with T&P. However, the same shall be remobilized on hearing of NEEPCO's request for remobilisation.
Demobilization and remobilisation (7 days intimation for vendor and 48 hours intimation for BHEL service engineer) of site shall be charged extra to contract value for a lump sum value of Rs.5,00,000.00. In case of remobilisation of any BHEL service engineer charges will be Rs. 70,000.00 per 8 hours per person.
- c) **Accommodation & Local conveyance:** Accommodation shall be provided to the Service Engineer/ Overhauling team at our Guest houses free of cost. M/s BHEL is requested to submit the complete list of the team members mentioning the designations, alongwith double vaccination certificates, well ahead of mobilization for necessary arrangement.
However, food shall be on chargeable basis.
To and Fro journey from nearest Airport/ Train station to Site and Local conveyance shall be arranged by NEEPCO for the service engineer/ overhauling team.

- 3. **Completion Period:** The complete overhauling shall be completed by BHEL within 26 (Twenty six) days. However, BHEL is requested to put the best effort to complete the overhauling job in as minimum days as possible. Bar chart for work schedule shall have to be shared before site mobilization.

NEEPCO shall give minimum advance notice of 2 months for the mobilization from the date of order or 20 days of written intimation whichever is later.

- 4. **Payment Terms:** Payment term will be as following:

- 20% of contract value on site mobilization
- 70% of the contract value on the completion of work.
- 10% of the contract value on completion of warranty period.

Payment shall be released on submission of the following documents:

- a) Original bill in triplicate,
- b) Test Report,
- c) Completion certificate,
- d) Warranty Certificate and
- e) Bank account details.

- 5. **Warranty:** The overhauled generator and exciter shall be guaranteed for a period of 3 (Three) months for any defective workmanship limited within BHEL's scope. If any such defects are noticed and proved that the problem is solely due to bad workmanship of BHEL, those shall be rectified free of cost within the guaranteed period.



6. **Tools and Equipment:** NEEPCO shall arrange all tools & plants required for conducting the overhauling which were supplied by the OEM. M/s BHEL shall arrange all special test equipment required for conducting the tests. However, NEEPCO can arrange the regular kind of testing equipment.
7. **Safety and Insurance:** M/s BHEL shall arrange all needful regarding the safety on engaged man power and also arrange valid appropriate insurance for them.
8. **Force Majeure:** M/s BHEL shall not be liable for loss and damage resulting from any delay or failure to complete the work, within time specified for all or any part of work due to acts of God, war declared or undeclared, act of public enemy, riots, civil commotion, invasion, insurrection, sabotage, act of restraints of Government, federal, state or municipal action or regulation, embargoes, strikes or other labour troubles, fire, flood, hurricanes, accidents, epidemics, earthquakes, quarantine restrictions, damage to or destruction in whole or in part of the tools and equipment or any failure on the part of NEEPCO or representative to supply materials, drawings or other technical documents in time or any other causes, contingencies or circumstances not subject to M/s BHEL's control, whether of a similar or dissimilar nature which prevents the work, any such causes or delays even though existing on the date of the contract or during the period of execution of work shall extend the time of M/s BHEL's performance by the length of delays occasioned thereby including delays reasonable incident to the resumption of normal work even though such case may occur after performance of our obligation has been delayed for the other causes.
9. **Paying Authority:**

The Gen. Manager (F)
F&A, AGBPS, NEEPCO Ltd.
PO. Bokuloni Chariali-786191
Dist. Dibrugarh, Assam

Please acknowledge the receipt of this work order and confirm your acceptance thereof.

Thanking you,

Yours faithfully,



DGM (E/M), PEMC
AGBPS, NEEPCO Ltd.

Contract | अनुबंध



Contract No | अनुबंध क्रमांक: GEMC-511687721777118

Generated Date | अनुबंध तिथि: 08-Feb-2023

Bid/RA/PBP No. | बोली/आरए/पीबीपी संख्या: [GEM/2022/B/2490257](#)

Organisation Details | संगठन विवरण	Buyer Details | खरीदार विवरण
Type | प्ररूप: Central PSU	Designation | पद: DEPUTY GENERAL MANAGER EM
Ministry | मंत्रालय: Ministry of Power	Contact No. | संपर्क नंबर: 0374-2825215-
Department | विभाग: NORTH EASTERN ELECTRIC POWER Corporation Limited	Email ID | ईमेल आईडी: dinabandhub.neepco@nic.in
Organisation Name | संगठन का नाम: NORTH EASTERN ELECTRIC POWER Corporation Limited	GSTIN | जीएसटीआईएन: 18AAACN9991J3ZP
Office Zone | कार्यालय क्षेत्र: Assam Gas Based Power Plant Bokuloni Dibrugarh	Address | पता: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, DIBRUGARH, ASSAM-786191, India

Financial Approval Detail | वित्तीय स्वीकृति विवरण	Paying Authority Details | भुगतान प्राधिकरण विवरण
IFD Concurrence | आईएफडी सहमति: No	Role: PAO
Designation of Administrative Approval | प्रशासनिक अनुमोदन का पदनाम: CGM(E/M)	Payment Mode | भुगतान का तरीका: Internet Banking
Designation of Financial Approval | वित्तीय अनुमोदन का पदनाम: CGM(E/M)	Designation | पद: IN CHARGE FINANCE
	Email ID | ईमेल आईडी: rahulg.neepco@nic.in
	GSTIN | जीएसटीआईएन: 18AAACN9991J3ZP
	Address | पता: AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam, Dibrugarh, ASSAM-786191, India

Seller Details | विक्रेता विवरण	
GeM Seller ID | जेम विक्रेता आईडी: TKNZ200001869263	
Company Name | कंपनी का नाम: EVERLITE ENGINEERING INDUSTRIES	
Contact No. | संपर्क नंबर: 09435135206	
Email ID | ईमेल आईडी: vseverlite@gmail.com	
Address | पता: A.T ROAD, EVERLITE HOUSE, PANITOLA, LAIPULI, TINSUKIA, ASSAM-786183, -	
MSME verified | एमएसएमई सत्यापित: Yes	
MSME Registration number | एमएसएमई पंजीकरण संख्या: AS26E0000345	
MSE Social Category | एमएसई सामाजिक श्रेणी: General	
MSE Gender | एमएसई लिंग श्रेणी: Male	
GSTIN | जीएसटीआईएन: 18AABFE6096R1ZN	

*GST / Tax invoice to be raised in the name of | जिसके नाम के पक्ष में GST/TAX इनवॉइस पेश किया जाएगा - Consignee

Product Details | उत्पाद विवरण						
#	Item Description | आइटम विवरण	Ordered Quantity | आइटम विवरण	Unit | इकाई	Unit Price (INR) | इकाई मूल्य (INR)	Tax Bifurcation (INR) | कर विभाजन (INR)	Price (Inclusive of all Duties and Taxes in INR) | मूल्य (INR में सभी शुल्क और कर सहित)
1	Product Name | उत्पाद का नाम: GE Instrument Transformer-CT, 400kV System Brand | ब्रांड: GE Brand Type | ब्रांड प्रकार: Registered Brand Catalogue Status | कैटलॉग की स्थिति: OEM verified catalogue Selling As | कैसे बेचा जा रहा है: OEM verified Reseller Category Name & Quadrant | श्रेणी का नाम और चतुर्थांश: Instrument Transformer-Ct-IS: 2705 (Q2) Model | मॉडल: OSKF 420 HSN Code | एचएसएन कोड: HSN not specified by seller	14	pieces	531,927	NA	7,446,978
Total Order Value | कुल ऑर्डर मूल्य (in INR)						7,446,978

Consignee Detail | परेषिती विवरण						
S.No | क्र.सं.	Consignee | परेषिती	Item | वस्तु	Lot No. | लॉट नंबर	Quantity | मात्रा	Delivery Start After | दिनांक के बाद डिलीवरी शुरू करना है	Delivery To Be Completed By | वितरण पूरा कब तक करना है
1	Designation | पद: - Email ID | ईमेल आईडी: rubudas.neepco@nic.in Contact | संपर्क: 0374-2825204- GSTIN | जीएसटीआईएन: -	GE Instrument Transformer-CT, 400kV System	-	14	08-Feb-2023	08-Jun-2023

Address | पता : AGBP, NEEPCO, Bokuloni, Dibrugarh, Assam,
DIBRUGARH, ASSAM-786191, India

Product Specification for GE Instrument Transformer-CT, 400kV System

Specification | विनिर्देश	Sub-Spec | उप-विनिर्देश	Value | मूल्य
Standards	Conformity to IEC: 61869-1 & 61869-2 or IS: 2705 Part-1 to 4 or IS:16227-1/IS:16227-2	Yes
	Conformity to Switchgear-INST C/ENGG/SPEC/SWGR/R11, JAN 2017	Yes
Technical Specification	Rated frequency	50
	Design ambient temperature	50
	Minimum Creepage distance	10500
	System Types	400kV System
	Rated Voltage, (kVrms)	420
	Rated dynamic current	100kAp/125kAp/ 157.5kAp (as applicable)
	Rated short time thermal withstand current	40kA/50kA/63kA (as applicable) for 1 sec
	No. of Poles	1
	Rated extended primary Current, %	120
	System neutral earthing	Effectively Earthed
	Number of terminals	All terminals of control circuits are to be wired up to marshaling box plus 20% spare terminals evenly distributed on all TBs
	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz at (microvolts)	1000 at 266kV rms
	Minimum Corona extinction voltage (kVrms)	320
	Temperature rise over design ambient temperature	As per IEC
	Rated Primary Current, (A)	3000
Partial Discharge	As per IEC	
Seismic acceleration (Horizontal)	0.3g	
Rated Insulation Levels	One minute power frequency withstand voltage between secondary terminals & earth (kVrms)	5kV
	Switching impulse withstand voltage (250/2500 microsecond) (dry and wet) between line terminals and ground (kVpeak)	+1050
	Full wave impulse withstand voltage (1.2/50 microsecond) between line terminals and ground (kVpeak)	+1425
	One minute power frequency dry withstand voltage (dry and wet) between line terminals and ground (kVrms)	630 (dry only)
Test Reports	Name and address of the Lab where Test conducted	Govt/NABL Apprd Lab
	Availability Of Test Report From Central Govt/Nabl/Ilac Accredited Lab To Prove Conformity To Specification	Yes
	Copies of reports and certifications to be furnished to buyer on demand at time of supplies	Yes
	Test Report Number and Date	As per TTR List
	The CT transformer offered should have been type tested and approved by Powergrid Engineering as on the originally scheduled date of bid opening	Yes
	The standard Manufacturing quality plan of the manufacturer for offered rating CT shall have been approved by Powergrid and shall be valid as on the originally scheduled date of opening	Yes
Additional Reports	General Reports	PowerGrid, reserves the right to waive the minor deviations of technical requirement provided it does not impact the execution of of contract

Buyer Defined Additional Specification for | खरीदार परिभाषित अतिरिक्त विशिष्टता के लिए GE Instrument Transformer-CT, 400kV System

Specification | विनिर्देश	Value | मूल्य
1) The Tenderer shall be a regular manufacturer or authorized dealer of original equipment manufacturer (OEM) 1.1) The offered new 245KV CVTs shall be suitable for replacement of the old ph-PTs and existing CVTs 1.2) Works in phase manner	1) The intending Tenderer shall be a regular manufacturer or authorized dealer of original equipment manufacturer for instrument transformer in India 1.1) The offered new 245KV CVTs shall be suitable for replacement of the old existing ph-PTs and CVT at AGBP; 1.2) Dismantling of existing old CVT, Bus PTs shall make the site ready for installation, testing and commissioning of new CVT on existing structure and civil foundation only. Works shall be carried out in phase manner

2) Accuracy class of CVT; 2.1) Ratio; 2.2) Capacitances, 2.3): Pass Band; 2.4) Secondary windings; 2.5) Lightning (Full wave) impulse withstand voltage; 2.6) Natural frequency of coupling capacitors; 2.7) Rated secondary burden	2) Accuracy class of CVT shall be 0.2 for metering; 3P for Protection or as per CEA's latest revision 2.1) $220000/\text{sq.root}$ 3)/(110/sq.root3); 2.2) 4400/6600(+10, -5%) shall be as per relevant standard and shall not be inferior to existing; 2.3) 40 to 500 KHZ; 2.4) 3; 2.5) Lightning impulse withstand voltage (1.2/50 s) between line terminal and ground shall be 1050 (kVp) 2.6) Natural frequency of coupling capacitors 1 MHZ 2.7) Suitable with existing and shall comply CEA guidelines
3) Rated system voltage; 3.1) Highest system voltage; 3.2) Fault current and duration; 3.3) One-minute power frequency withstand voltage; 3.4) Minimum corona extinction voltage; 3.5) Maximum radio interference voltage for frequency	3) Rated system voltage 220KV; 3.1) Highest system voltage 245KV; 3.2) Fault current and duration 40-50KA for 1 sec or as per CEA recent notifications; 3.3) One-minute power frequency withstand voltage between line terminals and ground 460 kVRMS; 3.4) Minimum corona extinction voltage 156 kVRMS; 3.5) Maximum radio interference voltage for frequency between 0.5 to 2 MHz (μV) shall be 1000 at 156 kVrms
4) Standard reference range of frequencies (%) 4.1) High frequency capacitance; 4.2) Equivalent Resistance for entire carrier frequency range; 4.3) Stray capacitance and stray conductance; 4.4) Maximum partial discharge level; 4.5) Cantilever strength	4) Frequencies for which the accuracies are valid for protection 96-120percent; measurement 99-101percent; 4.1) For entire carrier frequency range shall be 80 to 150 of rated capacitance; 4.2) For entire carrier frequency range is less 40%; 4.3) Stray capacitance and stray conductance of LV terminal over entire carrier frequency range shall be as per IEC 60358 or latest revision; 4.4) Maximum partial discharge level is 10pC; 4.5) Cantilever strength 350kg and 150kg for polymer housing
5) CVT subjected to type, routine and acceptance tests as per IEC 60044-1/IEC 60044-5 or latest revision. 5.1) Required Technical Specifications, Existing technical data, Scope of Contact, Buyer Added Bid Specific ATC etc.	5) CVT shall be subjected to type, routine and acceptance tests as per IEC 60044-1/IEC 60044-5 or latest revision. ; 5.1) All the bidders shall comply the required Technical Specifications suitable with existing technical data, Scope of Contact, Techno-Commercial requirement etc. as mentioned under Buyer Added Bid Specific ATC of bid document as attached.

Corrigendum | शुद्धिपत्र

1. **Extended Upto** | तक बढ़ाया गया : 2022-10-13 15:00:00
2. **Extended Upto** | तक बढ़ाया गया : 2022-10-20 15:00:00

Terms and Conditions | नियम और शर्तें

1. General Terms and Conditions-

- 1.1 This contract is governed by the [General Terms and Conditions](#), conditions stipulated to this Product/Service as provided in the Marketplace.
- 1.2 This Contract between the Seller and the Buyer, is for the supply of the Goods and/ or Services, detailed in the schedule above, in accordance with the General Terms and Conditions (GTC) unless otherwise superseded by Goods / Services specific Special Terms and Conditions (STC) and/ or BID/Reverse Auction Additional Terms and Conditions (ATC), as applicable

2. Buyer Added Bid Specific Terms and Conditions-

2.1 Generic

OPTION CLAUSE: The Purchaser reserves the right to increase or decrease the quantity to be ordered up to 25 percent of bid quantity at the time of placement of contract. The purchaser also reserves the right to increase the ordered quantity by up to 25% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly.

2.2 Generic

After award of contract - Successful Bidder shall have to get Detailed Design Drawings approved from buyer before starting fabrication. Successful Bidder shall submit Detailed Design Drawings for Buyer's approval, within 15 days of award of contract. Buyer shall, either approve the drawings or will provide complete list of modification required in the drawings within 10 days. Seller shall be required to ensure supply as per approved Drawings with modifications as communicated by Buyer. If there is delay from buyer side in approval of drawing- the delivery period shall be refixed without LD for the period of delay in approval of Drawing.

2.3 Generic

Actual delivery (and Installation & Commissioning (if covered in scope of supply)) is to be done at following address AGBP NEEPCO LTD Bokuloni Dibrugarh Assam Pin:786191.

2.4 Generic

Bidder financial standing: The bidder should not be under liquidation, court receivership or similar proceedings, should not be bankrupt. Bidder to upload undertaking to this effect with bid.

2.5 Generic

Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

2.6 Generic

Bidder shall submit the following documents along with their bid for Vendor Code Creation:

- a. Copy of PAN Card.
- b. Copy of GSTIN.
- c. Copy of Cancelled Cheque.
- d. Copy of EFT Mandate duly certified by Bank.

2.7 Generic

Data Sheet of the product(s) offered in the bid, are to be uploaded along with the bid documents. Buyers can match and verify the Data Sheet with the product specifications offered. In case of any unexplained mismatch of technical parameters, the bid is liable for rejection.

2.8 Generic

Experience Criteria: The Bidder or its OEM (themselves or through reseller(s)) should have regularly, manufactured and supplied same or similar Category Products to any Central / State Govt Organization / PSU / Public Listed Company for 3 years before the bid opening date. Copies of relevant contracts to be submitted along with bid in support of having supplied some quantity during each of the year. In case of bunch bids, the primary product having highest value should meet this criterion.

2.9 Generic

Installation, Commissioning, Testing, Configuration, Training (if any - which ever is applicable as per scope of supply) is to be carried out by OEM / OEM Certified resource or OEM authorised Reseller.

2.10 Generic

The Buyer has an existing set up / inventory of similar products. The offered / supplied product must be compatible with existing system. The bidder has to ensure Compatibility of the supplied items or shall have to include in the supply the necessary hardware / software to make them compatible at no extra cost to the buyer. The details of items with which compatibility is required are as under: Dismantling of existing old 220kV Capacitor Voltage Transformer, 220kV Bus PTs shall make the site ready for installation, erection, testing and commissioning of new CVT on existing support/mounting structure and civil foundation. Mounting structure of new CVTs (if required) shall be designed suitability considering existing support/ structure and foundation only. Please refer the Buyer Added Specific ATC.

2.11 Generic

1. The Seller shall not assign the Contract in whole or part without obtaining the prior written consent of buyer.
2. The Seller shall not sub-contract the Contract in whole or part to any entity without obtaining the prior written consent of buyer.
3. The Seller shall, notwithstanding the consent and assignment/sub-contract, remain jointly and severally liable and responsible to buyer together with the assignee/ sub-contractor, for and in respect of the due performance of the Contract and the Sellers obligations there under.

2.12 Generic

The seller is required to print logo as per buyer's requirement.

2.13 Generic

Upload Manufacturer authorization: Wherever Authorised Distributors are submitting the bid, Manufacturers Authorisation Form (MAF)/Certificate with OEM details such as name, designation, address, e-mail Id and Phone No. required to be furnished along with the bid.

2.14 Generic

Without prejudice to Buyer's right to price adjustment by way of discount or any other right or remedy available to Buyer, Buyer may terminate the Contract or any part thereof by a written notice to the Seller, if:

- i) The Seller fails to comply with any material term of the Contract.
- ii) The Seller informs Buyer of its inability to deliver the Material(s) or any part thereof within the stipulated Delivery Period or such inability otherwise becomes apparent.
- iii) The Seller fails to deliver the Material(s) or any part thereof within the stipulated Delivery Period and/or to replace/rectify any rejected or defective Material(s) promptly.
- iv) The Seller becomes bankrupt or goes into liquidation.
- v) The Seller makes a general assignment for the benefit of creditors.
- vi) A receiver is appointed for any substantial property owned by the Seller.
- vii) The Seller has misrepresented to Buyer, acting on which misrepresentation Buyer has placed the Purchase Order on the Seller.

2.15 Generic

While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

2.16 OEM

IMPORTED PRODUCTS: In case of imported products, OEM or Authorized Seller of OEM should have a registered office in India to provide after sales service support in India. The certificate to this effect should be submitted.

2.17 Inspection

Pre-dispatch inspection at Seller premises (Fee/Charges to be borne by the BUYER): Before dispatch, the goods will be inspected by Buyer / Consignee or their Authorized Representative or by Nominated External Inspection Agency (independently or jointly with Buyer or Consignee as decided by the Buyer) at Seller premises (or at designated place for inspection as declared / communicated by the seller) for their compliance to the contract specifications. Fee/Charges taken by the External inspection Agency and any external laboratories testing charges shall be borne by the Buyer. For in-house testing, the Sellers will provide necessary facilities free of cost. Seller shall notify the Buyer through e-mail about readiness of goods for pre-dispatch inspection and Buyer will notify the Seller about the Authorized Representative/ Nominated External Inspection Agency and the date for testing. The goods would be dispatched to consignee only after clearance in pre-dispatch inspection. Consignee's right of rejection as per GTC in respect of the goods finally received at his location shall in no way be limited or waived by reason of the goods having previously been inspected, tested and passed by Buyer/ Consignee or its Nominated External Inspection Agency prior to the goods' shipment. While bidding, the sellers should take into account 7 days for inspection from the date of email offering the goods for inspection. Any delay in inspection beyond 7 days shall be on the part of the buyer and shall be regularised without Liquidated Damages.

When there is requirement of submission the advance sample, the seller shall inform the buyer promptly through emails about the date of submission of sample to the buyer nominated Inspection agency.

2.18 Forms of EMD and PBG:

Successful Bidder can submit the Performance Security in the form of Account Payee Demand Draft also (besides PBG which is allowed as per GeM GTC). DD should be made in favour of AGBP NEEPCO LTD payable at SBI NEEPCO Bokuloni, Dibrugarh, Assam. A/C No:34098989892. After award of contract, Successful Bidder can upload scanned copy of the DD in place of PBG and has to ensure delivery of hard copy to the original DD to the Buyer within 15 days of award of contract.

2.19 Forms of EMD and PBG:

Successful Bidder can submit the Performance Security in the form of Payment online through RTGS / internet banking also (besides PBG which is allowed as per GeM GTC). Online payment shall be in Beneficiary name AGBP NEEPCO Account No. 34098989892 IFSC Code SBIN0009143 Bank Name SBI Bokuloni Chariali Branch address NEEPCO Bokuloni, Dibrugarh, Assam (786191). Successful Bidder to indicate Contract number and name of Seller entity in the transaction details field at the time of on-line transfer. Bidder has to upload scanned copy / proof of the Online Payment Transfer in place of PBG within 15 days of award of contract.

2.20 Financial Criteria:

NET WORTH: Net Worth of the OEM should be positive as per the last audited financial statement.

2.21 Scope of Supply:

Scope of supply (Bid price to include all cost components) : Supply Installation Testing Commissioning of Goods and Training of operators and providing Statutory Clearances required (if any)

2.22 Purchase Preference (Centre)

Purchase preference to Micro and Small Enterprises (MSEs): Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1+ 15% of margin of purchase preference /price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for percentage of 25% of total value.

2.23 Certificates:

Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

2.24 Certificates:

ISO 9001: The bidder or the OEM of the offered products must have ISO 9001 certification.

2.25 Certificates:

The bidder is required to upload, along with the bid, all relevant certificates such as BIS licence, type test certificate, approval certificates and other certificates as prescribed in the Product Specification given in the bid document.

2.26 Certificates:

To be eligible for award of contract, Bidder / OEM must possess following Certificates / Test Reports on the date of bid opening (to be uploaded with bid): CVT shall be subjected to type, routine and acceptance tests as per IEC 60044-1/IEC 60044-5 or latest revision. Please refer the Buyer Added Specific ATC..

2.27 Buyer Added Bid Specific ATC:

Buyer Added text based ATC clauses

1) Buyer Added Specific ATC (Additional Terms & Conditions for Techno-commercial Requirements):

- 1.1 SCOPE OF CONTRACT: Design, Engineering, Manufacture, Inspection and Testing at Manufacturer's works before dispatch of single phase 220/√3KV / 110/√3V Capacitive Voltage Transformer (CVT), Packing & Forwarding, Supply, Transportation to site, Insurance from the source of supply till commissioning, Material Handling, Loading and unloading, Storage at Site, dismantling of old existing CVTs, VTs, Retrofitting/Erection, Testing and Commissioning of new CVTs at AGBPS, NEEPCO LTD., Bokuloni, Dibrugarh, Assam.**
 - 1.2 The intending Tenderer shall be a regular manufacturer of instrument transformer preferably Capacitive Voltage Transformer (CVT)/Voltage Transformer (VT) in India for the equipment to be supplied under the scope of contract .**
 - 1.3 Bid Security/ Earnest Money Deposit: In line with the Office Memorandum vide No: DPE/7(4)/2017-Fin.(Part-I), dtd.19/11/2020 GOI, Ministry of Heavy Industries & Public Enterprises, the bidders are to submit "Bid Security Declaration" against Bid Security in the prescribed format (Form-B) duly signed and by accepting that if they withdraw or modify their bids during period of validity etc., they will be suspended for the time specified in the tender documents. Bids without Bid Security Declaration shall be summarily rejected.**
 - 1.4 Dismantling of existing old 220kV Capacitor Voltage Transformer, 220kV Bus PTs shall make the site ready for installation, erection, testing and commissioning of new CVT on existing support/mounting structure and civil foundation . Mounting structure of new CVTs (if required) shall be designed suitability considering existing support/ structure and foundation only .**
 - 1.5 The offered Capacitive Voltage Transformer (CVT) shall be as per specific technical parameters for outdoor installation and must be suitable for existing system, protections, termination of cables, dimensions of foundation/structure etc. whatever required to complete in all respects for satisfactory operation by retrofitting of 220kV CVTs at AGBPS.**
 - 1.6 The materials viz., adopter plate, base plate, pedestal etc. required for retrofitting of new 220kV CVTs to match with the existing support/mounting structure, foundation and foundation bolts.**
 - 1.7 Existing power, control/protection cable located at Central Control Room to the respective 220kV CVTs, VTs at switchyard shall be used. However, in case of requirement of any additional cable for interconnection shall be under scope of contract.**
 - 1.8 Mandatory Spare: The bidder has to provide Mandatory Spares for Capacitive Voltage Transformer (for Feeders, Bus PTs) including Terminal Connectors, fastening nut-bolts etc.**
 - 1.9 Bidders must indicate clearly the Service Life periods of the offered CVT which shall be 25-30 years or as per CEA latest guidelines and shall ensure the availability of spares for life periods of equipment to be supplied under the scope of contract. All the participating bidders shall have to confirm in writing and shall submit the undertaking with the Tech-Commercial bid.**
 - 1.10 All terminals shall be clearly marked with identification numbers or letters to facilitate connection to external wiring.**
 - 1.11 All necessary cable terminating accessories such as glands, crimp type tinned copper lugs etc. for power as well as control cables shall be included in supplier's scope of supply. Suitable brass cable glands shall be provided for cable entry.**
 - 1.12 Delivery Period: Complete set of equipment/material shall be delivered at site within 4 (four)months from the date of approval of drawing/manufacturing clearance or mutually agreed terms and conditions. Effort should be given by the bidder to minimize the delivery periods.**
 - 1.13 Dismantling, Retrofitting, Testing and Commissioning Period: The works shall be completed within 7 days for each feeder/220KV Bus effective from the date of availing shutdown or complete works within 5 months from the date of delivery of materials at site. However, Dismantling, Retrofitting/Erection, Testing and Commissioning works which shall be done in phase manner and feeder/bus wise depending on clearance for availing shutdown of Lines / Buses or mutually agreed terms and conditions. Prior intimation shall be given in due time and effort will be given from our end to avail the shutdown in a shortest possible time.**
- Further, the bidders can make the assessment of works by visiting our site at AGBPS, NEEPCO LTD. PO. BOKULONI C HARIALI, DIST. DIBRUGARH, ASSAM, PIN.786191 for technical suitability & confirmation accordingly**
- 1.14 Field Service: The bidder had to ensure the appropriate technical support service consisting of factory trained Customer Engineers dedicated to the start-up, maintenance and repair of equipment. In case of breakdown of equipment's or urgency, the bidder shall ensure to provide technical support service within 48 hrs from the time of intimation during contract periods.**
 - 1.15 Accommodation: Free accommodation shall be provided (food on chargeable basis) at our Guest House to the commissioning engineer/Serviceing Team during commissioning & service periods. The bidders may submit their views and the planning of schedule time for completion of supply, commissioning of works as per manufacturer standard.**
 - 1.16 STANDARDS: The Capacitive Voltage Transformer (CVT) shall conform to the latest revisions with amendments available at the time of testing of relevant standards, rules and codes. Equipment meeting with the requirements of any other authoritative standards, which ensures equals or better quality than the standards mentioned herein may also be offered. In that case, salient points of difference between the standards adopted and the specified standards shall be clearly brought out in the bid and shall be considered acceptable, if found justified after due technical evaluation.**

2.0 TECHNICAL REQUIREMENTS OF CAPACITIVE VOLTAGE TRANSFORMER (CVT)/VOLTAGE TRANSFORMER(VT):

- 2.1 Voltage Transformer (VT) shall be capacitor voltage divider type (CVT). CVT shall be single phase, oil immersed (with Class A insulation)/ SF₆ gas filled and self-cooled.**
- 2.2 The offered new CVTs shall be suitable for replacement of the old existing ph-PTs of the Buses at AGBPP (used for synchronization) and old existing CVT for feeders.**
- 2.3 CVT on lines shall be suitable for Carrier Coupling**
- 2.4 CVT shall be provided with three secondary windings: two windings for protection and one for metering.**
- 2.5 CVT shall be suitable for high frequency (HF) coupling required for power line carrier communication (PLCC). Carrier signal shall be prevented from flowing to electro- magnetic unit (EMU) circuit of VT with radio frequency (RF) choke/ reactor over entire carrier frequency range (40 to 500Khz). HF terminals shall be brought out through a suitable bushing.**
- 2.6 EMU comprising compensation reactor, intermediate transformer and protective and damping devices shall be provided with separate terminal box with all secondary terminals brought out.**
- 2.7 The damping devices permanently connected to one of the secondary windings shall suppress ferro-resonance oscillations also.**
- 2.8 Miniature circuit breaker (MCB) / HRC fuse shall be provided on the secondary windings of the VT. The auxiliary contacts shall be provided in the MCB for interlocking and alarm purpose.**
- 2.9 CVT shall be subjected to type, routine and acceptance tests as per IEC 60044-1/IEC 60044-5 or latest revision. In case type tests are not to be performed and type test reports are to be submitted, the manufacturer shall furnish certificate of conformity to relevant standards from the independent and approved test laboratory. The following additional type tests shall be carried out:**
- High frequency capacitance and equivalent series resistance measurement (as per IEC-60358).
 - Seismic withstand test.
 - Stray capacitance and stray conductance measurement of low voltage terminal (as per IEC 60358).
 - Determination of temperature coefficient test (as per IEC60358).
 - Radio interference test as per IEC60044-5.
- 2.10 VT burden for metering class windings shall not be less than 50VA to achieve 0.2 accuracy class.**

2.11 Salient features of Capacitive Voltage Transformer (CVT)/Voltage Transformer (VT):

Sl. No	Details/Description	220KV System
01	Nominal/Rated system voltage (kV)	220
02	Highest system voltage (kV).	245
03	Fault current and duration(kA)	40/50(1 sec) or as per CEA recent notifications.
04	Rated primary voltage (kV)	245/√3
05	Rated secondary voltage (V) ⁽¹⁾	110/√3
06	Accuracy class	
	- Protection	3P
	- Metering ⁽²⁾	0.2
07	Lightning (Full wave) impulse withstand voltage (1.2/50 s) between line terminal and ground (kV _p)	1050
08	Switching impulse withstand voltage (1250/2500 s) between line terminal and ground (dry & wet) (kV _p)	---
09	One-minute power frequency withstand voltage between line terminals and ground (kV _{RMS})	460
10	Minimum corona extinction voltage (kV _{RMS})	156
11	Maximum radio interference voltage for frequency between 0.5 to 2 MHz (μV)	1000(at 156 kV _{rms})
12	Standard reference range of frequencies for which the accuracies are valid	
	-protection (%)	96 to 120
	-measurement (%)	99 to 101
13	High frequency capacitance for entire carrier frequency range (%)	80 to 150% of rated capacitance
14	Equivalent Resistance for entire carrier frequency range(Ω)	<40
15	Stray capacitance and stray conductance of LV terminal over entire carrier frequency range	As per IEC 60358

16	One-minute power frequency withstand voltage (LV side)	
16a	Between LV (HF) terminal and earth	
	- for exposed terminals (kV _{RMS})	10
	- for terminals enclosed in weather proof enclosure (kV _{RMS})	4
16b	for secondary windings (kV _{RMS})	3
17	Rated voltage factor	
	- continuous	1.2
	- for 30 seconds	1.5
18	Maximum partial discharge level (pC)	10
19	Rated Capacitance ⁽³⁾ (pF)	4400/6600(+10, -5%) and shall not be inferior to existing.
20	Cantilever strength ⁽⁴⁾ (kg)	350

Note:

- The minimum burden for metering VT shall be 50VA to ensure 0.2 M accuracy class.
- The accuracy class for tariff metering core shall be equal to 0.2 or better as per the 'Central Electricity Authority (Installation and operation of Meters) Regulation,2006'.
- For PLCC, capacitance values shall be as follows:
- 220 kV system: 4400/5575/6600/8800 pF
- Cantilever strength shall be 150kg for polymer housing.

2.12 Site Test: After the CVT assembled at site, it shall be tested in order to check that it has not been damaged during transportation and assembly to such an extent that its future operation will be at risk. The performance of the test, the testing method shall be as per relevant/manufacture standards.

3.0 GENERAL DESIGN AND CONSTRUCTION:

3.1 The fabrication and erection of the equipment shall be generally as per IS 802 and IS 800. All materials shall be fabricated and galvanized.

3.2 The minimum safe clearance of all live parts of the equipment shall be as per relevant standards and electricity rules.

3.3 DOCUMENTS TO BE SUBMITTED ALONGWITH OFFER:**A) Drawings**

- Guaranteed Technical Particulars
- Type Test Reports
- Manufacturing Quality Plan

3.4 The contractor shall submit at least 5 (five) copies of instruction manuals in binding form for each type of CVTs and data sheets for each rating of equipment shall be submitted. The manuals shall clearly indicate the installation methods, check-ups and tests to be carried out for testing the equipment and maintenance procedure.

4.0 NAMEPLATE AND RATING PLATES: CVT shall be provided with a rating plate or plates marked with but not limited to following data

- Standard.
- Primary Voltage
- Highest System Voltage.
- Secondary Voltages of each core
- Secondary core VA
- Secondary Core Terminals
- Accuracy classes
- Insulation level.
- Rated Voltage Factor/Time
- Frequency.
- Capacitances C1, C2, Cn
- Electrical Specification
- Drawing no.
- Serial No.
- Manufacturing year.

The name/rating plate shall be visible in position of normal service and installation. The rating plate shall be weather proof and corrosion proof.

5.0) EXISTING TECHNICAL DATA OF 220 kV CAPACITOR VOLTAGE TRANSFORMER/VT.**5.1 EXISTING TECHNICAL DATA FOR CAPACITIVE VOLTAGE TRANSFORMERS.**

Sl. No.	Description	Existing Technical data
1	Name of manufacturer & Country of origin	BHEL BHOPAL
2	Type and Model	Outdoor
3	Rated voltage	220/√3 KV

4	Capacitances	
	a. Primary capacitance C 1	7334 PF
	b. Intermediate capacitance C2	66000 PF
	c. Equivalent capacitance C n	6600 PF
5	Pass Band	40 to 500 KHZ
6	Natural frequency of coupling capacitors	≥ 1 MHZ
7	No. of secondary windings	3
8	Rated secondary voltages	110/ $\sqrt{3}$ Volts
	a. Winding 1	110/ $\sqrt{3}$ Volts
	b. Winding 2	110/ $\sqrt{3}$ Volts
	c. Winding 3	
9	Rated secondary burden	200 VA
	a. Winding 1	200 VA
	b. Winding 2	100 VA
	c. Winding 3	
10	Accuracy class of each secondary	
	a. Winding 1	3 P
	b. Winding 2	3 P
	c. Winding 3	0.5
	0.5 Accuracy ceases on winding 3 and including a total simultaneous burden of 300 VA	
11	Temperature rise at 2 times rated voltage with rated burden	< 40°C
12	Rated voltage factor and time	1.2 continuous & 1.5 for 30 sec
13	Temperature rise for conditions specified at S. no. 12 above	< 50°C
14	One-minute power frequency withstand test voltage	<460 KV RMS
15	1.2 /50 micro second impulse wave withstand test voltage.	1050 KV Peak
16	One-minute power frequency withstand test voltage on secondary's	2 KV RMS
17	Shortest arcing distance	About 2.1 M
18	Minimum creepage distance (total)	5635 MM
19	Weight of oil and standard to which it confirms	85 KG (Fresh oil to IS: 335) IN EN UNIT
20	Total weight	According to OGA drg.
21	Overall dimension	According to OGA drg.
22	Minimum center to center recommended spacing between CVTs	As per BS 162
23	Clearance required from grounded equipment at various heights of CVTs	As per BS 162
24	Mounting flange dimension details	As per OGA drg.
25	Whether CVTs are suitable for carrier communication, carrier protection, carrier telemetering service, metering, relaying, protection, synchronizing and interlocking purpose	Yes

5.2) EXISTING TECHNICAL DATA FOR VOLTAGE TRANSFORMERS

Sl. No.	Description	Technical Existing data
1	Name of manufacturer & Country of origin	BHEL JHANSI
2	Type and Model	Outdoor
3	Rated voltage	220KV

4	Highest System Voltage	245KV
5	No. of secondary windings	2
6	Rated secondary voltages	
	a. Winding 1	110/ $\sqrt{3}$ Volts
	b. Winding 2	110/ $\sqrt{3}$ Volts
7	Rated Output (burden)	
	a. Winding 1	300 VA
	b. Winding 2	50 VA
8	Accuracy class of each secondary	
	a. Winding 1	0.5/3 P
	b. Winding 2	3 P
9	Frequency	50Hz
10	Insulation Level (KV)	460/ 1050 KVp
11	RVF/Time	1.5/ 30 Sec
12	Neutral	Earthed

UNPRICE SCHEDULE

(To be filled in by the Bidder in Price Bid only)

"Design, Engineering, Manufacturing, Supply, Retrofitting/Erection, Testing and Commissioning of new 220kV Capacitor Voltage Transformer for Replacement of old existing 220kV CVT, 220kV Bus Potential Transformers (PT) at AGBPS, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam."

Sl. No.	Description of item	UOM	QTY
	I (For Supply)	(q)	(a)
1	<i>Supply: Supply of 220 kV Capacitor Voltage Transformer along with retrofitting Material i.e. Adapter frame, Terminal Connectors for CVT/VT etc. complete in all respect.</i>	No	
1.1	<i>220KV Capacitor Voltage Transformer (CVT) for replacement of old CVTs.</i>		6
1.2	<i>220KV Capacitor Voltage Transformer (CVT) for replacement of old VT</i>		6
	Total (For Supply)		12
2	<i>II. Service: Dismantling of Existing CVTs/VTs and Installation, testing and commissioning of new CVTs Complete in all respect.</i>	No	
2.1	<i>CVTs (2sets=3nox2set=6nos) for Feeders</i>		6
2.2	<i>CVTs for VTs (2sets=3nox2set=6nos) for Buses</i>		6
	Total (For Service)		12
3	<i>Supply: Mandatory Spare: CVTs complete in all respect including Adapter frame, Terminal Connectors etc.</i>		2

FORM-B: Bid Security Declaration

(Bidders shall submit this DECLARATION online)

I/We(Name of the Bidder) do hereby solemnly affirm and declare that if I/We withdraw or modify my/our bid after the bid opening during the period of bid validity and extension thereof, I/We will be suspended from participating in future tenders of the Corporation for a period of 2 (two) years from the date of issue of notice of such suspension by the Corporation. "

Place, date
authorised to sign the bid on behalf of the Bidder (In block letters)
(Designation / Title of Signatory)

Signature) (Name of Signatory, duly

2.28 Buyer Added Bid Specific ATC:

Buyer uploaded ATC document [Click here to view the file](#).

2.29 Turnover:

Bidder Turn Over Criteria: The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year, should be as indicated in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the bidder is less than 3 year old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria.

2.30 Turnover:

OEM Turn Over Criteria: The minimum average annual financial turnover of the OEM of the offered product during the last three years, ending on 31st March of the previous financial year, should be as indicated in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the OEM is less than 3 year old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria. In case of bunch bids, the OEM of CATEGORY RELATED TO primary product having highest bid value should meet this criterion.

2.31 Service & Support:

Availability of Service Centres: Bidder/OEM must have a Functional Service Centre in the State of each Consignee's Location in case of carry-in warranty. (Not applicable in case of goods having on-site warranty). If service center is not already there at the time of bidding, successful bidder / OEM shall have to establish one within 30 days of award of contract. Payment shall be released only after submission of documentary evidence of having Functional Service Centre.

2.32 Service & Support:

Dedicated /toll Free Telephone No. for Service Support : BIDDER/OEM must have Dedicated/toll Free Telephone No. for Service Support.

2.33 Warranty:

Bidder / OEM has to give an undertaking that after expiry of warranty period, it will provide AMC Service for next 5 years for the offered products at the rate not more than 10 % of contract price per annum. Buyer reserves the right to enter into an AMC agreement (covering preventive maintenance and servicing)with the Successful Bidder / OEM after expiry of the Warranty period at rate as mentioned above and the payment for the AMC charges would be made Annually after rendering of the AMC Services of the relevant AMC period. Performance Security of the successful bidder shall be forfeited if it fails to accept the AMC contract when called upon by the buyer. The original Performance Security of contract will be returned only after submission and verification of AMC Performance Security for 10% of total AMC value valid up to AMC period plus 2 months (if there is no other claim). (Undertaking of acceptance to be uploaded with bid).

2.34 Warranty:

Warranty period of the supplied products shall be 1 years from the date of final acceptance of goods or after completion of installation, commissioning & testing of goods (if included in the scope of supply), at consignee location. OEM Warranty certificates must be submitted by Successful Bidder at the time of delivery of Goods. The seller should guarantee the rectification of goods in case of any break down during the guarantee period. Seller should have well established Installation, Commissioning, Training, Troubleshooting and Maintenance Service group in INDIA for attending the after sales service. Details of Service Centres near consignee destinations are to be uploaded along with the bid.

2.35 Warranty:

Over and above the normal Warranty terms as per GeM GTC, the successful bidder / OEM shall have to provide Comprehensive Warranty during the entire Standard warranty period as per contract. : The comprehensive warranty shall be covering the following scope The bidder had to ensure the appropriate technical support service consisting of factory trained Customer Engineers dedicated to maintenance and repair of equipment. In case of problem/defects in measuring & protection of equipment/breakdown of equipment's or urgency, the bidder shall ensure to provide Technical support service within 48 hrs from the time of intimation during entire contract including Annual Maintenance Contract periods. (Upload an undertaking with the bid confirming compliance by the bidder if Bidder is taking onus of this compliance. In case OEM is taking onus of this compliance, OEM undertaking is to be uploaded along with Bidder undertaking)

2.36 Warranty:

Successful bidder will have to ensure that adequate number of dedicated technical service personals / engineers are designated / deployed for attending to the Service Request in a time bound manner and for ensuring Timely Servicing / rectification of defects during warranty period, as per Service level agreement indicated in the relevant clause of the bid.

2.37 Purchase Preference (State):

Purchase preference to Micro and Small Enterprises (MSEs) from the State of Bid Inviting Authority : Purchase preference will be given to MSEs as Micro and Small Enterprises from the State of Bid inviting Authority whose credentials are validated online through Udyog Aadhaar/URC for that product category. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1+ 15 Quoted price as percentage margin of purchase preference/price} % of margin of purchase preference /price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for percentage of 25 % of total value as defined/ decided in relevant policy.

2.38 Past Project Experience:

The Bidder / OEM (themselves or through reseller(s)), should have executed project for supply and installation / commissioning of same or similar Category Products during preceding 3 financial years (i.e. current year and three previous financial years) as on opening of bid, as per following criteria:

- (i) Single order of at least 35% of estimated bid value; or
- (ii) Two orders of at least 20% each of estimated bid value; or
- (iii) Three orders of at least 15% each of estimated bid value.

Satisfactory Performance certificate issued by respective Buyer Organization for the above Orders should be uploaded with bid. In case of bunch bids, the Category related to primary product having highest bid value should meet this criterion

2.39 Past Project Experience:

For fulfilling the experience criteria any one of the following documents may be considered as valid proof for meeting the experience criteria:

- a. Purchase Order copy along with Invoice(s) with self-certification by the bidder that supplies against the invoices have been executed.
- b. Execution certificate by client with order value.
- c. Any other document in support of order execution like Third Party Inspection release note, etc.

2.40 Purchase Preference (State):

Procurement under this bid is reserved for purchase from Micro and Small Enterprises from the State of Bid Inviting Authority whose credentials are validated online through UDYAM Registration /Udyog Aadhaar (as validated by Government from time to time) for that product category. If the bidder wants to avail the reservation benefit, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along

with the bid in respect of the offered product or service. Benefits of MSE will be allowed only if seller is validated on-line in GeM profile as well as validated and approved by Buyer after evaluation of documents submitted.

2.41 Purchase Preference (Centre):

Purchase Preference linked with Local Content (PP-LC) Policy:

The bid clause regarding "Preference to Make In India products" stands modified in this bid and shall be governed by the PPLC Policy No. FP-20013/2/2017-FP-PNG dated 17.11.2020 issued by MoP&NG as amended up to date. Accordingly, bidders with Local Content less than or equal to 20% will be treated as "Non Local Supplier". The prescribed LC shall be applicable on the date of Bid opening. Sanctions on the bidders for false / wrong declaration or not fulfilling the Local Content requirement shall be as per the PPLC policy. Further following additional provisions are added in the certification and verification of local content provision of the Preference to Make in India clause:

- i. In case of foreign bidder, certificate from the statutory auditor or cost auditor of their own office or subsidiary in India giving the percentage of local content is also acceptable. In case office or subsidiary in India does not exist or Indian office/subsidiary is not required to appoint statutory auditor or cost auditor, certificate from practicing cost accountant or practicing chartered accountant giving the percentage of local content is also acceptable.
- ii. Along with Each Invoice: The local content certificate (issued by statutory auditor on behalf of procuring company) shall be submitted along with each invoice raised. However, the % of local content may vary with each invoice while maintaining the overall % of local content for the total work/purchase of the pro-rata local content requirement. In case, it is not satisfied cumulatively in the invoices raised up to that stage, the supplier shall indicate how the local content requirement would be met in the subsequent stages.
- iii. The bidder shall submit an undertaking from the authorized signatory of bidder having the Power of Attorney along with the bid stating the bidder meets the mandatory minimum LC requirement and such undertaking shall become a part of the contract.

2.42 Purchase Preference (Centre):

Purchase Preference linked with Local Content (PP-LC) Policy:

The bid clause regarding "Preference to Make In India products" stands modified in this bid and shall be governed by the PPLC Policy No. FP-20013/2/2017-FP-PNG dated 17.11.2020 issued by MoP&NG as amended up to date. Accordingly, bidders with Local Content less than or equal to 20% will be treated as "Non Local Supplier". The prescribed LC shall be applicable on the date of Bid opening. Sanctions on the bidders for false / wrong declaration or not fulfilling the Local Content requirement shall be as per the PPLC policy. Further following additional provisions are added in the certification and verification of local content provision of the Preference to Make in India clause:

- i. In case of foreign bidder, certificate from the statutory auditor or cost auditor of their own office or subsidiary in India giving the percentage of local content is also acceptable. In case office or subsidiary in India does not exist or Indian office/subsidiary is not required to appoint statutory auditor or cost auditor, certificate from practicing cost accountant or practicing chartered accountant giving the percentage of local content is also acceptable.
- ii. Along with Each Invoice: The local content certificate (issued by statutory auditor on behalf of procuring company) shall be submitted along with each invoice raised. However, the % of local content may vary with each invoice while maintaining the overall % of local content for the total work/purchase of the pro-rata local content requirement. In case, it is not satisfied cumulatively in the invoices raised up to that stage, the supplier shall indicate how the local content requirement would be met in the subsequent stages.
- iii. The bidder shall submit an undertaking from the authorized signatory of bidder having the Power of Attorney along with the bid stating the bidder meets the mandatory minimum LC requirement and such undertaking shall become a part of the contract.

Note: This is system generated file. No signature is required. Print out of this document is not valid for payment/ transaction purpose.

नोट: यह सिस्टम जनरेटेड फाइल है। कोई हस्ताक्षर की आवश्यकता नहीं है। इस दस्तावेज़ का प्रिंट आउट भुगतान/लेनदेन उद्देश्य के लिए मान्य नहीं है।



Surge Arresters

Ref. No.

AST/Oblum/NEEPCO/216kV/2021

Date :

07-12-2021

Price Schedule

S. No.	Brief Item Description	Qty	UOM	Ex-Works Rate Per Unit (INR)	Freight Per Unit (INR)	GST (IGST) As Applicable @18% (INR)	Landed Cost Per Unit (INR)	Total Landed Cost (INR)
1	2	3	4	5	6	7=(5+6)*18%	8=(5+6+7)	9=(8*3)
1	216kV 10kA 5M - Station Medium Duty (Old Line Discharge Class-III) Gapless Type Surge Arrester with Insulating Base, Surge Monitor, Connecting Lead and Terminal Connector suitable for Single ACSR Zebra conductor along with Sub-stool for Retrofitting Model: PBC (Supply of 216KV Metover Metal Oxide SA)*	42	Nos.	99,000.00 (Rupees Ninety-Nine Thousand Only)	7,650.00 (Rupees Seven Thousand Six Hundred and Fifty Only)	19,197.00 (Rupees Nineteen Thousand One Hundred and Ninety-Seven Only)	1,25,847.00 (Rupees One Lakh Twenty-Five Thousand Eight Hundred and Forty-Seven Only)	52,85,574.00 (Rupees Fifty-Two Lakh Eighty-Five Thousand Five Hundred and Seventy-Four Only)
2	Retrofitting, Testing and Commissioning of 216KV Metover Metal Oxide SA by replacing Old SA#	42	Each	27,000.00 (Rupees Twenty-Seven Thousand Only)	--	4,860.00 (Rupees Four thousand Eight Hundred and Sixty Only)	31,860.00 (Rupees Thirty-One Thousand Eight Hundred and Sixty Only)	13,38,120.00 (Rupees Thirteen Lakh Thirty-Eight Thousand One Hundred and Twenty Only)

***Detailed Item Description (S. No. 1):**

216kV 10kA 5M - Station Medium Duty (Old Line Discharge Class-III) With Qrs = 1.6C & With = 8kV/kV as per IEC-60099-4 of 2014 & IS-15086 (Part-4) of 2017 Gapless Type Surge Arrester Comprising of Metal Oxide Elements housed in FRP CAGE 'DESIGN B' duly moulded with Silicone Polymer to be used on a Nominal System Voltage of 220kV and Maximum System Voltage of 245kV with an MCOV of 184kVrms With Insulating Base and Surge Monitor along with Connecting Lead of 70 Sq. mm Cu. Cable of 4-meter length and Terminal Connector suitable for Single ACSR Zebra Conductor With Sub-stool Height of 824mm for Retrofitting.

Model of Polymer Surge Arrester: PBC

With Creepage Distance: 25mm/kV, Pressure Relief Class: 40kA@0.7sec, Cantilever Strength: 150kgf (As per CEA Guidelines, Type Test Reports Validity is 10 Years)

#Detailed Item Description (S. No. 2):

Dismantling of Existing Old Surge Arrester and Installation, Erection, Testing and Commissioning of New Surge Arrester on Existing Support/Mounting Structure and Civil Foundation

Signature



Surge Arresters

Ref. No. **AST/Oblum/NEEPCO/216kV/2021**Date: **07-12-2021**

Terms and Conditions

1. STANDARDS:

The Metal Oxide (gapless) Surge Arresters offered by us conforms to IEC 60099-4 of 2014 & IS-15086 (Part-IV).

2. PRICES:

Our Prices are **FIRM** and **F.O.R. Destination** inclusive of normal commercial packing suitable for transportation by rail or road. The **F.O.R. Destination** Prices have been estimated considering the Freight Charges for delivering of 14 Nos. of 216kV Polymer Surge Arresters on Part Load, Door Delivery and Single Lot & Location Basis through Road Transport to the Delivery Address: **AGBP, NEEPCO Ltd., Bokuloni, Dibrugarh, Assam - 786191.**

3. VALIDITY:

Our offer shall be valid for a period of 60 days from the date hereof. Kindly note that the cost of the input raw materials has increased exorbitantly and are still on the rise, wherein the quantum of the increase in the cost is highly non-linear and rather unpredictable. Due to this highly volatile price index maintaining the price validity for more than 60 days is extremely difficult for us under the present market conditions and hence beyond 60 days the offered prices are subject to revision / reconfirmation from our end.

4. DELIVERY:

14 - 16 Weeks from the date of Drawing Approvals and manufacturing clearance, whichever is later.

5. LOSS OR DAMAGE:

Loss or Damage which are prime-facie, the result of bad handling in transit are to be intimated to us immediately, loss or damage to any integral part which cannot be usually detected on a superficial visual examination should be intimated within a month from the date of receipt of material, in case item is lost or damaged will be replaced/rectified by us free of cost.

6. FORCE MAJEURE CLAUSE:

Deliveries are subject to Force Majeure conditions like war, hospitality, act of public civil Commotion, strikes, lockouts, sabotage, fires, floods, explosions and acts of GOD which are beyond our control.

7. WARRANTY:

Surge Arresters offered are guaranteed for satisfactory operation for a period of 12 months from the date of commissioning or 18 months from the date of shipment whichever is earlier, against proven manufacturing defects and subject to proper handling, storage, transportation & Installation.

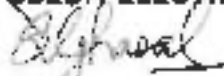
8. PAYMENT TERMS:

100% Payment with all taxes and levies within 30 days from the date of receipt of materials.

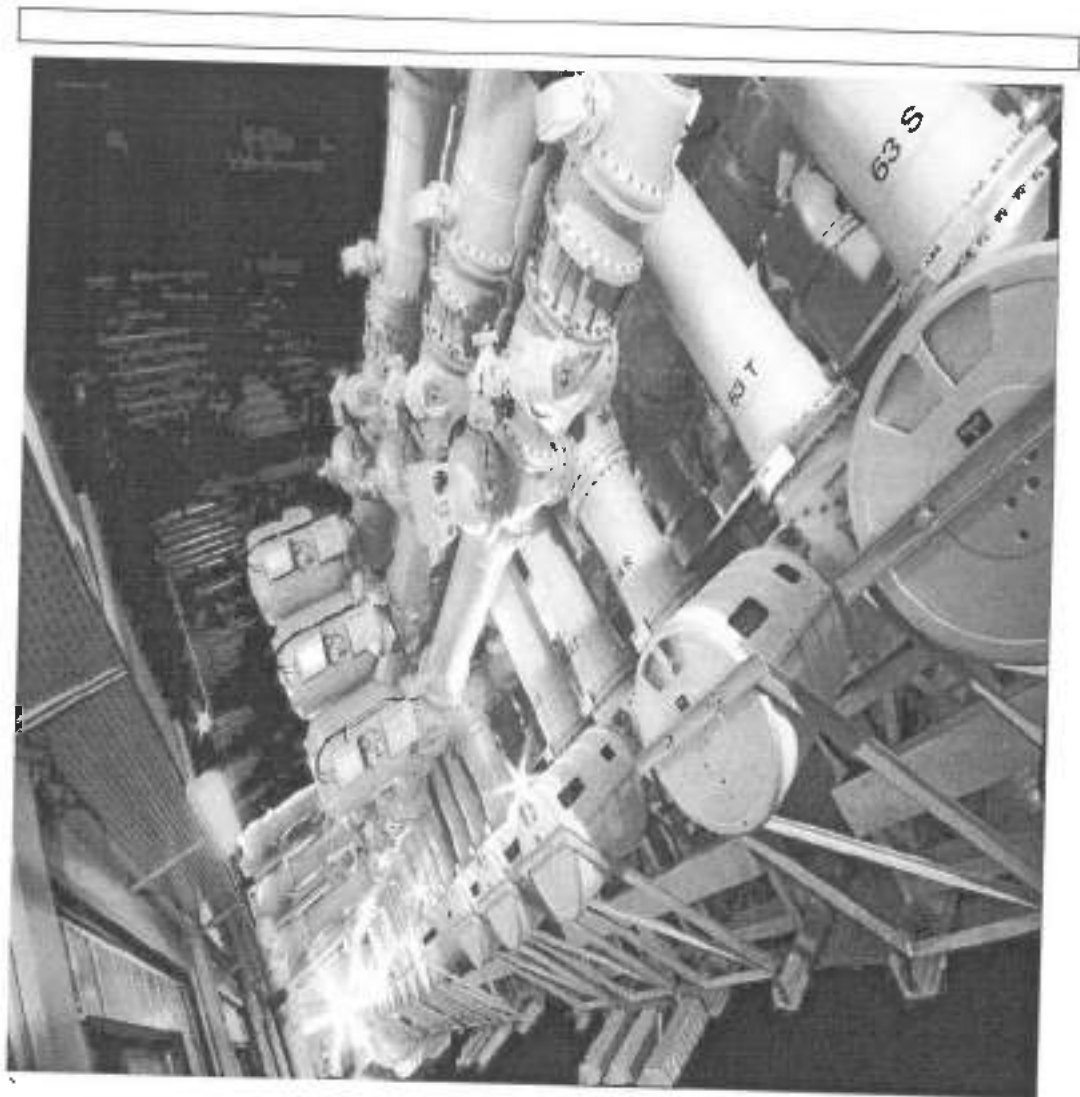
9. PLACEMENT OF ORDER

In the event of an Order the same may be placed on **M/s Everlite Engineering Industries, Everlite House, P. O. Panitola - 786183, Assam**, who are authorized by us to execute the Contract.

For **OBLUM ELECTRICAL INDUSTRIES PVT.LTD.**


SUBHASIS GHOSAL
MARKETING HEAD





PROJECT NAME
 SUPPLY & ETC OF 345 KV HCB ISOLATOR - 2 ES
 DATE
 30/03/2021

BASED ON
 EXTERNAL DOCUMENT ID - NONE

CUSTOMER

Opportunity Number OPP-21-6573363

PREPARED
 AJIT P PANWAR

STATUS
 Draft

SECURITY LEVEL
 Internal

APPROVED
 RAMKRISHNAN

DOCUMENT KIND
 Offer

DCC
 DCC

OWNING ORGANIZATION

DOCUMENT ID : 01

REV 07 LANG PAGE
 A en 1/11

© Hitachi ABB Power Grids 2020. All rights reserved.

Contents

1	Introduction	3
2	Scope of Work	3
2.1	Project Overview	3
2.1.1	Price schedule	4
2.1.2	Terms and conditions	4
2.2	Commercial	3
2.2.1	DEFINITIONS	4
2.2.2	VALIDITY	4
2.2.3	SCOPE	4
2.2.4	PRICE AND BASIS	5
2.2.5	TAXES & DUTIES	5
2.2.6	STATUTORY VARIATION	5
2.2.7	FREIGHT AND INSURANCE	6
2.2.8	PACKING AND FORWARDING	6
2.2.9	TERMS OF PAYMENT	6
2.2.10	DELIVERY	6
2.2.11	LIABILITY FOR DELAYED SHIPMENT	6
2.2.12	ALTITUDE	6
2.2.13	FORCE MAJEURE	6
2.2.14	NUCLEAR LIABILITY	7
2.2.15	ASSIGNMENT CLAUSE	7
2.2.16	WARRANTY	7
2.2.17	TECHNICAL SCHEDULE AND DOCUMENTS	8
2.2.18	LIMITATION OF LIABILITIES AND EXCLUSION OF CONSEQUENTIAL LOSSES	8
2.2.19	LANGUAGE	8
2.2.20	GOVERNING LAW & DISPUTE RESOLUTION	8
2.2.21	VARIATION IN QUANTITY	8
2.2.22	TRANSFER OF TITLE	9
2.2.23	CONFIDENTIAL TREATMENT AND SECRECY	9
2.2.24	PASSING OF BENEFIT AND RISK	9
2.2.25	COMPENSATION DUE TO BUYER'S DEFAULT	9
2.2.26	SUSPENSION AND TERMINATION	9
2.2.27	BANKRUPTCY	10
2.2.28	ACCEPTANCE	10
2.2.29	LIMIT OF SUPPLY	10
2.2.30	CHANGE IN SCOPE	10
2.2.31	GENERAL	10
3	CHANNELS FOR COMMUNICATION	11
4	Revisions	11

STATUS	SECURITY LEVEL	DOCUMENT ID	REV	LANG	PAGE
Draft	Internal		A	en	2/11

1. Introduction

Dear Sir,

We thank you for your enquiry and have pleasure in submitting our proposal below. We hope you will find our offer attractive in line with your expectations.

2. Scope of Work:

2.1 Project Overview

Subject: Supply and EIC APPSIL Make 245 kV HCB Isolator at existing Switchyard of NFFPOD, Dibrugarh.

Sr. No.	Description	UOM	QTY	Unit Ex - Works Price	Total Ex- Works Price
1	<p>Supply of 245 KV, 2000 Amp, HCB Isolator with double earth switch as per attached GA & GTP</p> <p><u>Including:</u></p> <p>1) Terminal Connector for Isolator (6 Nos. Per Isolator)</p> <p>2) Insulator ; 6 Nos. Per Isolator . 25 mm/KV</p> <p>3) Looping Cables along with Cable JB</p> <p>4) Adapter frame to match with existing Structure</p> <p><u>Excluding:</u></p> <p>1) Structure</p> <p>2) Earthing Material</p> <p>3) Cables from CRP to Isolator JB .</p> <p>4) Any kind of Civil work .</p> <p>5) Any kind of Integration with CRP /SAS & Mech. interlock with CS</p> <p>6) Castle key arrangement .</p>	SET	42	1,062,462	44,623,420
2	Dismantling of existing Isolator and installation Testing and commissioning of APPSIL make 245 KV Isolator .	SET	42	175,633	7,376,580
	Grand Total				52,000,000

Assumption of Project:

- We have assumed that existing earthing mat is available
- We have assumed that existing cable trench is available
- We have assumed that existing earthing risers will be utilized .
- Height matching is excluded from APPSIL scope .
- Conductor & other material if required to be provided by customer .

Exclusions of Project:

- Site cleaning and levelling .
- Supply of terminal connectors for other switchyard equipment.
- Illumination is excluded from our scope. All kind of lighting along with their accessories & cables is excluded from our scope.

STATUS	SECURITY LEVEL	DOCUMENT ID	REV.	LANG.	PAGE
Draft	Internal		R	en	3/11
© Hitachi ABB Power Grids, 2025. All rights reserved.					

- d) Any kind of Civil Construction & Modification work
- e) Any type of Licensing work & CEIG approval.
- f) Supply of earthing users & earthing is excluded from our scope.
- g) Existing CRP's shall be used. We have excluded supply of the same from our scope.
- h) Provision /availability of crane, electrician and other manpower etc.
- i) Integration of CB with Control Relay Panel/SAS .
- j) Travelling, Lodging and boarding expenses for training of NEEPCO officials.

Technical Note:

Sr. No	Tender Clause	Description of Deviation
1.	Technical Considerations	1) Standard Creepage Insulator is 25 mm/kV . 2) Altitude considered below 3000 Meter for offered CB .

2.1.2 Terms and conditions

Sr. No	Terms and Conditions	Description
1	GST	GST 18 % Shall be Charged Extra.
2	Freight and Insurance	Extra at actual.
3	Delivery	Supply: 4 Months from date of drawing approval. ETC . Erection ,testing and commissioning Will be done in single visit additional site visit for erection activity will be charged at INR 131,000 per visit .
4	Terms of Payment	100 % Payment advance along with Taxes and duties.
5	Warranty	12 months from date of Commissioning or 18 months from date of Supply whichever is earlier.
6	Validity	180 Days from date of submission of Offer.
7	Price Quoted	Price quoted shall be applicable for entire scope and not for part.

2.2 Commercial

2.2.1 DEFINITIONS

In these Conditions of supply

SELLER: ABB POWER PRODUCTS AND SYSTEMS INDIA LIMITED, INDIA is called the Seller

BUYER: The order issuing agency for buying the equipment/services against this offer will be called the Buyer.

2.2.2 VALIDITY

Unless otherwise specified, the offer will be valid for a period of 180 days from the issue date of the offer and thereafter it will be subject to Seller's confirmation / revision

2.2.3 SCOPE

The scope will include Design, Manufacturing and Routine Testing as per relevant standard (at Seller's Works), packing and delivery of items as quoted in the offer, item or work not expressly

STATUS	SECURITY LEVEL	DOCUMENT ID	REV.	LANG	PAGE
Origl	Internal		A	112	4.11

referred to therein shall be charged for separately. Seller will organize for Dispatch as per agreed terms but unloading at site will not be in the Seller's scope.

2.2.4 PRICE AND BASIS

Unless otherwise mentioned the prices quoted are Ex-Work Vadodara basis and inclusive of scitable packing. The prices are exclusive of all taxes and duties, which will be extra, at the rates prevailing at the time of supply.

Mod vat benefits, as applicable, have been considered in the prices quoted.

Buyer will have to furnish required documents within 30 days of release of order, for clearing the imported raw materials/components on the applicable rates of customs duty for the specified category of such projects as per Govt. policy. Details of the quantity of material or CIF value of import content will be furnished by the Seller in the event of order to enable Buyer to issue such documents.

2.2.5 TAXES & DUTIES

Above offered Prices are excluding GST and shall be applicable as per prevailing rate.

The price(s) quoted are excluding any taxes or duties and the same shall be charged as applicable at the time of dispatch and shall be payable by you at actual. As per present GST shall be charged extra at actual at the time of supply.

GST will be applied based on state of registration of buyer (bill to party) and state of registration of seller.

Following details are required in purchase order for the purpose of billing and consideration of GST.

- + Buyer Name & Address
- + Buyer GST details.

Purchase order should place on following seller address and GST details.

ABB POWER PRODUCTS AND SYSTEMS INDIA LIMITED

Maneja, Vadodara - 390013, Gujarat

GSTN No. for Gujarat: 24AARC09613E1ZV

Wherever, we are entitled to any exemptions / concessions on Tax and Duty, it shall be subject to the issue of necessary documentary evidences as prescribed under the governing provisions of the law.

In case of High seas sales, you are required to sign APPSIL HSS agreement and Customs Clearance, payment of Customs Duty, GST, Inland Transportation and Insurance shall be paid and borne by you.

Further should there be any new levies / duties imposed by the central government / state government / other statutory authorities the same shall be reimbursed by you at actual.

2.2.6 STATUTORY VARIATION

The Prices quoted are based on the present rates of various Government Taxes, duties as applicable on the HV equipment. Should there be any statutory variation in these rates later, the same will be adjusted extra to Buyer's account.

The Contract Price is based on taxes & duties applicable on 30 days before submission of price bid/quotation. Impact of any subsequent change in taxes & duties either by way of additional cost and/or time, and / or levy of new taxes & duties including introduction of Goods & Services tax, or any change in applicability or interpretation by any courts of law or statutory authorities, shall be borne and /or time extended by the Buyer, as the case may be.

This shall apply to the total Contract Price including price escalations, covering the goods manufactured by the Seller / Contractor, bought-out goods and services. This shall also apply if the change

STATUS	SECURITY LEVEL	DOCUMENT ID	REV	LANG.	PAGE
Draft	Internal		A	en	5/1

in tax law or introduction of new taxes & duties occurs during execution of the contract or during the extended period, in case the reasons for such extension are not attributable to the Seller / Contractor

In case such additional costs are not paid by the Buyer within 1 Month of submission of a valid claim, then the Seller / Contractor shall be entitled to charge interest @ 12% per annum on the outstanding amount

2.2.7 FREIGHT AND INSURANCE:

Quoted Ex-Works (inclusive of freight & insurance but exclusive of GST). If required, Seller can undertake the responsibility of dispatching the equipment by road through their standard transporter up to site as per pre-agreed rates and terms. Any type of civil work for transportation purposes, whatsoever, is excluded from Seller's scope.

In case the insurance for transit risks is covered by Seller, at the quoted extra charges, under Seller's open policy. Buyer will have to inform about transit pilferage/damage along with open delivery certificate, where applicable, within 15 days from the date of receipt of materials, to enable the Seller to lodge their claim with the underwriters. In case of delay in reporting of transit damages/pilferages the insurance underwriters may not accept Seller's claim and Seller will have no option but to make good such loss on chargeable basis. However, no deduction in Seller's bills is acceptable on this account. The defective/damaged parts will be repaired or replaced as considered appropriate by the Seller, within a reasonable time frame

2.2.8 PACKING AND FORWARDING

Offered equipment will be dispatched suitably crated/packed as per Seller's factory standard. The fitting/assembly of loose parts/accessories at site is not in Seller's scope unless otherwise specified in the enclosed offer.

2.2.9 TERMS OF PAYMENT

As per Schedule.

2.2.10 DELIVERY

As Per Schedule.

The installation activity is driven by the site conditions involving customer interface, shut down (wherever applicable) hence this will be worked out jointly with customer.

2.2.11 LIABILITY FOR DELAYED SHIPMENT

None

2.2.12 ALTITUDE

Altitude of Site has been considered up to 1000 meter & equipment quoted accordingly.

2.2.13 FORCE MAJEURE

Seller shall be under no liability if performance of contract on their part is prevented or delayed further in whole or in part due to any of the causes beyond their reasonable control such as but not limited to acts of God, acts of Government, acts of public enemy, war hostility, civil commotion, sabotage, fires, floods, explosions, epidemics, strike and lawful lock-out, then provided notice of happening of any such eventuality is given by the affected party to the other party within 10 days

STATUS	SECURITY LEVEL	DOCUMENT ID	REV	DATE	BY
Draft	Internal		A	07	01/11

from the date of occurrence and cessation of the Force Majeure, the period of Force Majeure shall be excluded accordingly.

If the Force Majeure event(s) continue beyond the period of three months, that parties shall hold consultation to chalk out the further course of action.

Neither party can claim any compensation from the other party on account of Force Majeure.

*Both ABB Power Products and Systems India Limited (and) the Customer (and the End-User) are aware of the outbreak of a Coronavirus (commonly known as COVID-19) or any mutation of such virus which is impacting or may impact normal business. ABB Power Products and Systems India Limited hereby reserves the right to amend the delivery Schedule, the price, the Scope of Supply & Works and the terms and conditions of contract set out in this offer. Notwithstanding anything to the contrary, the foregoing paragraph is deemed to be incorporated into any subsequent concluded contract. *

2.2.14 NUCLEAR LIABILITY

The products quoted by APPSIL under this quotation must not under any circumstances be used in connection with a nuclear reactor or any other nuclear facility. Any such nuclear use requires full protection against nuclear liability for the benefit of APPSIL and its Sub-suppliers in accordance with conditions to be determined by APPSIL.

2.2.15 ASSIGNMENT CLAUSE

ABB may transfer or assign, directly or indirectly, any or all of its rights or obligations under this agreement without the prior written consent of the other party to another legal entity of ABB Group or to the "ABB-Hitachi" joint venture created by both Hitachi and ABB Group or any subsidiary of this joint venture. This agreement, and the obligations hereunder, shall be binding upon the parties hereto, their successors and permitted assigns.

2.2.16 WARRANTY

12 months from date of Commissioning or 18 months from date of Supply whichever is earlier.

Seller's contractual warranty shall cover design, materials and manufacturing deficiencies for the equipment sold. The Seller shall correct said deficiencies in the manner it seems appropriate. However, the Seller shall not be required to fulfill any warranty obligation in the following cases:

- Efficiencies attributable to design, materials, or manufacturing techniques imposed by the Buyer and for which the Seller has expressed reservations.
- Servicing of the equipment specified in the Contract by the Buyer or by third parties under conditions not previously approved in writing by the Seller.
- Damages or degradation caused by error or negligence of the equipment user, or by a force majeure event or unforeseeable circumstances.
- Failure to comply with the Seller's instructions.
- Routine maintenance or replacement of parts required by normal equipment wear or by equipment exposure to inclement weather.

The Seller may not under any circumstances be required to bear expenses other than those attributable pursuant to this warranty clause. In particular, the Seller shall not be liable for payment of expenses incurred by the Buyer or by third parties during immobilization of equipment due to the performance of work pursuant to the warranty.

STATUS	SECURITY LEVEL	DOCUMENT ID	REV	LANG	PAGE
Orig	Internal		A	en	7/51

© Hitachi ABB Power Grids 2020. All rights reserved.

The undertaking and obligations of the Seller under this warranty clause are in place of and exclude all other warranties and conditions, whether oral, written, statutory, express or implied. Implied warranties or conditions of fitness and merchantability shall not apply.

Notwithstanding anything contained herein, seller's liability arising out of supplying the material or its use, whether warranties or otherwise, shall not in any case exceed the cost of correcting the defects or replacements of the defective material and upon expiration of the warranty period, all such liabilities shall terminate.

The foregoing warranties and remedies are exclusive and in lieu of all other warranties of quality and performance, written, oral or implied, and all other warranties including any implied warranties of merchantability or fitness for a particular purpose are hereby disclaimed by us.

2.2.17 TECHNICAL SCHEDULE AND DOCUMENTS

The Technical Schedule submitted with this offer shall apply.

In the event of order the Seller will furnish following technical documents:

- a) Drawings : 2 sets of agreed drawings for approval.
After approval by Buyer 3 sets of the finally approved Drawings for reference and record.
- b) Test reports : 2 sets of the test reports on completion of testing.
- c) Installation, Commissioning, Operation & Maintenance Manual : 3 copies on completion of dispatch.

Any other requirement of technical documents must be mutually discussed.

2.2.18 LIMITATION OF LIABILITIES AND EXCLUSION OF CONSEQUENTIAL LOSSES

Notwithstanding anything to the contrary in the contract or order, the conditions forming part of the quotation or otherwise, ABB POWER PRODUCTS AND SYSTEMS INDIA LIMITED's total liability for damages in aggregate (including damage caused by breach of contract, tort or statutory duty) shall not exceed 100 % of the contract price (net of tax). ABB POWER PRODUCTS AND SYSTEMS INDIA LIMITED be liable for any special, indirect, economic or consequential damages or losses such as, but not limited to, loss of revenue, loss of profit, loss of contracts, loss of use, loss of production, costs of capital, or costs or liability connected with interruption of operation.

2.2.19 LANGUAGE

English shall be the language of the Tender and the Contract and will prevail over any translation, if any.

2.2.20 GOVERNING LAW & DISPUTE RESOLUTION

This Offer shall be governed and construed in accordance with the laws of India.

The Parties shall settle all or any of the differences, disputes through mutual discussions amicably. The resolution of all disputes, which cannot be resolved amicably through mutual discussions, shall be settled through arbitration as provided under the Indian Arbitration and Conciliation Act, 1996 or any modifications thereof. Each party shall appoint an arbitrator from their side and two arbitrators shall appoint / select the third arbitrator who will preside over the arbitral tribunal which shall consist of three arbitrators. The arbitration proceedings shall take place in at a place mutually acceptable to both the parties and shall be conducted in the English language.

STATUS	SECURITY LEVEL	DOCUMENT ID	REV	LANG	PAGE
Draft	Internal		A	en	8/11

Nothing in this offer is intended to constitute, create or otherwise recognize a contractual relationship between APPSIL and the Customer, unless a separate agreement/ contract is entered into between these Parties incorporating the terms and conditions mentioned herein above and setting forth the rights and obligations of the Parties thereto

2.2.21 VARIATION IN QUANTITY

Any Variation i.e. increase or decrease, in the ordered quantity of equipment and components will not be binding on the Seller unless mutually agreed between the Buyer and the Seller

2.2.22 TRANSFER OF TITLE

Title (legal and beneficial ownership) in the goods shall pass to the Buyer upon loading on board the transportation vehicle at the Seller's works, unless otherwise provided in the agreement with the Seller.

The Buyer agrees not to transform, capitalise, pledge or resell the equipment sold until the price thereof has been fully paid, except in case of prior express permission granted by the Seller

2.2.23 CONFIDENTIAL TREATMENT AND SECRECY

Seller shall retain the ownership of its studies, drawings, models and any documents issued/ communicated to Buyer, or of which Buyer may have had knowledge in fulfillment of this contract. Such information and documents may be used only by the Buyer exclusively for execution of the contract. These documents and information shall be treated as confidential and shall not be distributed, published or generally communicated to any third parties without prior express permission in writing by the Seller.

2.2.24 PASSING OF BENEFIT AND RISK

Risk associated with the equipment shall be transferred upon delivery as per agreed terms. The Buyer shall provide the insurance required for the coverage of said risks immediately upon thereof. If dispatch is delayed at the request of the Buyer or due to reasons beyond Seller's control, the supplies shall be stored and insured for the account and at the risk of the Buyer.

2.2.25 COMPENSATION DUE TO BUYER'S DEFAULT

The Seller shall be suitably compensated for any delay or default not attributable to him during the execution of contract. Such compensation shall include but not limited to Price escalation claims, Increase in Freight, Storage & Port handling charges & re-fixation of contractual delivery etc

2.2.26 SUSPENSION AND TERMINATION

Unless otherwise mentioned the prices quoted are Ex-Work, Vadodara basis and inclusive of suitable pack

Suspension

If the Buyer fails to make any payment when due or perform on time any of its other obligations under the contract:

- The Seller shall be entitled to suspend performance of the contract until the failure is remedied.
- The time for performance of the contract by the Seller shall be extended accordingly

STATUS	SECURITY LEVEL	DOCUMENT ID	REV	LANG.	PAGE
Draft	Internal		A	en	9/11
© 2020 ABB Power Grids. All rights reserved.					

- Any cost (including financial cost and storage) thereby incurred by the Seller shall be paid by the Buyer

If performance of the contract is for any reason suspended and such suspension continues for more than 3 months the Seller shall be entitled at any time during that continued suspension by not less than 30 days' written notice to terminate the contract forthwith, in which event the provisions of the termination clause below shall apply.

Termination

In case of termination of the contract in whole or in part under any sub-clause of these Conditions of Supply the Buyer shall pay to the Seller without prejudice to any other remedy the Seller may have

- The outstanding balance of the contract value of the goods and services which have been duly delivered or performed;
- The cost incurred by the Seller up to the date of termination in performing work on goods and services which are not then in a deliverable status, plus a reasonable sum to compensate the loss of profit.

2.2.27 BANKRUPTCY

If the Buyer becomes bankrupt or insolvent or makes any agreement with its creditors compounding debts or if, being a limited company, any proceedings are begun in respect of it applying for the appointment of a liquidator, administrator, receiver or similar official for it or all or any substantial part of its assets or seeking an order or relief against it as debtor or under any law relating to insolvency, readjustment of debt, reorganisation, administration or liquidation, the Seller may at any time by written notice terminate the contract forthwith, in which event the provisions of the termination clause above shall apply.

2.2.28 ACCEPTANCE

The acceptance of the equipment by the Buyer shall be deemed complete on successful testing of the same at the plant of the Seller's or its agent suppliers or subcontractors, before dispatch to the site.

2.2.29 LIMIT OF SUPPLY

Supply scope will be limited to submitted BOD or Price schedule only. Any change in scope of supply or service will be charged extra or actual.

2.2.30 CHANGE IN SCOPE

The prices quoted are in accordance with the scope of work specified in our Technical Scope enclosed. If after the tender evaluation and placement of order, changes in the specification alter the quoted scope of supply and services, seller reserve the right to re-negotiate the price.

Any change in our scope of work shall be compensated by buyer. Seller shall maintain a record of such changes. Any increase or decrease in the price shall be mutually discussed and agreed before seller undertakes the manufacturing of the corresponding equipment.

STATUS	SECURITY LEVEL	DOCUMENT ID	REV	LANG.	PAGE
Draft	Internal		A	en	10/11

2.2.31 GENERAL

These "Standard Conditions of supply" will be supplementary to any other terms and conditions mentioned in the enclosed offer. In case of any contradiction the relevant terms and condition of the enclosed offer will prevail.

Both the parties are under obligation to maintain secrecy of the documents, data, information, IP right etc. supplied by either of the parties.

We trust that the above quotation and the enclosed documentation will be enough for the evaluation of our quotation and await with interest to hear further from you. Should you need any further information or assistance, please do not hesitate to contact us.

3. CHANNELS FOR COMMUNICATION

The Buyer is requested to direct his communication at the following address, in addition to Seller's branch office / local office (if any).

ABB POWER PRODUCTS AND SYSTEMS INDIA LIMITED
High Voltage Products
Maneja Works,
VADODARA -390013,
India

4. Revisions

T: Rev 01

Yours Faithfully,

Ajit P. Pawar
ABB POWER PRODUCTS AND SYSTEMS INDIA LIMITED
Maneja
390013, Vadodara, Gujarat, INDIA
Phone: +91 265 6724841

STATUS	SECURITY LEVEL	DOCUMENT ID	REV.	LANG.	PAGE
Draft	Internal		A	en	1/1

© 2007 ABB Power Grids. All rights reserved.



Techno-Commercial Proposal

Module 2&3 DCS, TCS Refresh of Power Plant
NEEPCO Bokuloni, Assam



DOCUMENT TITLE

Module 2&3 DCS, TCS Refresh of Power Plant

END CUSTOMER:

NEEPCO Bokuloni

ENQUIRY REFERENCE:

Neepco Letter: NEEPCO/AGBPS/C&I/T-52/2022-23/214 dt 28/11/2022

Mail dt 15.05.2023

OFFER REFERENCE NO.:

PAEN.PG.RE.22.00190.R3

REVISION HISTORY

Revision	Date	Description
R0	12 th July 2022	Technical unpriced offer
R1	12 th August 2022	Techno Commercial offer
R2	21 st December 2022	Techno Commercial offer
R3	18 th May 2023	Techno Commercial offer

Offer Validity

45 days from the date of the offer.

ABB Business Line

Process Automation-Energy Industries

Submitted By

ABB India Ltd,
PA Building, Plot No. 4A, 5 & 6, Peenya Industrial Area,
Peenya 2nd Phase, Bangalore – 560058,
Karnataka - India

Query regarding the proposal:

Mr Sudipta Sarkar
Mob: +91 84202 00165
Email: sudipta.s@in.abb.com

Mr Rajesh Raina
Phone: 8884122062
E-mail : rajesh.raina@in.abb.com

ORDERING DETAILS

Register email for e-tender: sudipta.s@in.abb.com
rajesh.raina@in.abb.com

PO SHALL BE ADDRESSED TO

ABB INDIA LIMITED
PA Building, Plot No. 4A, 5 & 6, Peenya Industrial Area,
Peenya 2nd Phase, Bangalore - 560058,
Karnataka - India
GSTIN Registration No (KARNATAKA): 29AAACA3834B1Z4

SERVICES SHALL BE RENDERED FROM

ABB INDIA LIMITED
PA Building, Plot No. 4A, 5 & 6, Peenya Industrial Area,
Peenya 2nd Phase, Bangalore – 560058,
Karnataka - India

GST REGISTRATION DETAILS

State	Provisional ID
Karnataka	29AAACA3834B1Z4

Contents

1	BASIS OF OFFER	5
2	PROCONTROL MODULE COUNT	6
3	SCOPE OF THE SERVICES.....	6
4	EXCLUSIONS.....	6
5	CUSTOMER'S RESPONSIBILITIES	7
6	BILL OF MATERIAL	9
7	PRICE SCHEDULE.....	12
8	GENERAL COMMERCIAL TERMS AND CONDITIONS	13
9	DEVIATION LIST	17

1 BASIS OF OFFER

M/s NEEPCO Bokuloni CCPP has ABB Procontrol P13 system for WHRB & ST control and protection. The system is realized using 70PR05a processors and communicating data over co-axial Intra plant bus.

Module#1 of the CCPP had a DCS refresh, and HMI upgrade this year that encompassed replacement of P13 control hardware by AC800M control hardware and upgrade of Windows Server 2008 and Windows 7 to Windows Server 2016 and Windows 10 respectively. The ABB application software was also upgraded to 800xA V6.0.1.

While this modernized control and communication network of Module #1, the other two modules continue to operate on Copper Coaxial bus called Inter Plant Bus or IPB and P13 control hardware.

The upgrade was executed during planned outage thereby saving valuable generation.

Having experienced the advantages of this modernization & execution methodology M/S Neepco has requested for a proposal for refresh of the balance two Modules. As advised in the E mail dated June 3rd & 23rd 2022, the following additional items have to be included.

- Relays for Coupling Relay panel of Module-1, Module-2 & Module-3 . Relay panels will be retained.
- Alarm panels of Module-1, Module-2 & Module-3 with 03(three) larger screens.
- Computer Cubicle for the Server station

In this proposal is identical to the upgrade of Module 1, except for inclusion of the additional items mentioned above, as desired by M/S Neepco Bokuloni. The module replacement includes Governing also as in the upgrade just commissioned successfully.

The following are major considerations of this budgetary proposal for upgrade of the Module#2&3.

The IO count has been considered as per the upgrade of Module #1. If during the stage of the detailed Engineering, additional modules are required, the same will be charged extra.

The scope of work under this revised proposal is limited to

- Supply, design, testing, & Replacement of Procontrol P13 IO modules and controllers of Module#2&3 of the CCPP by AC800M control hardware
- Replacement of the existing Governing system Hydraulic skid of Module#2&3 of the CCPP.
- Integration of the Supplied AC800M control hardware into the existing HMI.

Marshalling and field Cabling will be retained. Customer to ensure the healthiness of the same.

It is envisaged that the existing signal and power wiring will be used.

ABB Documentation will be produced following ABB Standards and in English Language.

Customer shall provide the printouts of as-built engineering documents and the latest system backup as required.

Site storage and security shall be in customer scope.

2 PROCONTROL MODULE COUNT

Sr. No.	Part No.	P13 Module Description	Qty.
1	70PR05	P13 Controller	28
2	70AA01	Analog Output Modules for Voltage Signal (+10V to -10 V)	12
3	70AA02	Analog Output Modules for Current Signal (4 to 20 mA)	58
4	70AB01	Binary Output modules for using Relay & Lamp	106
5	70AB02	Binary Output modules for using Relay & Lamp Potential free contacts	16
6	70EA02	Analog Input Module for 2 Wire Transducer (4 mA to +20 mA signal)	103
7	70EA03	Analog Input Modules for Resistor Elements (Thermocouple)	32
8	70EA04	Analog Input Modules for 8-fold (Thermocouple)	16
9	70EB01	Binary Input Module	75
10	70EB02	Binary Input Module	122
11	70EB03	Binary Input Module for Supervised Contacts	30
12	70AS04	Binary Drive Module	39
13	70AS06	Analog Drive Module	29

3 SCOPE OF THE SERVICES

Design, Engineering, Supervision, installation & commissioning of proposed evolution of Procontrol to AC800M control hardware and digital governor with hydraulic skid covering:

- Data collection from site for pre-engineering activities.
- Installing and commissioning of OWS, Server with latest HMI software
- Migration of existing graphics to the supplied HMI
- Modification of HMI & Server programming to include the new control hardware
- Program loading & verification, logic healthiness checks
- HMI communication configuration & verification with upgraded control hardware.
- Installation and commissioning of Hydraulic Skid and supplied governing system
- Integration of the Digital governor as node to the existing HMI.

4 EXCLUSIONS

- Civil works and activities not mentioned in the proposal.
- Receipt, storage, site security, local logistics of material.

- Cable Gallery access & associated cable laying. We have considered only panel to panel cable routing from bottom via flexible PVC conduit.
- Air Conditioning for Control Rooms
- Synchronization of the turbines
- Supply of relay panel.
- Lighting/illumination of the area
- Specific testing of CE, seismic, impact, painting or any other certifications beyond Certificates (including ABB) of any equipment or material is not included.
- External Power Supply cabling up-to bidder's power distribution boards.
- If customer desires any specific testing, it should be paid by Purchaser.
- Programming or testing of any third-party systems/ software not included in ABB's scope.
- Third party system OPC and Modbus connectivity configuration
- Intrinsic safety barriers.
- Any other activity or supply not mentioned explicitly.
- Instrumentation, cabling, marshalling, loop checking and related works.
- Supply, positioning and connection of related items e.g., cable trays, junction boxes, conduits, Control room furniture etc.
- All field instruments and related cabling, ferruling, termination and dressing of filed cables up to the marshalling cabinets.
- External Power Supply cabling up-to bidder's power distribution boards
- Electrical Systems
- Any testing not covered in the scope explicitly.
- If customer desires any specific testing, it should be paid by Purchaser.
- Supply, Programming or testing of any third-party systems/ software
- Third party system OPC and Modbus connectivity configuration
- All UPS, Field cable and its related work
- Any Civil works minor or major other than mentioned.
- Travel, accommodation and living expenses of the FAT/Training attendees
- Any material not included in the description of ABB's scope of supply
- Special tools, devices, and laboratory instruments

5 CUSTOMER'S RESPONSIBILITIES

- During the execution of this project, customer shall provide, and/or insure the availability of the following in timely manner at no cost to company:
- Site security, considered to be the act of safeguarding the job site against sabotage, theft, arson or any other dishonest or criminal act by physical means, such as guards, fencing, and lighting.
- Customer designated representative(s) for coordination of the work scope with company's on-site personnel during the entire job and for resolving procedures for certain activities where questions might occur. Customer's representative will have immediate access to the customer's warehousing and shop facilities, if required.
- Consultation with company's personnel in advance with respect to the scheduling of all related work associated with company's services.
- Lockable Office with infrastructure telephone, Internet connection.
- Site safety and adequate lighting for nightshift works if any.
- All necessary technical information, equipment manuals, and drawings for the use of company's personnel.

- Storage of the items to be supplied will be in Customer's scope.
- Proper Accommodation for the ABB engineers at the Plant Guest House.
- Customer shall prepare all necessary permits to allow entrance of ABB's in the power plant.
- All works in our scope of supply shall have the absolute priority. No significant interruptions are considered.
- The turbine and all its auxiliary systems must be fully available.
- Oil of the Hydraulic Skid shall be provided to us by M/S NEEPCO.

6 BILL OF MATERIAL

SN	ITEM	Make/ Model	Description	QTY (M#1)	QTY (M#2)	QTY (M#3)
ABB Software						
1	OWS License	ABB	Operator Workplace (800xA Client) license		3	
ABB Hardware						
1	AC800M Controller	PM866AK02	Redundant Processor Unit (6Pair)		6	6
2	I/O Module DI	DI810	Digital Input Module 24V 16 Channel		270	270
3	I/O Module DI	DI830	Digital Input SOE Module 24V 16 Channel		11	11
4	I/O Module DO	DO810	Digital Output Module 24V 16 Channel		136	136
5	I/O Module AI	AI810	Analog Input Module 8 Channel		70	70
6	I/O Module AI	AI820	Analog Input Module 4 Channel		3	3
7	I/O Module AO	AO820	Analog Input Module 4 Channel		18	18
8	I/O Module AO	AO810V2	Analog Input Module 8 Channel		40	40
9	I/O Module AI	AI830A	Analog Input RTD 8 Channel		24	24
10	I/O Module AI	AI835A	Thermocouple mv Input Module 8Channel		24	24
11	I/O Module base	TU810	Module Base		596	596
12	Module Bus	TB840	Module Bus		10	10
13	CI Module	CI854B	Profibus DP-V1 Interface Master Module		12	12
14	CI Module	CI840A	Profibus DP-V1 Interface Slave Module		126	126
15	CI Module	CI853	Modbus RTU		1	1
Other Hardware						
1	Workstation	Dell /HP	Intel Xenon Processor Turbo 8MB, 16 GB UDIMM ECC, DDR4 Memory 2GB Graphics Card 2x 10/100/1000 Mbps NIC USB standard keyboard and USB Optical scroll mouse DVD RW Drive Windows 10 IoT Enterprise LTSB 2016		3	
2	Network Switch	ABB Standard	Switch 24 port		2	

3	Ethernet Cables	ABB Standard	CAT 6 UTP cable		500 mtr	500 mtr
4	DC TO DC Converter	ABB Standard	DC TO DC CONVERTER 10A		14	14
5	DC TO DC Converter	ABB Standard	DC TO DC CONVERTER 20A		32	32
6	Optical Fiber Cable	ABB Standard	Multi mode 4 Core (Armoured) cable- Mtrs		300 mtr	300 mtr
7	Printer	ABB Standard	Colour Laserjet	1		
8	Large LED Screen	ABB Standard	85" inch/ similar monitor	3		
9	Panel	Rittal/ ABB Std.	Pre-Wired Panel Dimension (mm): 2315 H x 1000 W x 800 D		17	17
10	Relay (Annunciation)	ABB Standard	2NC & 2NO, 24V DC		150	150
11	Relay (Interpose)	ABB Standard	2NC & 2NO, 24V DC	200	200	200
12	Relay (Interpose)	ABB Standard	4NC & 4NO, 24V DC	300	300	300
13	Console for server monitor	ABB Standard	Any Standard make, size- 13 feet Length to 4 feet width		1	1
14	Console for client monitor	ABB Standard	Any Standard make, size- 6 feet Length to 4 feet width		2	2
15	PVC Conduit	ABB Standard	PVC Flexi Conduit		500	500
Turbine Protection Modules						
1	ASM810	ABB	Auto Synch Module		1	1
2	CPM810	ABB	Common Processor Module		3	3
3	TPM810	ABB	Turbine Protection Module		2	2
4	VPM810	ABB	Valve Positioner Module		2	2
5	TBU810	ABB	Termination Base Unit		3	3
6	SIM810	ABB	Serial Interface Module		3	3
7	ROM830	ABB	Cable, 2 ft.		3	3
Governing Hydraulic skid with accessories						
1	Governor Hydraulic Skid with base frame, manifold block, solenoid valves and other accessories.				1	1
Mandatory Spare						
1	AC800M Controller	PM866AK01	Processor Unit - Non Redundant		1	1
2	I/O Module DI	DI810	Digital Input Module 24V 16 Channel		4	4

3	I/O Module DI	DI830	Digital Input SOE Module 24V 16 Channel		1	1
4	I/O Module DO	DO810	Digital Output Module 24V 16 Channel		3	3
5	I/O Module AI	AI810	Analog Input Module 8 Channel		2	2
6	I/O Module AI	AI820	Analog Input Module 4 Channel		1	1
7	I/O Module AO	AO820	Analog Input Module 4 Channel		1	1
8	I/O Module AO	AO810V2	Analog Input Module 8 Channel		3	3
9	I/O Module AI	AI830A	Analog Input RTD 8 Channel		1	1
10	I/O Module AI	AI835A	Thermocouple mv Input Module 8 Channel		1	1
11	I/O Module base	TU810	Module Base		1	1
12	Module Bus	TB840	Module Bus		1	1
13	CI Module	CI854B	Profibus DP-V1 Interface Master Module		1	1
14	CI Module	CI840A	Profibus DP-V1 Interface Slave Module		4	4
15	CI Module	CI853	Modbus RTU		1	1

Note: LED Screens will be supplied with floor standing arrangements. If Neepco wants to fix them with some special arrangement, we request Neepco to complete that activity at their end.

7 PRICE SCHEDULE

SN	Description	Qty	Price (INR)
1	Engineering, Supply, supervision of installation & commissioning of HMI Upgrade, DCS Controller upgrade and upgrade of ST Governing at two blocks/ module as Per BOM enclosed	1 Lot	166,425,000.00
2	P&F, Freight & Insurance (@1%)	1 Lot	1,664,250.00
Total price (excluding taxes and duties)			168,089,250.00

8 GENERAL COMMERCIAL TERMS AND CONDITIONS

Payment Terms:

- a) 75% of Ex-works price with 100% taxes shall be paid against despatch documents through bank and production of the following documents to the consignee:
 - Proof of dispatch (lorry receipt/ railway receipt)
 - Contractor's detailed Invoice and Detailed packing list
 - Test certificate and or duly approved inspection certificate
 - Dispatch clearance
 - CPBG for an amount equal to 10% or lower as per the GOI Guidelines. The CPBG shall be valid for 60days after Warranty period expiry.
- b) 15% of ex-works price shall be paid within 15 days receipt of materials at site in full and good condition, and duly certified by Engineer in charge
- c) Balance 10% of total ex -works price shall be paid after Final acceptance after erection, testing and commissioning. However, this balance 10% amount may be released against submission of bank Guarantee for equivalent amount. Validity of BG shall be for a period of 3 months + 3 months claim period.

Taxes & Duties:

The prices quoted are exclusive of all taxes & duties, which have to be borne by M/s Neepco at actual at the time of delivery. Necessary declaration forms shall be furnished by M/s Neepco wherever applicable.

P&F, F&I:

P&F, Freight & Insurance extra @ 1% of the total order value.

Any increase in duties, taxes/levy of new duties/taxes under existing or future laws of State/Central Government including GST & any cost implication on account of change in Law shall be paid/re-imbursed extra by the Employer/Buyer to the contractor/seller which includes for the supply & Services of both contractor & his vendor/sub-vendor directly to the Customer

Delivery:

40 weeks from the date of receipt of manufacturing clearance.

Warranty:

For the materials supplied by us, if any discrepancy reported within 12 months from the date of commissioning or 18 months from date of supply, whichever is earlier. The corresponding item will be rectified / replaced free of cost.

Limitation of Liability:

Notwithstanding anything contained in this AGREEMENT, its Appendices or orders to the contrary, with respect to any and all claims arising out of the performance or non-performance of obligations under this AGREEMENT or purchase orders, whether arising in

contract, tort, warranty, strict liability or otherwise, ABB's liability shall not exceed in the aggregate 100% of the order value or payments received, whatever is lower.

Consequential Losses:

ABB shall in no event be liable for loss of profit, loss of revenues, loss of use, loss of production, costs of capital or costs connected with interruption of operation, loss of anticipated savings or for any special, indirect or consequential damage or loss of any nature whatsoever.

Arbitration:

All disputes arising in connection with this Agreement / Purchaser Order shall be finally settled and governed by the provisions of Arbitration and Conciliation Act, 1996. The arbitration panel shall consist of three arbitrators, one to be appointed by each Party and the third arbitrator shall be appointed by the two appointed arbitrators. The third arbitrator shall serve as a chairman. The award of the arbitral tribunal shall be final and binding on both Parties. The place of arbitration shall be Bangalore (or any metro city in India). The proceedings shall be conducted in English language.

Force Majeure:

Neither party shall be liable for any loss, damage, failure or delay in performing its obligations under the Contract to the extent directly or indirectly caused by or arising from an event of Force Majeure, which shall include but not be limited to acts of God, acts of governmental authorities, earthquakes, strikes, fire, war, flood, epidemics, civil unrest, riots or other causes beyond its reasonable control. The delivery date shall be extended for a period equal to the time lost by reason of delay plus such additional time as may be reasonably necessary to overcome the effect of the delay.

Covid19 Clause:

In India, according to the Office Memorandum on Force Majeure Clause ("FMC") issued by Ministry of Finance No.F.18/4/2020-PPD dt. Feb 19, 2020 disruption of supply chains due to spread of corona virus in China or any other country will be covered in the Force Majeure Clause. Further in March, 2020 Government of India has declared Covid19 as a "notified disaster" and World Health Organization (WHO) has categorized Covid19 as a pandemic situation. The Parties [i.e. Purchaser and Seller] are aware of the current outbreak of the Covid19 worldwide which impacts or may impact the normal business and execution of this Contract. The Parties agree that ABB is entitled to any potential cost compensation, time extension, or other reasonably required adjustments in the Contract, if any consequences, whether directly or indirectly resulting out of, or in connection with the Covid19 outbreak, lead to delays in delivery of goods or provision of services, supplies or otherwise affect ABB's contractual obligations and/or duties.

Changes in scope of work:

The prices quoted are in accordance with the bill of material specified in our offer enclosed. If subsequent to the evaluation and placement of order, changes in the specification alter the quoted scope of supply and services, we reserve the right to re-negotiate the price. Any change in scope of work of ABB shall be compensated by buyer. ABB shall maintain a record of such changes. Any increase or decrease in the price shall be mutually discussed and agreed before ABB undertakes the manufacturing of the corresponding equipment's.

Customer's Obligations:

The customer shall provide the following to ABB engineers

Any claims arising out of transit, storage, erection damages to be handled by Customer. However, separate PO shall be placed on ABB by Customer to supply such damaged items.

Governing Law & Dispute Resolution:

This Offer shall be governed and construed in accordance with the laws of India.

The Parties shall settle all or any of the differences, disputes through mutual discussions amicably. The resolution of all disputes, which cannot be resolved amicably through mutual discussions, shall be settled through arbitration as provided under the Indian Arbitration and Conciliation Act, 1996 or according to the Rules of Arbitration and Conciliation of the International Chamber of Commerce, Paris. Each party shall appoint an arbitrator from their side and two arbitrators shall appoint / select the third arbitrator who will preside over the arbitral tribunal which shall consist three arbitrators. The arbitration proceedings shall take place in at a place mutually acceptable to both the parties and shall be conducted in the English language.

Nothing in this offer is intended to constitute, create or otherwise recognize a contractual relationship between ABB and the Customer, unless a separate agreement/ contract is entered into between these Parties incorporating the terms and conditions mentioned

Raw Material, Commodities, Transportation and Other Critical Components:

The Parties hereby recognize the existence of a global severe shortage of electronic components (including, but not limited to, semiconductors), as well of market volatility in the availability and cost of other raw materials, commodities, transportation, and other critical components and/or elements, for an unpredictable period of time, which may impact normal business and the execution of the scope of delivery in a way and with a timing beyond ABB's control (hereinafter "Excusable Event").

Notwithstanding anything in the contract/terms and conditions/purchase order to the contrary, if after the date of ABB's proposal or order confirmation or during the term of the performance of the contract/purchase order/confirmed purchase order an Excusable Event occurs, so that the costs of the ABB's performance increase or ABB's performance obligations are materially adversely affected, temporarily or permanently prevented or delayed, ABB shall be relieved of any affected obligations and the Parties shall negotiate in good faith equitable adjustments of the ABB's obligations in terms of:

- reasonable extensions of the original date of delivery or completion;
- equitable adjustments in the price, to compensate ABB for any documented increase in components, raw materials, commodity and/or transportation costs;
- possible reductions of the contractually owed quantity of the goods to be delivered to the Customer, with a view to employing reasonable efforts to ensure that the contract/purchase order/confirmed purchase order can at least be filled in part.

Agreed liquidated damages, any actual damages, penalties or other fines, otherwise payable by ABB shall not apply for delays directly or indirectly caused by the Excusable Event. Customer cannot invoke such a delay as a cause for termination/cancellation of the Contract/Order, unless otherwise agreed between the Parties. In the event of a prolonged Excusable Event, ABB retains the ability to terminate any affected agreement for convenience, by servicing notice to Customer to this effect.

In case of termination/cancellation of the contract/purchase order/confirmed purchase order directly or indirectly caused by the Excusable Event, each Party waives any claim against the other Party either for direct damages and/or loss of profits and/or indirect and/or intermediate damages, penalties and/or liquidated damages. If any dispute or difference arises between the Parties, the Parties hereto shall endeavor to settle such dispute amicably. Any contract, order acceptance or order confirmation by ABB is entered into and made subject and conditioned to the above terms, which the Parties recognize as fundamental conditions of any such agreement within the Parties.

9 DEVIATION LIST

SN	Document Name	Page No	Clause No & Description	ABB's Deviation /Clarification
1	ABB/NEEPCO/ PAEN.PG.RE.22.00190.R2/LTR02 Date:- 20.12.2022	3/5	6. FALL CLAUSE: If quoted price is found in higher side at any point of time even after completion of works, the excess amount must be returned back to the customer by the supplier.	We here would like to inform that the price for the scope covered in the present tender varies with respect to timeline, specifications, scope of work and product /sub systems. So, we request M/s Neepco to kindly waive off Fall clause for this RFQ.
2	ABB/NEEPCO/ PAEN.PG.RE.22.00190.R2/LTR02 Date:- 20.12.2022	4/5	8. Arbitration If amicable settlement has not been reached within the period started in sub-clause 20.2 above and the contractor opts for arbitration instead of conciliation, then the dispute shall be finally settled through arbitration as below: A dispute or difference whatsoever arising between the parties and of or relating to the construction , interpretation, application , meaning , scope , operation or effect of this contract or the validity or the breach thereof , shall be settled by Arbitration in accordance with the Arbitration and Conciliation Act 1996 (act no 26 of 1996) with its subsequent amendments and the rules of arbitration of the institution (viz. SFCA, CIAC,DIAC, ICA, SAROD, IIAM, IDRC, ICADR etc. from which, only one Arbitration institute shall be selected and specified accordingly by the employer) as stated in appendix of the tender.	We request Neepco for acceptance of the following arbitration clause. In case of any breach of contract/ disputes/ differences arising under or in connection with this agreement, which cannot be settled by friendly negotiation and agreement amongst the parties, this offer is subjected to the standard arbitration clause in accordance with the provisions of the arbitration and conciliation act 1996. The venue of arbitration proceedings shall be mutually agreed place in India. (kindly refer point no 16 of your order NEEPCO/AGBP/HOP/2021-22/W-11(B)/3600000/133 dt 23/07/2021).

3	ABB/NEEPCO/ PAEN.PG.RE.22.00190.R2/LTR02 Date:- 20.12.2022	<p>PERFORMANCE GUARANTEE: Within 30(thirty) days from the date of issue of Letter of Award, / Letter of Intent, the Contractor shall furnish a Bank Guarantee strictly in prescribed format, for an amount equal to 10% Ten percent of the Total Contract Value by way of Guarantee for the due and faithful performance of the Agreement and for the due and faithful performance of the Letter of Intent along with the other terms and conditions agreed to. The Bank Guarantee shall be initially valid for such period to cover 60 (Sixty) days after the Warranty Period as per Agreement.</p>	<p>Performance Guarantee shall be submitted along with the dispatch documents. The Bank Guarantee shall be furnished in a prescribed format, for an amount equal to 10% (Ten percent) or lower as per the guidelines of Government of India, of the Total Contract Value by way of Guarantee for the due and faithful performance of the Agreement and for the due and faithful performance of the order along with the other terms and conditions agreed to. The Bank Guarantee shall be initially valid for such period to cover 60 (Sixty) days after the Warranty Period as per Agreement</p>
---	--	---	---



NEEPCO
150-1004-2020
160-14001-2004
200408-10001-1000

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संवंत्र
बकुलनि, जिला- दिब्रुगढ़, असम, पिन - 789 191

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 789 191
Ph: 3374-2625210, FAX: 3374-2625211

D9520 DOCUMENT/76



Dt. 17/11/2023.

NO: NEEPCO/AGBPS/C&I/T-48/2023-24/

To
M/s TJA ENGINEERING & TRADING CO.
FLAT NO.109 C-1, BLOCK ABCD,
PALM GROVE ENCLAVE, NEAR CAPUCHIN HOUSE,
JURIPAR PATH, PANJABARI ROAD,
PIN-781022, GUWAHATI, ASSAM

Sub: Purchase Order for Upgradation of SWA-System of Module-2 at Assam Gas Based Power Station (AGBPS), NEEPCO LTD., Bokuloni, Dibrugarh.

Our Ref: 1) Tender ref: AGBP/C&I/T-48/2021-22/NIQ 01 dtd 02/12/2021.
2) E-tendering ID: 2021_NEEPC_95907_4.

3) P.O.: NEEPCO/AGBPS/C&I/T-48/2022-23/96 Dt.05/07/2022
Your ref: 1) Online Bid No: 375784 dtd 25/01/2022.
2) E-mail ref regarding final price dtd 18.06/2022 & 28/8/2023.

Dear Sir,

The Corporation is pleased to place this purchase order for Upgradation of SWA-System of Module-2 by Design, Supply, Installation and Commissioning at Assam Gas Based Power Station (AGBPS), NEEPCO LTD., Bokuloni, Dibrugarh, Assam in reference to the above.

> **Scope** of Supply, Services and other terms & conditions shall be as below and as per Annexure: 1.

The complete sampling system shall be as below consisting of 02(two) sections 1(a) & 1(b).

1) Sampling table for module-2 shall be as below.

S/N	Sampling lines	DM make-up water	CEP/Con'sate	De'tor I/L	Eco'er/Boiler feed water-3 & 4	Boiler Drum 3 & Boiler Drum 4	Boiler Super-heater 3 & 4	Main steam-3 & 4	Total
1	Conductivity (Specific)	1	1	0	2	2	0	0	6
2	Conductivity (Cation)	0	1	0	0	0	2	2	5
3	pH,	0	1	0	2	2	2	2	9
4	Dissolved oxygen	0	1	1	0	0	0	0	2
5	Phosphate	0	1	0	2	2	2	2	9
6	Silica	0	1	0	2	2	2	2	9
7	Ammonia	0	1	0	2	0	0	0	3



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बकुलुनि, जिला- डिब्रुगढ़, आसाम, पिन - 786 5 11

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191
Ph. 0374-2825216, 0374-2825207, 0374-2825208 FAX - 0374-2825204, 0374-2825217



	(NH3)								
8	Hydrazine (N2H4)	0	1	0	2	0	0	0	3
9	Total hardness	0	1	0	2	2	2	2	9
10	TDS	0	0	0	0	2	0	0	2
11	Grab	1	1	1	2	2	2	2	11
	Total	2	10	2	16	14	12	12	68

1(a) Combination of Wet panel & Dry Panel as per A & C of BOM must be capable to measure following samples inside Steam Turbine building.

S/N	Parameters to be measured	DM make-up water	CEP/ Condensate	Deaerator I/L	Total
1	Conductivity (Specific),	1	1	0	2
2	Conductivity (Cation),	0	1	0	1
3	pH	0	1	0	1
4	Dissolved oxygen,	0	1	1	2
5	Phosphate	0	1	0	1
6	Silica	0	1	0	1
7	Ammonia (NH3)	0	1	0	1
8	Hydrazine (N2H4)	0	1	0	1
9	Total hardness	0	1	0	1
10	TDS, 1-ch	0	0	0	0
11	Grab	1	1	1	3
	Total	2	10	2	14

1(b) Combination of Wet panel & Dry Panel as per B & D of BOM must be capable to measure following sample near boilers.

S/N	Parameters to be measured	Economizer/ Boiler feed water--3 & 4	Boiler Drum -3 & 4	Super-heater-3 & 4	MS-3 & 4	Total
1	Conductivity (Specific)	2	2	0	0	4
2	Conductivity (Cation)	0	0	2	2	4
3	pH,	2	2	2	2	8
4	DO2	0	0	0	0	0
5	Phosphate	2	2	2	2	8
6	Silica	2	2	2	2	8
7	Ammonia	2	0	0	0	2
8	Hydrazine	2	0	0	0	2
9	Total hardness	2	2	2	2	8
10	TDS, 1-ch	0	2	0	0	2
11	Grab	2	2	2	2	8
	Total	16	14	12	12	54



ISO-9001:2000
ISO-14001:2004
OHSAS-18001:2007

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बकुलुनि, जिला- डिब्रुगढ़, असम, पिन - 786 191

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)

www.neepco.gov.in

ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191

Ph: 3874-26252/5, EPABX 3825307/3825423/2825208 FAX: 0374-3825914/2825217

1522



Sl	Description/HSNC	Unit quoted rate (₹)	Qty	Discounted Final Price (₹)
1	Supply part			
1a	Supply of SWA-system for Midule-2	1,69,60,520.00	1.00 lot	1,64,51,704.40
1b	Mandatory spares required for smooth operation for minimum 1-years as per BOM.	5,78,000.00	1.00 lot	5,78,000.00
2	Service Part			
2a	Installation and commissioning of SWA-system for Midule-2.	66,500.00	1.00 lot	66,500.00
2b	AMC for 2-yrs with quarterly mandatory visit & Servicing.	33,250.00	8.00 lot	2,66,000.00
3	Freight on Supply of SWA-system.	2,25,000.00	1.00 lot	Waived off
4	Freight on Supply of Mandatory spares	15,000.00	1.00 lot	Waived off
5	Total without discount			1,81,11,020.00
6	Total Discount			(-) 7,48,815.60
	TOTAL with discount (₹)			1,73,62,204.40

>>>₹. 1,73,62,204/- (Rupees One Crore, Seventy-Three Lac, Sixty-Two thousand, Two hundred and Four) only.

Terms & Conditions:

- 1. Scope of Supply:** As per Annexure: 1. Supplier has to submit fresh P & I, Wiring and other engineering drawing after acceptance of P.O. based on remarks, approval of AGBPS, NEEPCO, supplier can start the manufacturing process.
- 2. Scope of Services:** Installation and Commissioning of the system in module-2. Supplier shall be liable to maintain the system for 02(two) years with quarterly mandatory visit after completion of Warranty period. Each on-call duty shall be considered as a mandatory visit.
- 3. Price Basis:** Total Price as shown above is in INR and on AGBPS, NEEPCO basis including P&F and Freight.
- 4. P&F: Nil.**
- 5. Payment terms:** (i) 90% payment of supply with 100% taxes shall be paid after receipt of materials in full and good condition,
(ii) Balance 10% of supply shall be paid after successful installation and commissioning of the system.
iii) **For Services:** 100% payment of services shall be made only after successful installation & commissioning of the system.
iv) **Service charge for AMC:** 100% payment shall be made only after successful visit of Service engineer.



NEEPCO - 2004-2005
1342-MNDI-2004
ONGAS - 1001-1500

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बकुलुमि, जिला- डिब्रुगढ़, असम, पिन - 786 119

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)

www.neepco.gov.in

ASSAM GAS BASED POWER PLANT


BOKULOMI, DIST. DIBRUGARH, ASSAM, PIN - 786 119

Ph. 0374-2620210, EPH&X 36220701926+230025206 FAX : 0374-2620941/41020517



Memo No: NEEPCO/AGBPS/C&I/T-48/2023-24/ 130-34 Dt.17/11/2023.

- 1) The HOP, AGBPS, NEEPCO Ltd for favour of information pl. This has your kind approval through FLM dtd. 01/7/2022 & 13/10/2023.
- 2) The DGM (E/M), MMW, AGBPS, NEEPCO Ltd for necessary action please.
- 3) The DGM (Civil), Vigilance, AGBPS, NEEPCO Ltd for information please.
- 4) The DM (Fin), AGBPS, NEEPCO Ltd for necessary action please.
- ✓5) T-48/Tender file/Guard file.


GM (E/M), C&I Division
AGBPS, NEEPCO Ltd.

---X---



ISO - 9001:2001
ISO - 14001:2004
OHSAS - 18001:1999

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बकुलनी, जिला- डिब्रुगढ़, असम, पिन - 786 104

North Eastern Electric Power Corporation Ltd.
(A Govt of India Enterprise)

www.neepec.gov.in

ASSAM GAS BASED POWER PLANT

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 104

Ph: 0374-2625216, EPABX: 2625207/2625423/2625902 FAX: 0374-2621043/2625217

1525



	<ul style="list-style-type: none"> ➤ Drain Header ➤ Grab Sample Valve ➤ Tundish ➤ Flow Thru Chambers for the required sensors: 			
C	Dry Panel for mounting analyzers of "A" above.	no	1	
D	Dry Panel for mounting analyzers of "B" above.	no	1	
2	Analyzers	lot	01	
	Conductivity (Specific) (Single channel)	no	6	
	Conductivity (Cation) (Single channel)	no	5	
	pH (Single channel)	no	9	
	Dissolved oxygen (Single channel)	no	2	
	Silica (5-channel with external sequencer)	no	2	
	Phosphate (5-channel)	no	1	
	Ammonia (NH3) (3-channel)	no	1	
	Hydrazine (N2H4) (3-channel)	no	2	
	Total hardness (5-channel)	no	2	
4	TDS (Single channel)	Mtr	500	
4	SS-Sampling tube with connectors (straight, T, elbow) etc	Mtr	500	
5	Control cables (Cu), 1.5 mm2	lot	1	
6	Start-up, Commissioning Spares and Consumables as required for commissioning & Handing over of System.			
7	LOOSE SUPPLY ITEMS FOR SWAS	lot	1	
8	Engineering documentation shall includes a) Detailed engineering of the system, b) P&I diagram, c) Panel wiring diagram, d) Instrument List, User manuals, Item Data Sheets, Item catalogue etc.	lot	1	
2	Mandatory spares required for smooth operation for minimum 1-years.	5,78,000.00	1.00 lot	5,78,000.
	Item description			Qty
	PH SENSOR			1 NOS
	PH TRANSMITTER			1 NOS
	CONDUCTIVITY SENSOR			1 NOS
	CONDUCTIVITY TRANSMITTER			1 NOS
	DO SENSOR			1 NOS
	DO TRANSMITTER			1 NOS
	TDS SENSOR			1 NOS
	TDS TRANSMITTER			2 NOS
	SAMPLE FILTER			2 NOS
	PRESSURE REDUCER			2 NOS
	CATION COLUMN			5 NOS
	ROTAMETERS			2 SET
	SPARE KIT FOR SILICA ANALYZER FOR 1 YEAR OPERATION			2 SET
	REAGENT KIT FOR SILICA ANALYZER FOR 1 YEAR OPERATION			2 SET
	REAGENT KIT FOR HYDRAZINE ANALYZER FOR 1 YEAR OPERATION			2 NOS
	PRESSURE REGULATORS			2 NOS



NEEPCO
100-001-2000
943-4991-0224
DHRAG - 78241-9520

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बोकुलोन, जिला- डिब्रुगढ़, असम, पिन - 786 191

North Eastern Electric Power Corporation Ltd.
(A Govt of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 191
Ph. 0374-2825216, EP&SX 2525007/2525423/25258208 FAX - 0374-7824191/2525217

1526



Annexure-1

Dt. 17/11/2023.

Ref: NEEPCO/AGBPS/C&I/T-48/2023-24/

Schedule of Items & Prices

S/N	Item description	Unit Price in Rs.	Qty	Total Amt in Rs
1	Supply of SWA-system for Midule-2	1,64,51,704/-	1.00 lot	1,64,51,704/-
S/N	ITEM DESCRIPTION		UNITS	QTY PER SET
1	SAMPLE HANDLING SYSTEM		no	1
A	<p>FREE FRAME STANDING WET PANEL STG BUILDING (RACK)</p> <p>A):</p> <ul style="list-style-type: none"> i) DM make-up water ii) CEP/ Condensate iii) Deaerator I/L <p>Supply of 3 Lines Sample Conditioning System as per above for continuous online analysis, mounted over a free-standing rack type with structural framework of CRCA, consisting of following components mounted over back plate of MS:</p> <ul style="list-style-type: none"> ➤ Bulkhead Union (3/4" NB SWX 1/4" O.D) ➤ Sample Isolation valve HT, Globe Type (for T>200DegC) – IBR Certified ➤ Sample Isolation Valve LT, Needle Type (for T<200DegC) ➤ Blow Down Isolation Valves ➤ Blowdown Headers ➤ Cooling Water Headers ➤ Isolation Valves, At Cooling Water Headers ➤ Pressure Gauge & Temperature Gauge at Cooling Water Headers ➤ Flow switch, At Cooling Water Header ➤ Isolation Valves, Cooling Water I/L & O/L Line ➤ Coolant flow Indicator at Cooling Water O/L Lines ➤ Sample Cooler (INCONEL Coil & SS 316 Shell Construction) – IBR Approved ➤ Along with Sample Pressure Relief Valve ➤ Sample filter, 40 Micron, Redundant Type Arrangement ➤ Variable pressure reducer(VRTS) (For P> 30 Bar) ➤ Pressure Regulator (For P<30 Bar) ➤ Thermal Shutoff Valve, Mechanical Type ➤ Along with Contacts ➤ Pressure Gauge ➤ Temperature Gauge ➤ Rotameter (Flow Indicator) with built in Needle Valve 			



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बकुलम, डिस्ट-दिब्रुगार, असम, पिन - 785 194

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULOM, DIST. DIBRUGARH, ASSAM, PIN - 785 194
Ph. 0374-2925219, EPASX 2625207/2925423/2925208 FAX: 0374-2625493/2925217

1527



	<ul style="list-style-type: none"> ➤ Cation Columns, Redundant Arrangement ➤ Back Pressure Regulator ➤ Drain Header ➤ Grab Sample Valve ➤ Tundish ➤ Flow Thru Chambers for the required sensors : 		
B	<p>FREE FRAME STANDING WET PANEL NEAR BOILERS (RACK B):</p> <ul style="list-style-type: none"> i) Economizer Inlet/Boiler feed water for Boiler-3 & 4 ii) Boiler Drum 3 & Boiler Drum 4 iii) Boiler Super-heater 3 & 4 iv) Main Steam-3 & 4 <p>Supply of 8 Lines Sample Conditioning System as per above specifications for continuous online analysis, mounted over a free-standing rack type with structural framework of CRCA, consisting of following components mounted over back plate of MS:</p> <ul style="list-style-type: none"> ➤ Bulkhead Union (3/4" NB SWX 1/4" O.D) ➤ Sample Isolation valve HT, Globe Type (for T>200 DegC) – IBR Certified ➤ Sample Isolation Valve LT, Needle Type (for T<200 DegC) ➤ Blow Down Isolation Valves ➤ Blowdown Headers ➤ Cooling Water Headers ➤ Isolation Valves, At Cooling Water Headers ➤ Pressure Gauge & Temperature Gauge at Cooling Water Headers ➤ Flow switch, At Cooling Water Header ➤ Isolation Valves, Cooling Water I/L & O/L Line ➤ Coolant flow Indicator at Cooling Water O/L Lines ➤ Sample Cooler (INCONEL Coil & SS 316 Shell Construction) – IBR Approved ➤ Along with Sample Pressure Relief Valve ➤ Sample filter, 40 Micron, Redundant Type Arrangement ➤ Variable pressure reducer (VRTS) (For P> 30 Bar) ➤ Pressure Regulator (For P<30 Bar) ➤ Thermal Shutoff Valve, Mechanical Type ➤ Along with Contacts ➤ Pressure Gauge ➤ Temperature Gauge ➤ Rotameter (Flow Indicator) with built in Needle Valve ➤ Cation Columns, Redundant Arrangement ➤ Back Pressure Regulator 	no	1



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बकुलुनि, जिला- डिब्रुगढ़, असम, पिन - 7861 11

North Eastern Electric Power Corporation Ltd.

(A Govt. of India Enterprise)

www.neepeco.gov.in

ASSAM GAS BASED POWER PLANT

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 101

Ph: 0374-2825216, E-MAIL: 28251071@2825423@825208 FAX: 0374-2825349@2825117



PRESSURE GAUGES	2 NOS
TEMPERATURE GAUGES	2 NOS
BACK PRESSURE REGULATOR	2 NOS
3 WAY GRAB SAMPLE VALVE	2 NOS
NEEDLE VALVES	2 NOS
FLOW SWITCH	2 NOS
HT ISOLATION VALVES	2 NOS
THERMAL SHUTOFF VALVES	2 NOS
PRIMARY COOLER	1 NOS
SECONDARY COOLER	1 NOS

[Signature]
15/11/2023



नई दिल्ली स्थित नार्थ ईस्टर्न बिजनेस लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित बिजली संयंत्र
बोकुलगु, डिब्रुगढ़-781005, असम, पिन- 781 005

North Eastern Electric Power Co.,
(A Government Enterprise)
ASSAM GAS BASED POWER PLANT
BOKULONG, DIBRUGARH, ASSAM, PIN- 781005
Ph. 3644202018 Fax 3644202018

DOC1529 NT/77



No: NEEPCO/AGBPS/C&I/T-54/2022-23/

Dt. 15/02/2023.

To
The General Manager,
Power System Export Unit,
Power & Electrical System division
Mitsubishi Corporation, 2-Chome,
Chiyoda-ku, Tokyo-100-8086,
Japan.

Kind atten: Mrs. Artia Bhatia, MHI, New Delhi office

**Sub: Purchase Order for Supply of Control Valves for the replacement
[upgradation] of Governor of Gas Turbine# 1 and 2.**

Offer reference: XAF-NEEPCO-825PG5K, dt. 08/8/2022 of MHI

Dear Sir,
The Corporation is pleased to place this Purchase Order for the supply of full set Control Valves of governor with accessories (filter regulators, positioners, booster relay etc) in reference to the above. The materials shall be one to one replaceable for the Gas Turbines. Make: MHI, Model: MW-251 of AGBPS, NEEPCO Ltd. Prices, terms & conditions of the P.O. shall be as below.

Description/HSNC	Unit Rate (¥)	Qty	Total Amt (¥)
✓ 1) (FCV-1173) Fuel Gas Start-up valve 40A (93K8072)	1,806,700.00	1 no	1,806,700.00
✓ 2) (FCV-1174): Fuel Gas Throttle valve 100A (93K8070)	2,652,400.00	1 no	2,652,400.00
✓ 3) (FCV-1176) Fuel Gas blow-off valve 25A (93C8043)	1,785,400.00	1 no	1,785,400.00
✓ 4) (FCV-1170B) Fuel Gas vent valve 25A (93C8044)	759,400.00	1 no	759,400.00
✓ 5) (FCV-1177) Fuel Gas Isolation valve 100A (93C8045)	4,750,800.00	1 no	4,750,800.00
✓ 6) (FCV-1170A) Fuel Gas OST valve 100A (93C8046) [Accessories for FCV-1274 steam throttle valve 100A (93K8077)]	3,451,800.00	1 no	3,451,800.00
✓ 7) E/P positioner NS728x1 pcs	353,900.00	1 no	353,900.00
✓ 8) Filter regulator NS770C	37,900.00	1 no	37,900.00
✓ 9) Filter regulator NS770CG	37,900.00	1 no	37,900.00
✓ 10) Booster regulator NS766C	22,800.00		22,800.00
✓ 11) Double flow speed controller (KC004723)	101,100.00		101,100.00
Cost in JPY, FCA Japan basis		1 lot	15,760,100.00
<p>>> ¥ 15,760,100/- (Fifteen million, Seven hundred Sixty thousand, One hundred JPY (¥) only.</p>			



उत्तर पूर्वी बिजली उत्पादन निगम लिमिटेड
(भारत सरकार का उपनिगम)
बिजली सेवा अधिनियम, 1948 के अन्तर्गत
असम, जमा-दिब्रुगढ़-बोकुलनी, पिन-786191

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
BOKULONI GAS BASED POWER PLANT
BOKULONI, DIST: DIBRUGARH, ASSAM - 786191
TEL: 037625226 FROM 037625226/037625226 FAX: 037625226



- a) **The Coordinator, Kolkata, NEEPCO Ltd, DS-1, Maniktola CIVIC Centre, 1/16, VIP Road, CIT Scheme No: VII M, P.P: Kankurgachi, Kolkata-700054, Ph: (033) 65444451, 23554341.**
- b) **The Head of Project, AGBPS, NEEPCO Ltd, Bokuloni, Dist: Dibrugarh, Assam, Pin-786191.**
13. **Consignee:-** The DGM(E/M), Material Management Wing(MMW), AGBPS, NEEPCO Ltd, Bokuloni, Dibrugarh, Assam, Pin-786191, Ph-(0374) 2825411.
14. **Delivery destination:** - Assam Gas Based Power Station (AGBPS), NEEPCO Ltd, Bokuloni, District: Dibrugarh (ASSAM), PIN: 7866191.

You are requested to convey acceptance of this P.O.

Thanking you.

Your faithfully,

General Manager(E/M), C&I wing,
AGBPS, NEEPCO Ltd, Bokuloni,
Dibrugarh, Assam.

Memo No: NEEPCO/AGBPS/T-54/2022-23/274-79

Dt. 15/02/2023.

- 1) The HOP, AGBPS, NEEPCO Ltd for favour of information please.
- 2) The CGM/GM, o/o the ED(O&M), NEEPCO Ltd for kind appraisal of the ED(O&M) please. This has kind approval of the ED(OM) through FLM dtd 10/02/2023.
- 3) The DM(Fin), AGBPS, NEEPCO Ltd for kind appraisal of CGM/GM (Fin) please. A copy of approval note is attached herewith. You are requested to take necessary action for opening the LC for making on time payment please.
- 4) The DGM (E/M), MMW, AGBPS, NEEPCO Ltd for necessary action please.
- 5) The DGM(Civil), Vigilance, AGBPS, NEEPCO Ltd for information please.
- ✓ 6) T-54/Guard file.

General Manager(E/M), C&I wing,
AGBPS, NEEPCO Ltd

--X--

AVR
 CT #1 to 4
 Sl. 13, 14, 15, 16

WITH EASTERN ELECTRIC POWER CORPORATION LTD
 ASSAM GAS BASED POWER PLANT
 UPGRADING OF CT CONTROLLER FOR UNIT #1-4
 REPLACEMENT OF AVR AND TH FOR UNIT #1-4

1. Modification of CT Control Panel (BTR)

No	Name of part	Remarks	Qty	Unit Price	Subtotal
1	Material for Modification 改造材料		1	¥1,390,000	¥1,390,000
2	MACTUS AVR Data Saving 1 engineer x Working days MACTUS AVR 稼働記録(1) 保存作業	Details are as per attached sheet	2	¥1,852,000	¥3,704,000
3	Site Investigation for Modification 2 engineers x Working days 改造調査(2名) 5日分	Details are as per attached sheet	2	¥2,104,000	¥4,208,000
				Subtotal	¥9,302,000

(*) Site investigation may be required before and after starting designing work.

2. AVR Replacement to "MECTDQ"

No	Name of part	Remarks	Qty	Unit Price	Subtotal
1	MECTDQ AVR				
1	MECTDQ AVR Unit MECTDQ AVR 1台		2	¥5,100,000	¥10,200,000
2	Site Investigation 1 Engineer x Working days 現場調査(1名) 5日分	Details are as per attached sheet	1	¥1,380,000	¥1,380,000
2	Special Test for AVR Cabinet 1 used for replacement of 4 units				
1	Accessory Box for Test Feeding AVR CT 付加品		1	¥122,500	¥122,500
1	Measurement bar for D-PWR 棒状物		1	¥1,525,000	¥1,525,000
2	High Frequency Generator for with test 高周波発生機(1台)		1	¥5,100,000	¥5,100,000
2	Special Pump for AVR/AVR Cabinet (Recommendatory)				
1	AVR module AVRモジュール		1	¥950,000	¥950,000
2	Thyristor Module elements in Tractor サイリスタモジュール素子	2台	1	¥220,000	¥220,000
1	Fuse for AVR Thyristor Module Element 1 (20A) 2	100KA	6	¥145,000	¥870,000
				Subtotal	¥23,402,500

JPY
 13,100,000.00
 1,380,000.00
 122,500.00
 1,525,000.00
 5,100,000.00
 850,000.00
 220,000.00
 105,000.00

JPY 23,402,500 = (11#) 15445650

3. Special Testing Equipment for Replacement for 1 Unit of AVR

No	NAME OF INSTRUMENT	TYPE (model)	Qty	Term ¹⁾ (Month)	Unit Price	Subtotal
1	Special Testing Equipment for Replacement for 1 Unit of AVR		1set	2	¥1,962,500	¥1,962,500
Equipment of 1 Unit						
1	Digital Multimeter	734-C2 (NEW)	2	2		
2	Insulation Resistance Tester	MY40-01 (NEW)	1	2		
3	Waveform Recorder	WR1 (NEW)	1	2		
4	DC Power Supply	27500 (NEW)	1	2		
5	Resistor	100Ω, 400W	2	2		
6	3-Phase AC Generator	40.7M (NF)	1	2		
7	Phase Angle Meter	COM-2000 (NEW)	1	2		
8	Function Generator	170012 (NEW)	1	2		
9	Fluorescent Calibrator	CA100 (NEW)	2	2		
10	Phase Angle Indicator	RS12 (NEW)	1	2		
11	Signal Power Meter	407, 100 (NEW)	1	2		
12	Auto-tuning Transformer	AT-100	1	2		

¹⁾ Term: Rental period is 2 months after shipment from Japan for PDR (after close) and returning to the factory. Shipment from Japan and returning to Japan is assumed by Applicant.

(10%)
 23402500 * 10% = 2340250
 23402500 - 2340250 = 21062250
 21062250 / 12 = 1755187.5
 1755187.5 * 2 = 3510375
 3510375 for 2-units.

Changes for the Better

御注文元
PROJECT

INDIA NEEPCO
ASSAM Power Plant No. 1, 2, 3 & 4

項目
TITLE

Technical Proposal for Replacement
of Automatic Voltage Regulator

Copyright © 2005 MITSUBISHI ELECTRIC CORPORATION
NOT TO BE REPRODUCED OR DISCLOSED WITHOUT WRITTEN PERMISSION OF MITSUBISHI ELECTRIC CORPORATION

MITSUBISHI ELECTRIC CORPORATION
Energy Plant & Systems Department
Energy Plant Service Engineering Section

送付先 SEND TO				作成 DRAWN	検査 CHECKED	設計 DESIGN	承認 APPROVED
種別	本工場の 力量		工物品 工事対象 大掛物 工機類	Y. Hosh	S. Hosh	Y. Hosh	[Signature]
種別	建設部	第一	電力部				
種別	建設部	第二	電力部				
種別	建設部	第三	電力部				
種別	建設部	第四	電力部				
種別	建設部	第五	電力部				
種別	建設部	第六	電力部				
種別	建設部	第七	電力部				
種別	建設部	第八	電力部				
種別	建設部	第九	電力部				
種別	建設部	第十	電力部				
種別	建設部	第十一	電力部				
種別	建設部	第十二	電力部				
種別	建設部	第十三	電力部				
種別	建設部	第十四	電力部				
種別	建設部	第十五	電力部				
種別	建設部	第十六	電力部				
種別	建設部	第十七	電力部				
種別	建設部	第十八	電力部				
種別	建設部	第十九	電力部				
種別	建設部	第二十	電力部				
種別	建設部	第二十一	電力部				
種別	建設部	第二十二	電力部				
種別	建設部	第二十三	電力部				
種別	建設部	第二十四	電力部				
種別	建設部	第二十五	電力部				
種別	建設部	第二十六	電力部				
種別	建設部	第二十七	電力部				
種別	建設部	第二十八	電力部				
種別	建設部	第二十九	電力部				
種別	建設部	第三十	電力部				
種別	建設部	第三十一	電力部				
種別	建設部	第三十二	電力部				
種別	建設部	第三十三	電力部				
種別	建設部	第三十四	電力部				
種別	建設部	第三十五	電力部				
種別	建設部	第三十六	電力部				
種別	建設部	第三十七	電力部				
種別	建設部	第三十八	電力部				
種別	建設部	第三十九	電力部				
種別	建設部	第四十	電力部				
種別	建設部	第四十一	電力部				
種別	建設部	第四十二	電力部				
種別	建設部	第四十三	電力部				
種別	建設部	第四十四	電力部				
種別	建設部	第四十五	電力部				
種別	建設部	第四十六	電力部				
種別	建設部	第四十七	電力部				
種別	建設部	第四十八	電力部				
種別	建設部	第四十九	電力部				
種別	建設部	第五十	電力部				
種別	建設部	第五十一	電力部				
種別	建設部	第五十二	電力部				
種別	建設部	第五十三	電力部				
種別	建設部	第五十四	電力部				
種別	建設部	第五十五	電力部				
種別	建設部	第五十六	電力部				
種別	建設部	第五十七	電力部				
種別	建設部	第五十八	電力部				
種別	建設部	第五十九	電力部				
種別	建設部	第六十	電力部				
種別	建設部	第六十一	電力部				
種別	建設部	第六十二	電力部				
種別	建設部	第六十三	電力部				
種別	建設部	第六十四	電力部				
種別	建設部	第六十五	電力部				
種別	建設部	第六十六	電力部				
種別	建設部	第六十七	電力部				
種別	建設部	第六十八	電力部				
種別	建設部	第六十九	電力部				
種別	建設部	第七十	電力部				
種別	建設部	第七十一	電力部				
種別	建設部	第七十二	電力部				
種別	建設部	第七十三	電力部				
種別	建設部	第七十四	電力部				
種別	建設部	第七十五	電力部				
種別	建設部	第七十六	電力部				
種別	建設部	第七十七	電力部				
種別	建設部	第七十八	電力部				
種別	建設部	第七十九	電力部				
種別	建設部	第八十	電力部				
種別	建設部	第八十一	電力部				
種別	建設部	第八十二	電力部				
種別	建設部	第八十三	電力部				
種別	建設部	第八十四	電力部				
種別	建設部	第八十五	電力部				
種別	建設部	第八十六	電力部				
種別	建設部	第八十七	電力部				
種別	建設部	第八十八	電力部				
種別	建設部	第八十九	電力部				
種別	建設部	第九十	電力部				
種別	建設部	第九十一	電力部				
種別	建設部	第九十二	電力部				
種別	建設部	第九十三	電力部				
種別	建設部	第九十四	電力部				
種別	建設部	第九十五	電力部				
種別	建設部	第九十六	電力部				
種別	建設部	第九十七	電力部				
種別	建設部	第九十八	電力部				
種別	建設部	第九十九	電力部				
種別	建設部	第一百	電力部				
種別	建設部	第一〇一	電力部				
種別	建設部	第一〇二	電力部				
種別	建設部	第一〇三	電力部				
種別	建設部	第一〇四	電力部				
種別	建設部	第一〇五	電力部				
種別	建設部	第一〇六	電力部				
種別	建設部	第一〇七	電力部				
種別	建設部	第一〇八	電力部				
種別	建設部	第一〇九	電力部				
種別	建設部	第一一〇	電力部				
種別	建設部	第一一一	電力部				
種別	建設部	第一一二	電力部				
種別	建設部	第一一三	電力部				
種別	建設部	第一一四	電力部				
種別	建設部	第一一五	電力部				
種別	建設部	第一一六	電力部				
種別	建設部	第一一七	電力部				
種別	建設部	第一一八	電力部				
種別	建設部	第一一九	電力部				
種別	建設部	第一二〇	電力部				
種別	建設部	第一二一	電力部				
種別	建設部	第一二二	電力部				
種別	建設部	第一二三	電力部				
種別	建設部	第一二四	電力部				
種別	建設部	第一二五	電力部				
種別	建設部	第一二六	電力部				
種別	建設部	第一二七	電力部				
種別	建設部	第一二八	電力部				
種別	建設部	第一二九	電力部				
種別	建設部	第一三〇	電力部				
種別	建設部	第一三一	電力部				
種別	建設部	第一三二	電力部				
種別	建設部	第一三三	電力部				
種別	建設部	第一三四	電力部				
種別	建設部	第一三五	電力部				
種別	建設部	第一三六	電力部				
種別	建設部	第一三七	電力部				
種別	建設部	第一三八	電力部				
種別	建設部	第一三九	電力部				
種別	建設部	第一四〇	電力部				
種別	建設部	第一四一	電力部				
種別	建設部	第一四二	電力部				
種別	建設部	第一四三	電力部				
種別	建設部	第一四四	電力部				
種別	建設部	第一四五	電力部				
種別	建設部	第一四六	電力部				
種別	建設部	第一四七	電力部				
種別	建設部	第一四八	電力部				
種別	建設部	第一四九	電力部				
種別	建設部	第一五〇	電力部				
種別	建設部	第一五一	電力部				
種別	建設部	第一五二	電力部				
種別	建設部	第一五三	電力部				
種別	建設部	第一五四	電力部				
種別	建設部	第一五五	電力部				
種別	建設部	第一五六	電力部				
種別	建設部	第一五七	電力部				
種別	建設部	第一五八	電力部				
種別	建設部	第一五九	電力部				
種別	建設部	第一六〇	電力部				
種別	建設部	第一六一	電力部				
種別	建設部	第一六二	電力部				
種別	建設部	第一六三	電力部				
種別	建設部	第一六四	電力部				
種別	建設部	第一六五	電力部				
種別	建設部	第一六六	電力部				
種別	建設部	第一六七	電力部				
種別	建設部	第一六八	電力部				
種別	建設部	第一六九	電力部				
種別	建設部	第一七〇	電力部				
種別	建設部	第一七一	電力部				
種別	建設部	第一七二	電力部				
種別	建設部	第一七三	電力部				
種別	建設部	第一七四	電力部				
種別	建設部	第一七五	電力部				
種別	建設部	第一七六	電力部				
種別	建設部	第一七七	電力部				
種別	建設部	第一七八	電力部				
種別	建設部	第一七九	電力部				
種別	建設部	第一八〇	電力部				
種別	建設部	第一八一	電力部				
種別	建設部	第一八二	電力部				
種別	建設部	第一八三	電力部				
種別	建設部	第一八四	電力部				
種別	建設部	第一八五	電力部				
種別	建設部	第一八六	電力部				
種別	建設部	第一八七	電力部				
種別	建設部	第一八八	電力部				
種別	建設部	第一八九	電力部				
種別	建設部	第一九〇	電力部				
種別	建設部	第一九一	電力部				
種別	建設部	第一九二	電力部				
種別	建設部	第一九三	電力部				
種別	建設部	第一九四	電力部				
種別	建設部	第一九五	電力部				
種別	建設部	第一九六	電力部				
種別	建設部	第一九七	電力部				
種別	建設部	第一九八	電力部				
種別							



CONTENTS

1. Introduction

2. Modification Outline of Local Generator Control Panel

(1) Modification items

(2) Reuse of Existing Equipment

(3) Division of Responsibility

(4) Comparison of Existing and New AVR

3. Attachment



1. Introduction

This proposal specification is applied to the replacement of Analogue type Automatic Voltage Regulator (hereinafter called AVR) unit to newest Digital type AVR unit for Brushless excitation system.

Nowadays, the control system is changed from analogue technology to digital technology.

Control unit of excitation system supplied by Mitsubishi Electric CO., (hereinafter called MELCO) was changed to digital AVR from around 2000.

Since year 2002, AVR has been shifted to from analogue technology to digital technology and we stopped manufacturing of analogue type AVR for new power station project.

We had terminated to the supply of spare card/module of analogue type AVR on year 2005.

Therefore, we are recommending to replace AVR from analogue type to digital type, it is because, there is not available of analogue AVR's spare parts and difficulty of maintenance support and service.

Advantage of digital AVR unit is

- Better operability
- Better maintainability
- Higher reliability
- Self Diagnosis Function
- Signal Recording

In response to your request, we are proposing to replace existing AVR (VRG-PMN VI) and MVR (VRG-PMN VI) unit located in the local generator control panel from analogue type AVR to digital type AVR by using type "MEC-700" supplied from MELCO, mounted location is same as existing.



2. Modification Outline of Local Generator Control Panel

In order to replace AVR, modification of Local Generator Control Panel is required. The following modification scheme will be taken into account.

(1) Modification items

AVR (VRG-PMN VI) and MVR (VRG-PMN VI) is located in Local Generator Control Panel.

New digital dual AVR units are installed in same location of existing AVR and MVR after removing existing AVR and MVR.

(2) Reuse of Existing Equipment

The following equipments will be considered to reuse as much as possible.

- PMG and AC exciter
- Field circuit breaker(41E), shunts, and resistors on the field circuit
- Voltage transformer and Current transformer
- Test terminals on the VT and CT circuits
- Field current and voltage meters and its indicator
- Switches on the PMG output circuit
- Control and changeover switches and associated indicators (7-90R,7-70E)
- Generator field ground detection system (64F1/64F2)
- Annunciator

(3) Division of Responsibility

The proposed Division of Responsibility (DOR) between NEEPCO and MELCO is as shown on Table-1.

Table-1 DOR

No.	Description	NEEPCO	MELCO	Remarks
A	Equipments, Parts and Materials			
A-1	Digital dual AVR unit		●	
A-2	Special tool		●	
A-3	Modification materials for Local Generator Control Panel		●	
A-4	Cable and associated materials	●		Cable means external cable
B	Modification Work of Existing Equipment			
B-1	Technical Advisor of the modification work		●	
B-2	Modification Work	●		
B-3	Cabling work	●		
C	Test & Commissioning			
C-1	Individual test at shop		●	
C-2	Individual test at site	●		
C-3	Commissioning	●		
C-4	Technical Advisor of the commissioning		●	



3. Attachment

- | | | |
|------------------|----------------------------|------------|
| (1) Attachment-1 | Specifications of AVR unit | JETA-PF353 |
| (2) Attachment-2 | Panel arrangement | GA32283 |

SPECIFICATION OF AVR UNIT

1. Project **INDIA NEEPCO
ASSAM POWER PLANT units 1 to 4**
2. Number of sets of AVR unit to be replaced: **4 sets**
3. Type & model No. of AVR: **Digital, MEC700**

4. Configuration of AVR unit

Existing (Before replacement)	AVR - MVR
After replacement	AVR (dual) MVR function is included in the AVR Total 8 AVR unit(s) provided for 4 generator(s)

5. Specifications of AVR

- (1) Ambient temperature: **-10 degree C ~ 40 degree C**
- (2) Humidity: **50 ~ 90%RH (No dew condensation)**
- (3) CPU sampling time: **3 msec.**
- (4) Voltage setting range: **AUTO**
MANUAL
46 ~ 110% (no-load)
95 ~ 105% (on-load)
105% (no-load) ~ 110% (on-load)
- (5) Rating of output current (hydraulic): **30 A**

(6) Functions

- MFJ (Maximum Excitation Limiter)
- OEL (Over Excitation Limiter)
- V/Hz (Volt/Hz Limiter)
- LDC (Line Drop Compensator)

6. Accessory & Special tool for AVR unit

Accessory	Test terminal of VFACT	1 set
Special tool	AVR maintenance tool (Notebook PC)	1 set
	HFG (High Frequency Generator) for AVR testing	1 set

7. Generator/Excitor rating

Generator Rating	Capacity	44,600 (kVA)
	Voltage	11 (kV)
	Rotation speed	3,000 (min ⁻¹)
Excitor Rating	Capacity	240 (kW)
	Voltage	160 (V)
PMG Rating	Capacity	5 (kVA)
	Voltage	100 (V)
	Frequency	300 (Hz)
Excitor field current Rating		7.4 A
(at 100% load rated power factor)		

Revision History

Revision	D	A	B	C	D	E
Drawn	M Tamura					
Date	2011/06/12					

JETA-PR3533

(2/2)

9/



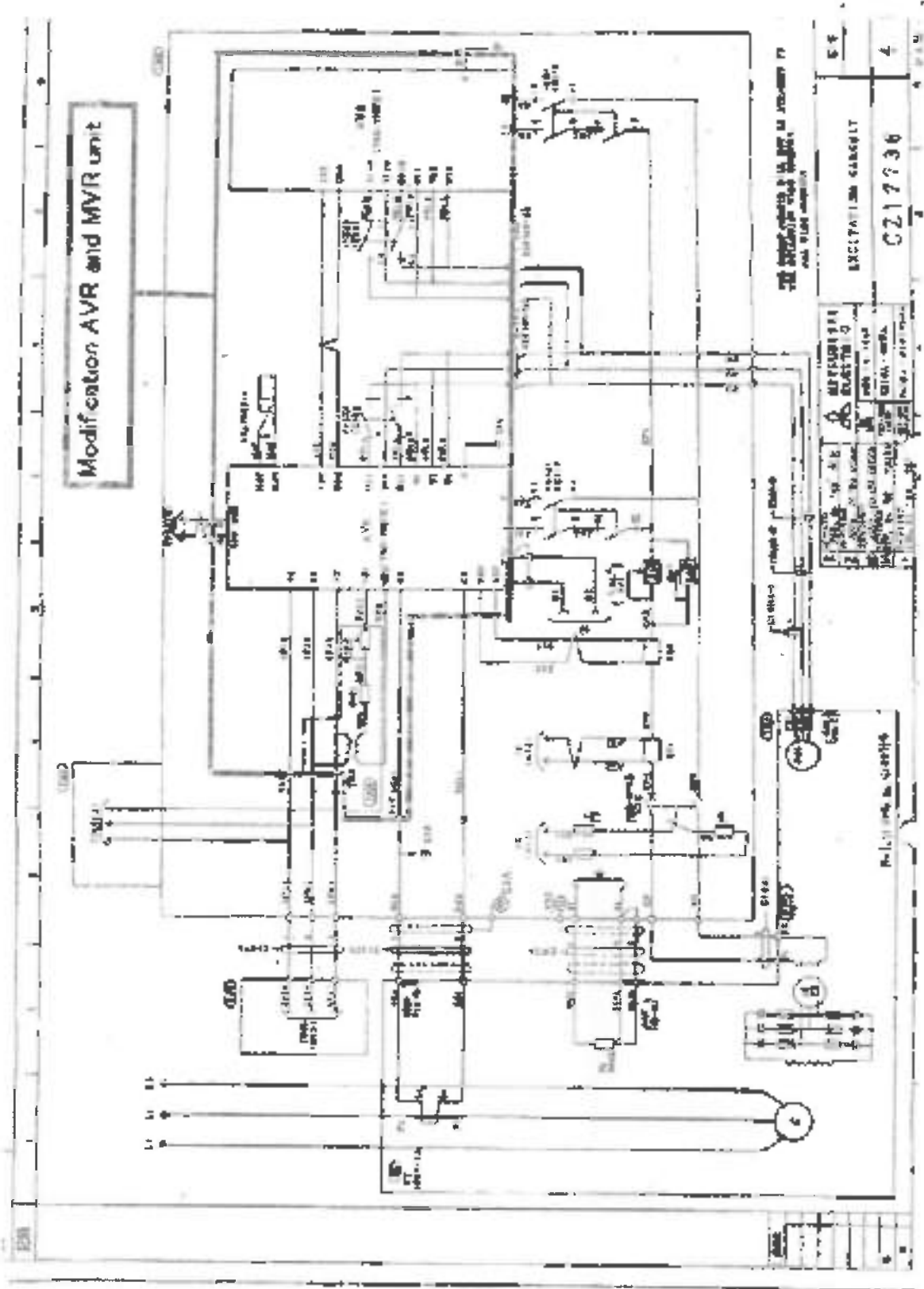
No.	Description	NEPCO	MELCO	Remarks
D	Engineering			
D-1	Engineering and Designing		●	
D-2	Modification procedure		●	
D-3	Cabling design	●		
E	Others			
E-1	<ul style="list-style-type: none"> • Temporary power source • Gas turbine operation for commissioning • Transportation at site • Unpacking of supplied materials • Discard of unused materials such as packing materials or removed components 	●		

(4) Comparison of Existing and New AVR

Comparison table between existing AVR and digital AVR is as shown on Table-2.

Table-2 Comparison table of AVR characteristics

Item	Existing AVR	Digital AVR																												
Function	<ul style="list-style-type: none"> • Minimum Excitation Limiter • Over Excitation Limiter 	<ul style="list-style-type: none"> • Minimum Excitation Limiter • Over Excitation Limiter • V/Hz Limiter 																												
Performance	<ul style="list-style-type: none"> • Automatically start up 	<ul style="list-style-type: none"> • Automatically start up • Precise control 																												
Reliability	<ul style="list-style-type: none"> • AVR - MVR 	<ul style="list-style-type: none"> • Fully duplex system controls • automatically changeover to stand-by system • Self diagnosis function 																												
Operation	<ul style="list-style-type: none"> • Automatic voltage control mode • Manual voltage control mode • Automatic changeover from AVR to MVR 	<ul style="list-style-type: none"> • Automatic voltage control mode • Manual voltage control mode • AVR changeover concept during failure conditions mentioned as follows. AVR channel will be selected automatically. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>A channel</th> <th>B channel</th> <th>Select channel</th> </tr> </thead> <tbody> <tr> <td>Start</td> <td>Normal</td> <td>Normal</td> <td>A (initial)</td> </tr> <tr> <td>↓</td> <td>Right Fault</td> <td>Normal</td> <td>A → B</td> </tr> <tr> <td>↓</td> <td>Right Fault</td> <td>Right Fault</td> <td>B (No changeover)</td> </tr> <tr> <td>↓</td> <td>Right Fault</td> <td>Middle Fault</td> <td>B → A</td> </tr> <tr> <td>↓</td> <td>Middle Fault</td> <td>Middle Fault</td> <td>A (No changeover)</td> </tr> <tr> <td>End</td> <td>Heavy Fault</td> <td>Middle Fault</td> <td>A → B</td> </tr> </tbody> </table>		A channel	B channel	Select channel	Start	Normal	Normal	A (initial)	↓	Right Fault	Normal	A → B	↓	Right Fault	Right Fault	B (No changeover)	↓	Right Fault	Middle Fault	B → A	↓	Middle Fault	Middle Fault	A (No changeover)	End	Heavy Fault	Middle Fault	A → B
	A channel	B channel	Select channel																											
Start	Normal	Normal	A (initial)																											
↓	Right Fault	Normal	A → B																											
↓	Right Fault	Right Fault	B (No changeover)																											
↓	Right Fault	Middle Fault	B → A																											
↓	Middle Fault	Middle Fault	A (No changeover)																											
End	Heavy Fault	Middle Fault	A → B																											





नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)

1543 DOCUMENT/79

TEL: 0361-2501200
FAX: 0361-2501204
0361-2501205

असम गैस आधारित शक्ति संयंत्र

ASSAM GAS BASED POWER PLANT

BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 131

Ph: 0374-2625219, E-MAIL: director@neepco.co.in / agb@neepco.co.in / agb@neepco.co.in



NO: NEEPCO/AGBPS/C&I/T-54/2022-23/3700000 /

Dtd.28/4/2022.

To
The General Manager,
Power System Export Unit,
Power & Electrical System division
Mitsubshi Corporation, 2-Chome,
Chiyoda-ku, Tokyo-10086
Japan.

Sub: Work Order for Configuration/Modification of Existing Control System of Gas Turbines #1,2,3 & 4 of AGBPS for the Implementation of AGC (Automatic Generation Control).

Ref:

- 1) NEEPCO/AGBP/C&I/T-54/2019-20/219 Dtd.02/01/2020 for Gas Turbines # 1,2,3 and 4.
- 2) MHI offer: i) XAF-NEEPCO-825P98R-ENG dt 17TH Sept'2021 and ii) XAF-NEEPCO-825P98R-TA dtd 17TH Sept'2021.

Dear Sir,

The Corporation is pleased to place this Work Order for the services of Configuration /Modification of existing Control System of Gas Turbines # 1,2,3 & 4 of AGBPS, NEEPCO Ltd for the Implementation of AGC (Automatic Generation Control).

Service charges, terms & conditions will be as below.

Description	Unit Price (JPY)	Qty	Total Amt (JPY)
i) Engineering fee for 4(four) units	8,555,120.00	01 lot	8,555,120.00
ii) Estimated Technical advisory fee for 4(four) units	4,018,400.00	01 lot	4,018,400.00
iii) Estimated Expenses for 4(four) units	3,400,000.00	01 lot	3,400,000.00
Sub-total in JPY for 4(four) units			15,973,520.00

- > (JPY) 15,973,520/ i.e (₹) 1,02,23,053/--(Rupees One crore, Two Lac, Twenty-Three Thousand and Fifty-Three) only. (Considering exchange rate as 0.64)
- > **However**, Technical advisory fee as shown above is as estimated by MHI, Japan in their offer and that shall be as per actual time sheet. (i) Charges for normal working day shall be ¥151,100, (ii) Normal OT (Mon-Fri) ¥24,500 per hour, (iii) Working hours (Sat/Sun/GH) ¥24,500 per hour, (iv) OT on (Sat/Sun/GH) ¥26,700 per hour.
- > Expenses as shown in (iii) above is as estimated by MHI, Japan in their offer and that shall be paid at actual. This includes
 - a) International air-fare (round trip)

W-11(A)

Handwritten signature/initials

Handwritten signature: GM (E) 2/15/22

Handwritten signature: AM (E) 04/15/22



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
पुस्तक, निवा- डिब्रुगढ़, असम, पिन - 786 151

North Eastern Electric Power Corporation Ltd.
(A Govt of India Undertaking)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 151
Ph: 0374-2625216, EM: 0361-2625216/2625217 FAX: 0374-2625216/2625217

1544



- b) Domestic air-fare (round trip)
c) Charges in India in Inward & Outward journey.

Terms & conditions:

- 1. Price Basis:** Above price is in JPY excluding IGST and TDS.
- 2. Payment terms:** Any payment due to the Seller shall be made through Letter of Credit in Japanese Yen. Payment shall be made in Japanese Yen by an irrevocable and confirmed Letter of Credit (L/C) to be established for the estimated amount of L/C mentioned above in favor of Mitsubishi Corporation by a first class bank in Europe, the U.S.A. or Japan acceptable to us, payable against presentation of at sight draft accompanied by our invoice together with working time sheet duly signed by the Purchaser, without restriction on negotiation bank, with sufficient validity to cover our bank negotiation. L/C opening charge, confirmation charge and other bank charges shall be borne and paid by the Purchaser.
- 3. TDS:** TDS as per applicable rate on (ii) Technical advisory fee shall be paid by NEEPCO at actual. Present rate of TDS is @2%.
- 4. Taxes:** IGST and other taxes as applicable in India shall be paid extra at actual by NEEPCO. Present rate of IGST is 18%. Our GST No: 18AAAACN9991J3ZP.
- 5. Lodgings** shall be arranged and paid by the Purchaser. Telephone, telefax and telex communications are invoiced at actual cost if such costs are paid and borne by TECHNICAL ADVISER(s) during the performance of duties. Any miscellaneous expenses including food and drink will be paid or reimbursed at actual against documentary evidence.
- 6. Invoice:** The invoice of advisory technical services fee shall be supported by the original work time sheets, which shall be countersigned by authorized personnel of the Purchaser. The full invoice amount shall be net receivable to the Seller and shall not include income tax and any other impositions levied in India.
- 7. Time-Sheet:** The Purchasers representative at the site shall approve and sign time sheets daily. If the Purchaser has any queries regarding any timesheets, the Purchaser shall assess and clarify with the Seller's representative at the site to determine the approved time sheet within one week. In case that Purchaser's fail to approve time sheet within a week, Seller is entitled to claim the service fee based on the time sheet which the TECHNICAL ADVISER(s) writes.
- 8. Facilities and Services:** The Purchaser shall, at his own expense, provide TECHNICAL ADVISER(s) with the following facilities and services, (a) Safety equipment, (b) adequate first aid and medical services, according to the Purchaser's general rules of medical care and welfare for its engineers, (c) usable stable communication facilities for the performance of the TECHNICAL ADVISER's duties, (d) Office with desk, chair and locker, etc.
- 9. Delivery:** Within 26-weeks from the receipt of confirmation of LC.
- 10. Shipment, Freight & Insurance:** Not applicable.
- 11. Insurance:** Not applicable.
- 12. Warranty:** Warranty shall not be applicable on this Software Services.



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बोकुलोनि, जिला - डिब्रुगढ़, असम - 786619

North Eastern Electric Power Corporation Ltd.
(A Govt. of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST. DIBRUGARH, ASSAM, PIN - 786 611
Ph: (0374) 2825216, 2196501/2829201/2829202/2829203 FAX: 0374 2825214/2825217



13. **Plant Location:** Assam Gas Based Power Station (AGBPS), NEEPCO Ltd, Bokuloni, District: Dibrugarh (Assam), PIN: 786619
14. **Contact Person:** The General Manager (E/M), Control & Instrumentation Wing (C&I), AGBPS, NEEPCO Ltd, Bokuloni, Ph-(0374) 2825411.

Kindly convey your acceptance of this Work Order.
Thanking you.

Yours truly,

General Manager (E/M), C&I Division
AGBPS, NEEPCO Ltd, Bokuloni,
Dibrugarh, Assam.

Memo No: NEEPCO/AGBPS/C&I/T-54/2021-22/ 31-37 Dtd. 28/4/2022.

- 1) The CGM(E/M), O/O The Director(Technical), NEEPCO Ltd for the kind appraisal of The Director(Technical) please. This has his kind approval dtd 29/3/2022.
- 2) The GM (E/M), O/O The ED (O&M), NEEPCO Ltd for the kind appraisal of The ED (O&M) please.
- 3) The HOP, AGBPS, NEEPCO Ltd, Bokuloni for favour of kind information please.
- 4) The GM (F&A), AGBPS, NEEPCO Ltd for necessary action please.
- 5) The Sr. Manager(Civil), Vigilance, AGBPS, NEEPCO Ltd for information please.
- 6) The Sr. Manager (HR), AGBPS, NEEPCO Ltd, Bokuloni for site accommodation and local transportation of official(s) as per W.O.
- 7) T-54/Guard file.

General Manager (E/M), C&I Division
AGBPS, NEEPCO Ltd, Bokuloni

---X---



NEEPCO
1975-2004
1975-2004
0204-7-10015-100

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
भुवनेश्वर, बिसाल - डिब्रुगढ़, असम, पिन - 786 155

North Eastern Electric Power Corporation Ltd.
(A Govt of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BORULDEH, DIST. DIBRUGARH, ASSAM, PIN - 786 161
Ph: 0374 0820016, 0374 0820017, 0374 0820018, 0374 0820019, 0374 0820020, 0374 0820021

DC1546ENT/80



NO: NEEPCO/AGBPS/C&I/T-55/2022-23/3700000 /

Dtd.28/4/2022.

To
M/S BHEL-GE Gas Turbine Services Ltd.
A1,A2 & A3, Quadrant 1, 7th Floor,
Cyber Towers, Madhapur, Hyderabad,
Telangana: 500081, India.

Sub: Work Order for Configuration/Modification of Existing Control System of Gas Turbines #5 & 6 of AGBPS for the Implementation of AGC (Automatic Generation Control).

Ref: 1) (i) LOI ref: NEEPCO/AGBPS/C&I/T-55/2021-22/599 dtd.29/34/2022, (ii) NEEPCO/AGBP/C&I/T-55/2019-20/221 dtd.02/01/2020, (iii) NEEPCO/AGBP/NEEPCO/C&I/T-55/2021-23/341 dtd 11/06/2021, (iv) E-mail dated 29th Nov 2021 & dtd 10th January,2022.
2. BGGTS offer ref: (i) Q20-0074 Date: 06-06-2020, (ii) Q20-0074-Rev01 Date: 24-07-2020, (iii) Q20-0074-Rev02-01 Date: 31-08-2020, (iv) Q20-0074-Rev02-02 Date: 31-08-2020, v) Q20-0074-Rev03/CL3 DTD 10th Dec 2021.

Dear Sir,

The Corporation is pleased to place this Work Order for the services of Configuration /Modification of existing Control System of Gas Turbines #5 & 6 of AGBPS, NEEPCO Ltd for the Implementation of AGC (Automatic Generation Control). Service charges, terms & conditions will be as below.

Description	Unit Price (₹)	Qty	Total Amt (₹)
1) Automatic Generator Control Functionality/ Engineering fee	41,00,000/-	02 (two)	82,00,000.00
2) Commissioning services as per diem Normal Rate	75,000/-	06 (Six) man-days	4,50,000.00
Total without taxes			86,50,000.00
❖ ₹ 86,50,000/- (Rupees Eighty-six Lac and Fifty thousand) only.			
❖ Commissioning services as shown above is estimated and that shall be regulated at actual.			

Terms & conditions:

- Price Basis: Your quoted price is in INR excluding GST.
- Payment terms: 90% of Contract Value with applicable Taxes & Duties shall be paid by NEEPCO within 10 Days of Job Completion/MOM signed by representatives of BGGTS & NEEPCO. Balance 10% within 10 Days of submission of Report/ Statutory Documents as applicable.

N-II(B)

(Handwritten signature/initials)

(Handwritten signature/initials)
2/5/22

(Handwritten signature/initials)
2/5/22



NEEPCO
100-1001-1000
CHAS - 12514-0010

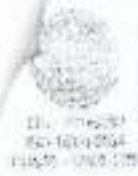
नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संशोधन
संस्थान, बिरला - डिब्रुगढ़, असम, पिन - 786 191

North Eastern Electric Power Corporation Ltd.
(A Govt of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BORULOH, DIST. DIBRUGAHI, ASSAM, PIN- 786 191
Ph: 0374-382226, 0374-382207, 0374-382208, 0374-382209, 0374-382210, 0374-382211, 0374-382212, 0374-382213

1547



3. **Taxes:** GST and other taxes as applicable shall be paid extra at actual by NEEPCO. Present rate of GST is 18%. Our GST No: 18AAACN9991J3ZP. GST No of M/S BGGTs is 36AAACB5126H1ZZ.
4. **Service Rate Schedule** for Trouble Shooting: (i) Field Services per diem Normal Rate: Troubleshooting services related to Gas Turbines is ₹ 75000/- (ii) Overtime 1: Weekdays more than the normal 8 hrs is 1.5 x Normal Rate, (iii) Overtime 2: Sundays and National Holidays is 2 X Normal Rates, (iv) Travel time charges are 1 X Normal Rates, (v) To and fro Travel (Economy Air Travel) and other incidental charges (Like Taxi, Excess Baggage) are at actual plus 15% administrative charges.
5. (a) Rates are based on six working days (Monday to Saturday) per week with 8 hrs of working during day time to coincide with Customer's normal working time. Any work hours falling outside of the normal work hours specified here shall be subject to rate multipliers.
(b) Normal Rate for "Rate Multiplier" shall be on hourly basis calculated from Normal Daily Rate per Extra hour shall be 13500 INR.
© Travel-time: if travel time is less than 2 hours each way, or if TA travels to site and returns to base station after completion of work on the same day, no travel time is charged. If travel time is more than 2 hrs and less than 4 hrs each way, one day charges are applicable for the total trip. if travel time is more than 4 hrs each way, travel time charges are applicable as one day each way. Travel time on Sunday/National Holiday shall be 2xdaily normal rate.
(d) If Person is available at site but not utilised due to any reason (Including Sunday/holidays) Normal rate will be applicable
(e) Minimum charges for site work will be equivalent to one day charge plus all other expenses towards travel, lodging & boarding etc. as applicable
(f) Minimum charges on Sunday and National Holiday will be for 4 hrs.
(h) Minimum Over time on normal working day will be 2 hrs.
(i) Air-Conditioned Accommodation will be provided by customers at site (Equivalent to what is provided to their executives (middle mgmt.). In case customer is not able to provide required accommodation, the same will be charged at actuals plus 15% administrative charges.
(j) Pick up from nearest Airport and Local travel (Air-Conditioned Car) will be provided by customers. In case customer is not able to provide, the same shall be charged at actuals plus 15% administrative charges.
(k) Calculation for Job order value for invoicing shall be done on the basis of "Time Sheet" duly approved by the customer. GST shall be extra charged. No workmanship warranty is applicable for this service.
(l) During the stay at site accommodation, local transportation, TO& FRO travelling charges shall be born by customer.



नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड
(भारत सरकार का संस्थान)
असम गैस आधारित शक्ति संयंत्र
बकुलनी, डिब्रुगढ़, असम, पिन - 786619

North Eastern Electric Power Corporation Ltd.
(A Govt of India Enterprise)
www.neepco.gov.in
ASSAM GAS BASED POWER PLANT
BOKULONI, DIST: DIBRUGARH, ASSAM, PIN - 786 619
Ph: 0374-2825411 EMail: 2825411@neepco.gov.in FAX: 0374-2825411

1548



6. **Delivery:** The standard completion time is 32 Weeks and shall be counted from the date of receipt of technically and commercially clear order and amendments, if any.
7. **Shipment, Freight & Insurance:** Not applicable.
8. **Insurance:** Not applicable.
9. **Warranty:** Warranty shall not be applicable on this Software Services.
10. **Plant Location:** Assam Gas Based Power Station (AGBPS), NEEPCO Ltd, Bokuloni, District: Dibrugarh (ASSAM), PIN: 7866191
11. **Contact Person:** The General Manager (E/M), Control & Instrumentation Wing (C&I), AGBPS, NEEPCO Ltd, Bokuloni, Ph-(0374) 2825411.

Kindly convey your acceptance of this Work Order.

Thanking you,

Yours truly,

General Manager (E/M), C&I Division
AGBPS, NEEPCO Ltd, Bokuloni,
Dibrugarh, Assam.

Memo No: NEEPCO/AGBPS/C&I/T-55/2021-22/39-45, Dtd. 28/4/2022.

- 1) The CGM(E/M), O/O The Director(Technical), NEEPCO Ltd for the kind appraisal of The Director(Technical) please. This has his kind approval dtd 29/3/2022.
- 2) The GM (E/M), O/O The ED (O&M), NEEPCO Ltd for the kind appraisal of The ED (O&M) please.
- 3) The HOP, AGBPS, NEEPCO Ltd, Bokuloni for favour of kind information please.
- 4) The GM (F&A), AGBPS, NEEPCO Ltd for necessary action please.
- 5) The Sr. Manager(Civil), Vigilance, AGBPS, NEEPCO Ltd for information please.
- 6) The Sr. Manager (HR), AGBPS, NEEPCO Ltd, Bokuloni for site accommodation and local transportation of official(s) as per W.O. please.
- 7) T-55/Guard file.

General Manager (E/M), C&I Division
AGBPS, NEEPCO Ltd, Bokuloni

---X---

AGC
ET. No. 12

PURCHASE ORDER

VENDOR DETAILS	ORDER DETAILS
Vendor Code : 100001142 SIEMENS LIMITED PLOT NO - 78, SECTOR - 18, TOWER - 122015, India Attn : Tel : E-mail : Vendor GST Reg. No.: 33AAACS0764L1ZD Vendor PAN No. : AAACS0764L	Purchase Order Ref: 7500000031 Date : 01.10.2021 Currency : INR Company Representative : Mr. AKSHAY KUMAR E-mail Our Reference No : Vendor's Quote reference : OLA Reference No :- NA Comp. GST Reg. No.: 09AAECP2746B1ZM

Supply, Installation and Commissioning of Automatic Generation Control (AGC) Mechanism

The Purchase Order constitutes Purchaser's offer to Vendor upon the terms and conditions stated herein and shall become a binding Contract, when it is accepted either by Vendor's acknowledgement or performance. The purchase order expressly limits acceptance to the terms and conditions stated herein. Any additional or different terms or conditions proposed by Vendor are objected to and hereby rejected, including without limitation, Vendor's quotation or acknowledgement forms. Any reference in the Purchase Order to Vendor's quotation or proposal does not imply acceptance of any terms or conditions in that quotation or proposal. It is important that Vendor signs and returns the Purchase Order copy within (3) days of receipt. Failure to return the acceptance does not diminish the responsibilities as set forth herein, but may result in delay to any payment that may be due to and may be a cause of termination of this Purchase Order.

TOTAL ORDER VALUE (Exclusive of all taxes, levies and duties) : INR 6,000,000.00

In words: (Rupees Sixty lakh only)

For Prayagraj Power Gn.Co.Ltd	VENDOR'S ACCEPTANCE
Signature: _____ Name: Approver Name UDAY JHA Designation :	Signature: _____ Name

ORDER DETAILS 1550
ORDER REF: 7500000031

PRICE SCHEDULE

Item No.	HSN/SAC Code	Item Code	Material/Description	Qty	UOM	Unit Price	Amount
10	998599		INSTT,ERECTION & COMM OF AGC SYSTEM	1.000	AU		
			This above item includes the following services				
10.10		4008577	C&IS,INSTALLATION, ERECTION & COMMISSION	1.000	AU	7,20,000.00	7,20,000.00
			IN: Integrated GST - 18 %				
100	84812000	2000026133	SUPPLY OF MATERIAL FOR AGC SYSTEM	1.000	LOT	52,80,000.00	52,80,000.00
			IN: Integrated GST - 18 %				

Total Order Value (INR) (Exclusive of all taxes, levies and duties)

6,00,000.00

Total Order Value: Rupees Sixty lakh only (Exclusive of all taxes, levies and duties).

GST @ 18%

1,00,000.00

₹,00,000.00

COMMERCIAL CONDITIONS

1. Scope :

The scope of work shall comprise of complete supply, Installation and Commissioning of AGC mechanism with your own requisite and trained resources at Bara Site. Detail scope of work is enclosed as annexure A to this PO

2. Price Basis and Shipping Terms :

FOT/CPR/FOR: The entire work shall be carried out at PPGCL Bara Site with your own requisite and trained resources. Prices inclusive of supply and services to be Delivered at Place (DAP destination Bara Site) inclusive of freight, handling and transit insurance etc. The prices shall remain firm and fixed during the contract period and no variation of any kind except statutory variations as provisioned in the GCC shall be admissible.

3. Payment Terms :

20% ADV,80% LC at Sight

a) 20% (Twenty percent) of total contract value as advance against submission of ABG.

b) 80% (eighty percent) against LC with usance period of 45 days (LC related charges shall be absorbed by Siemens)

All payments shall be made on 30 days credit terms basis after receipt of commercially cleared, error free invoices along with supporting documents for having completed the Work and duly verified by Order Manager PPGCL.

4. Taxes and Duties :

Prices are excluding GST which shall be payable extra as per applicable rates, current rate being 18%. No other taxes, duties, cess etc. payable and shall be deemed to be included in the price mentioned above.

5. Delivery Schedule :

The Effective Date (ED) of Contract shall be from the date of Issuance of PO. Supplies shall ensure to be delivered within 18 weeks from ED. Installation and commissioning shall be carried out within 24 weeks of ED. However, bidder ensured to complete the entire project earlier than the committed period on best effort basis.

6. Anti Profiteering Clause :

Notwithstanding anything contained in the Contract, in the event of introduction of any new legislation or any change or amendment or enforcement of any Act or Law, or any change in the interpretation by the Supreme Court of India of any said Act or Law, rules or regulations of Government of India or State Government(s) or Public Body which becomes effective after the bid date to the completion of work including defect liability period, if any, which results in any decrease in the cost of the works through reduced liability of taxes & duties, increase in the input tax credits, the Supplier shall pass on the benefits of such reduced cost, taxes or duties to the extent which is directly attributable to such introduction of new legislation or change or amendment as mentioned above as per Anti-profiteering Rules, 2017, hereby, "Tax" or "tax" shall include taxes, duties, levies, cess and similar imposts by whatever name called whether in the nature of indirect tax or direct taxes and whether or not imposed by the Central government, state government, local or municipal authority or any other statutory body

7. Order Manager and Place of Delivery :

This order shall be managed by Prayagraj Power Gen.Co.Ltd.You are requested to contact him/her for further queries related to execution.

The deliveries shall be accepted between 10:00 am to 05:00 pm on working weekdays except weekly off, National and Bank Holidays.

Kindly deliver to:

Address: Prayagraj Power Generation, Company Limited, P.O. Lohgara, Therd - Bara, 212107, Allahabad.

Contact Details: Mr. Pooash Patel(Head-IMD)9227295559

8. Contract Performance Bank Guarantee :

Contractor shall within 15 days of ED furnish an unconditional and irrevocable bank guarantee towards contract performance payable on demand duly stamped and signed by authorized signatory of the issuing bank, strictly as per the prescribed format of Owner from any nationalized bank or any scheduled bank and approved by the Owner for a sum equivalent to 10% of the Total Contract value valid till the end of Defects Liability Period/Warranty period and with a claim period of not less than 6 months from the expiry date of Contract. The Issuing bank should be advised to send a direct confirmation of issue of bank guarantee to Owner. An amount equivalent to CPBG shall be retained from the bills payable till such time the CPBG is provided

9. LD Clause :

For delay in overall completion schedule beyond the agreed completion schedule, Contractor shall pay Owner pre-determined Liquidated Damages for Delay at the rate of 0.5% of the Contract Value for every day or part thereof of delay of not achieving the final milestones subject to a maximum of 5 % of the Contract Value.

10. Order of Precedence :

In the event of conflict between the provision of this order along with its attachments and annexure, the following order of precedence shall apply so that the conflicting provision(s) in the document lower in the order of precedence set out below shall give way to the conflicting provision(s) in the document higher in the order of precedence, namely:

1. Purchase Order (with 'Commercial Conditions')
2. Special Terms and conditions .
3. General Terms & Conditions
4. Technical Specification

11. Modifications to the General Conditions of Contract :

- a) The entire work shall be carried out at PPGCL Bara Site with your own requisite and trained resources. Prices inclusive of supply and services to be Delivered at Place (DAP destination Bara Site) inclusive of freight, handling and transir Insurance etc. The prices shall remain firm and fixed during the contract period and no variation of any kind except statutory variations as provisioned in the GCC shall be admissible
- b) For delay in overall completion schedule beyond the agreed completion schedule, Contractor shall pay Owner pre-determined Liquidated Damages for Delay at the rate of 0.5% of the Contract Value for every day or part thereof of delay of not achieving the final milestones subject to a maximum of 5 % of the Contract Value.
- c) Bidder shall guarantee the performance of the system for any defects in design, manufacturing, material, workmanship and satisfactory performance as per Technical Specifications, good engineering practices and applicable standards and codes for a period of 18 months from the date of supply and 12 months from commissioning whichever is earlier.
- d) Prices are inclusive of Lodging & Boarding, Travel Cost, Local conveyance of any nature and no separate payment on any of these accounts admissible. Only Accommodation shall be provided by PPGCL. FOC and Food for 2-3 executives shall be provided shall be provided by PPGCL on chargeable basis in its Guest House
- e) Bidder has agreed to comply with all Safety Terms and Conditions of PPGCL annexed to the GCC while working inside PPGCL premises
- f) Bidder confirmed that he has the PF Insurance and will comply with all statutory requirements and submit documentary evidence towards the same. This will include monthly wages register, PF challans for demonstrating compliance for minimum wages, PF for each individual employee in accordance with the wage register. The compliance statement with supporting challans will be submitted every month as per the deadlines prescribed by PPGCL. PF & other statutory compliance of the previous month must be attached with the invoice of any given month for release of service payments.
- g) Siemens shall supply 7-KM FOC, 4 Core, Single Mode with this package. Laying of cable shall be in PPGCL scope under Siemen's supervision.
- h) All civil related activities and supporting manpower shall be in PPGCL scope.

12. Annexure

Scope of Works-Annexure A
PPGCL Services & Supply GCC

13. Delivery Details

Line Item	HSN/SAC Code	Material Code	Short Description	Long Description	Quantity	UOM	Del. Date
00010	998599		INST,ERECTION & COMM OF AGC SYSTEM		1	AU	30.03.2022
10.10		4008577	C&IS,INSTALLATION, ERECTION & COMMISSION	C&IS,INSTALLATION, ERECTION & COMMISSION	1	AU	30.03.2022
00100	84812000	20C0026433	SUPPLY OF MATERIAL FOR AGC SYSTEM	SUPPLY OF IMS,AUTOMATION CONTROLLERS,APPLICATION SERVERS,I/M,CABINET,COMPLETE NETWORK INTERFACE,CABLES FOR AGC,	1	LOT	15-05-2022



AO/Guwahati/2022

Date: 04/05/2022

NEEPCO
DIBRUGARH

Dear Sir,

Subject: Confirmation of obsolescence of 495, 743 and 855 small cam engine series

This is in reference to our visit on 26.04.2022 on your good office and discussion on repowering Cummins make 495 engines running in your fire-fighting section, we would like to confirm herewith that 495 series, 743 series and 855 small cam series of engines were last shipped from our factory more than 15 years ago.

495, 743 and 855 small cam series of engines are obsolete and no more in production, hence replacing these existing engines on one to one basis with same model is not possible.

However, we offer 6CTA Engine Models which can replace the existing 495 engine series. Newer 855 engines are suitable replacement for 743 and 855 small cam engines.

Kindly note, that we are supporting these engines as on now with the available inventory with us and the limited supply of parts from our suppliers. However, as the population of these engines are getting drastically reduced and in turn, demand for these engine's parts are also reducing day by day, it is becoming very difficult for us to continue supporting these obsolete models within the desired lead time.

We suggest replacing the obsoleted engine series with newer engines, as these have been developed with newer technology and offer various advantages such as superior performance, durability, and better aftermarket support.

In case of any further details required, please feel free to contact the undersigned.

Yours truly,

For Cummins India Ltd-DBU

Debajani Das



Debajani Das


Dealer Account Manager


Cc: Garuda Power Private Ltd

Area Office
Cummins India Limited- DBU
Office No. 305, Sri Kamakhya Tower
Christian Bazar, G.S. Road
Guwahati - 781005, Assam
Cumminsindia.com

Corporate Office
Cummins India Ltd
Cummins India Office Campus
Survey No. 21, Baleswar
Pine 411045, Maharashtra, India
Phone +91 20 67067000, 30890100
Fax +91 20 67067013

Registered Office
Cummins India Limited,
Cummins India Office Campus, Survey No.21 Baleswar
Pine 411045, Maharashtra, India
CIN: L29112PN1962PLC012276

Garuda Power Private Ltd				Quotation										Quot No: 040000023280		Dt: 06/05/2022 10:40:06AM						
 Gillapukhuri Road, Bordoloi Nagar, Tinsukia Tinsukia, Pin No: 786125, Dist: Tinsukia Assam, India Contact Parts Department :- 9706008311 Contact Service Department :- 9706008310				Customer Assistance Cell No : 9435040000 E-Mail: enquiry@garudapower.com Tel No: 9176455285 Fax No: 03742305343 Web Site: -				GSTIN No: 18AADCG390B512C PAN NO: AADCG3609M CIN NO: MSME NO: -														
Customer Ref: Replacement/Re-Powering against NTA495F				Dt: 06/05/2022				Product Group: Cummins BU New Engine				Price Tag: L1B										
Indantor: 26439 GSTIN No: 18AAACN8991J32P MSME NO:				Consignee: 26439 GSTIN No: 18AAACN8991J32P MSME NO:																		
North Eastern Electric Power Corporation Assam Gas Based Power Project, Bokuloni Chariali, DIBRUGARH Dist: Dibrugarh, Assam, India				North Eastern Electric Power Corporation Assam Gas Based Power Project, Bokuloni Chariali, DIBRUGARH Dist: Dibrugarh, Assam, India																		
Sl No	Product No	Cost Part No	Description	HSN / SAC	Unit	Qty	Rate	P&F %	P&F Amt	F&D %	F&D Amt	Ext Amt	CGST%	CGST Amt	SGST%	SGST Amt	IGST %	IGST Amt	GST Amt	Gross Amt		
0001	9041324		Cummins Engine Model 6CTA8.3F (219@1500) Suitable for Pile Puro (HE Coiled)	8408000	No	1.00	1438596.00	0	0.00	0	0.00	1438596.00	14.00	201403.44	14.00	201403.44	0.00	0.00	402806.88	1841402.88		
0002	Transport		Transport Charges	8408000	No	1.00	9500.00	0	0.00	0	0.00	9500.00	14.00	1330.00	14.00	1330.00	0.00	0.00	2660.00	12190.00		
0003	P&F		Packaging & Forwarding Charges	8408000	No	1.00	26771.00	0	0.00	0	0.00	26771.00	14.00	4227.94	14.00	4227.94	0.00	0.00	8055.88	34826.88		
0004	Ins-Sup		Inspection,modification,installation,trial & commissioning of Engine	8410400	No	1.00	15000.00	0	0.00	0	0.00	15000.00	9.00	1350.00	9.00	1350.00	0.00	0.00	2700.00	17700.00		
Commercial Terms & Conditions: 1. Delivery Schedule: Within five months of the date of receipt of your technically and commercially clear Purchase Order 2. Payment Terms: 100% against proforma invoice. 3. PRD Clause: Our Principals, Cummins India Ltd. Listed Prices ruling at the time of delivery shall be applicable.																						
Note: Replacement/Repowering of existing Engine Model-NTA495F											Total: 1712367.00				464462.76		2178829.76					
											Taxable Amt				Tax Type		Tax %		Tax Value			
											15000.00				CGST Output @		9%		1350.00			
											19000.00				SGST Output @		9%		1710.00			
											166297.00				SGST Output @		14%		23281.58			
											156297.00				CGST Output @		14%		21881.58			
Foot Note: * In case there be any GST related issue against our invoice Customer is requested to inform us in 30 days of submission of invoice. After expiry of 30 days we will not be in a position to entertain any change requests*															Total Taxable Amount :				1712367.00			
															Total GST Tax Amount :				464462.76			
For Garuda Power Private Ltd				Currency: Rupee				Validity: 05/08/2022 12:23:30				Round off: 0.00										
Authorised Signature				Amount in Word: ₹ Twenty One Lakhs Seventy Six Thousand Eight Hundred Twenty Nine And Seventy Six Paise Only				Grand Total:				2178829.76										

Garuda Power Private Ltd				Quotation										Quot No: 040000023260		Dt: 06/05/2022 10:40:06AM							
 Giliapkhari Road, Borsoloi Nagar, Tinsukia Tinsukia, Pin No: 786125, Dist: Tinsukia Assam, India Contact Parts Department :- 870008311 Contact Service Department :- 870008310				Customer Assistance Call No : 9435040003										Cdas Quot Ref:		GSTIN No: 18AACG3908M12C							
				E-Mail: enquiry@garudapower.com										PAN NO: AADCG3908M		DIN NO: -		MSME NO: -					
Tel No: 9178458265				Fax No: 03742305343										Web Site: -									
Customer Ref:				Dt:				Product Group:				Price Tag:											
Order No: 26439				GSTIN No: 18AAACN8991J32P				MSME NO:				Consignee: 26439				GSTIN No: 18AAACN8991J32P				MSME NO:			
North Eastern Electric Power Corporation																							
Sid No	Product No	Cust Part No	Description	HSN / SAC	Unit	Qty	Rate	PSF %	PSF Amt	F&D %	F&D Amt	Exl Amt	CGST%	CGST Amt	SGST%	SGST Amt	IGST %	IGST Amt	GST Amt	Gross Amt			
	4. Transportation		Will be undertaken by us and billed on you as per the quoted rate																				
	5. Liquidation damages		Not acceptable																				
	6. Insurance		Insurance to be done by you. We will intimate the details as soon as the material is handed over to the transporter																				
	7. Warranty for New Engine		2 Year/5000 Hrs which ever is earlier from the date of delivery																				
	8. Inspection		Inspection to be done by consignee at our premises																				
	9. BVO Clause		The statutory changes in local and central government laws shall be applicable from the date they are made effective.																				
	10. Man Power Deployment		Unskilled man power to be provided by the customer																				
	11. Consumables		Consumables like Diesel, Water, Cotton Waste, Lub Oil if required to be provided by customer																				
Notes: Replacement /Repowering of existing Engine Model-NTA495F										Total:		1712367.00								464482.76		2176828.76	
										Taxable Amt		Tax Type		Tax %		Tax Value		Total Taxable Amount :		1712367.00			
										15000.00		CGST Output @		9 %		13500.00		Total GST Tax Amount :		464482.76			
										15000.00		SGST Output @		9 %		13500.00							
										1592367.00		SGST Output @		14 %		218731.38							
										1592367.00		CGST Output @		14 %		218731.38							
For Garuda Power Private Ltd				Currency: Rupee				Validity: 05/06/2022 12:23:30I				Round off: 0.00											
Authorized Signature				Amount in Word: ₹ Twenty One Lakhs Seventy Six Thousand Eight Hundred Twenty Nine And Seventy Six Paise Only				Grand Total: 2176828.76															

SCOPE OF SUPPLY:

CUMMINS DIESEL ENGINE MODEL	: 6CTA 8.3 F 219HP @ 1500 RPM
APPLICATION	: FIRE PUMP
SO NO	: SO41324

The rating is guaranteed within minus 5 % limit for site conditions of 150 M altitude, 736 mm Hg dry barometer, 28 degree C intake air temp and 9.6 mm Hg water vapor pressure and has to be derated as per site conditions.

01- AIR INTAKE SYSTEM:

- a. AIR CLEANER & BRACKET
- b. RESTRICTION INDICATOR
- c. AIR TRANSFER TUBE

02- ENGINE EXHAUST SYSTEM:

- a. TURBOCHARGER , HMFO
- b. CONNECTION, EXHAUST
- c. MUFFLER

03- ENGINE COOLING SYSTEM:

- a. HEAT EXCHANGER
- b. THERMOSTAT INSTALLED IN THE ENGINE COOLANT OUTLET
- c. WATER PUMP - ONE NUMBER, ENGINE MOUNTED

04- ENGINE LUBRICATING OIL SYSTEM:

- a. LUB OIL SUMP, MOUNTED ON ENGINE, REAR
- b. LUB OIL PUMP, GEAR DRIVEN, MOUNTED ON ENGINE
- c. DIP STICK, MOUNTED ON ENGINE
- d. FULL FLOW OIL FILTER MOUNTED ON ENGINE

05- ENGINE FUEL SYSTEM:

- a. FUEL FILTER ENGINE MOUNTED
- b. FUEL PUMP ENGINE MOUNTED
- c. PLUMBING BETWEEN FUEL PUMP AND INJECTOR

06- ENGINE STARTING SYSTEM:

- a. ELECTRIC STARTER MOTOR 24V, 4 KW
- b. CHARGING ALTERNATOR 24V DC, 45A

NOTE: BATTERIES AND CABLES ARE NOT IN OUR SCOPE OF SUPPLY

07- INSTRUMENTATION

- a. HARNESS WIRING
- b. ENGINE CONTROLLER (ECP)
- c. OIL PRESSURE SWITCH
- d. COOLANT TEMPERATURE & OIL PRESSURE SENSOR

08- OTHER ENGINE PARTS CONSISTS:

- a. FLYWHEEL HOUSING: SAE #2
- b. FLYWHEEL
- c. COUPLING, FLEXIBLE (BORE DIA 35 - 95 MM)

09- PARTS NOT MENTIONED ABOVE ARE IN CUSTOMER / O EM SCOPE


KIRLOSKAR BROTHERS LIMITED

A Kirloskar Group Company

Enriching Lives

Ref: KBL-CSS/EZ/11/23-24

Date: 15.12.2023

 To,
 NEEPCO Ltd
 Bokuloni, Assam

Kind attn.: Mr Tassadduk Ali

Subj.: Commercial Offer for Kirloskar Make Fire Motor Driven Pump.

Dear Sir,

We thank you very much for showing interest in our product and would like to submit you our Techno commercial proposal Motor Driven Fire pump and accessories.

Commercial terms and conditions:

01	Delivery Term	EX Works: Freight extra at actual 18% GST or any other taxes will applicable extra on our offered price.
02	Delivery Schedule of materials	Within Six months from the date of receipt of your Technically and Commercially clear Purchase Order.
03	Payment terms :	100% Payment within 30 days from the date of receipt at site.
04	Packing, Forwarding	Inclusive in offered price.
05	Price Validity	60 Days.
06	Warranty Terms	Warranty will be valid against manufacturing defect or poor workmanship until 18 months from Invoice date or 12 months from the commissioning date whichever comes earlier.
07	Placement of P.O.	We will intimate you our dealer / channel partners name at the time of placement of order. We will extend our OEM support during installation, commissioning and any kind of warranty support.

Sr. No.	Name of Component	Duty Points/ Specifications	QTY.	Unit of Quantity (Set / No.)	Quote Price Each Item	Quote Price Total Item
1	1. Bare Pump: UP150/45 2. Coupling. 3. Base Frame. 4. Companion Flange	H - 70 mt, Q - 410 m3/hr DOR - CW Stuffing Box - Gland Packing	2	Set	6,71,000	13,42,000

For Kirloskar Brothers Limited.

 Pranav Prabhakar
 Sr. Manager
 Engineered Services Division

Regional Office: C/o AWFIS Working Spaces, Godrej Waterside,

Office No. 1207, Tower No 2, 12th Floor, Brook-DF Sector-V, Salt Lake-Kolkata, West Bengal - 700091.

Registered Office & Global Headquarters: 'Yamuna', Survey No. 98/3 to 7, Plot No. 3, Baner, Pune - 411 045, Maharashtra, India

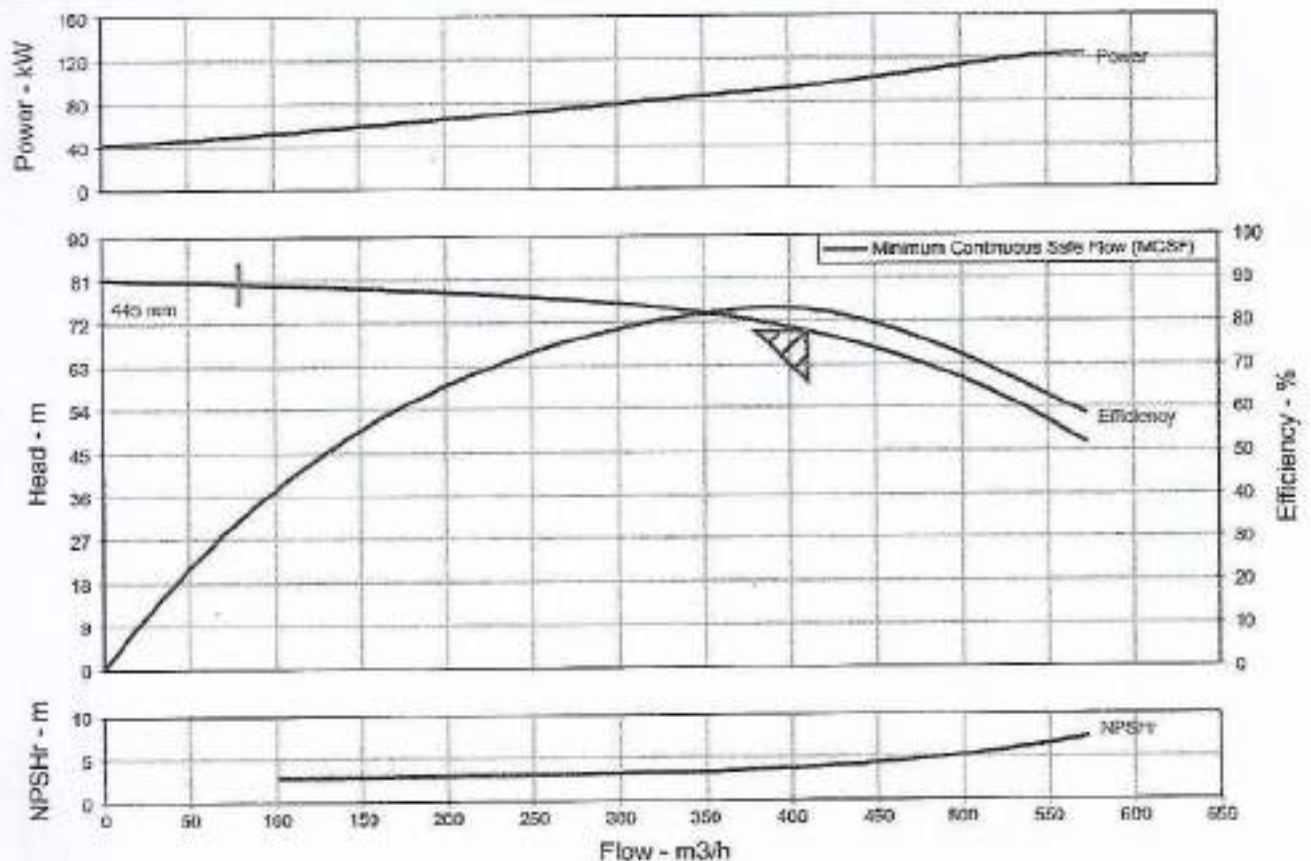
Email: marketing@kbl.co.in Website: www.kirloskarpumps.com

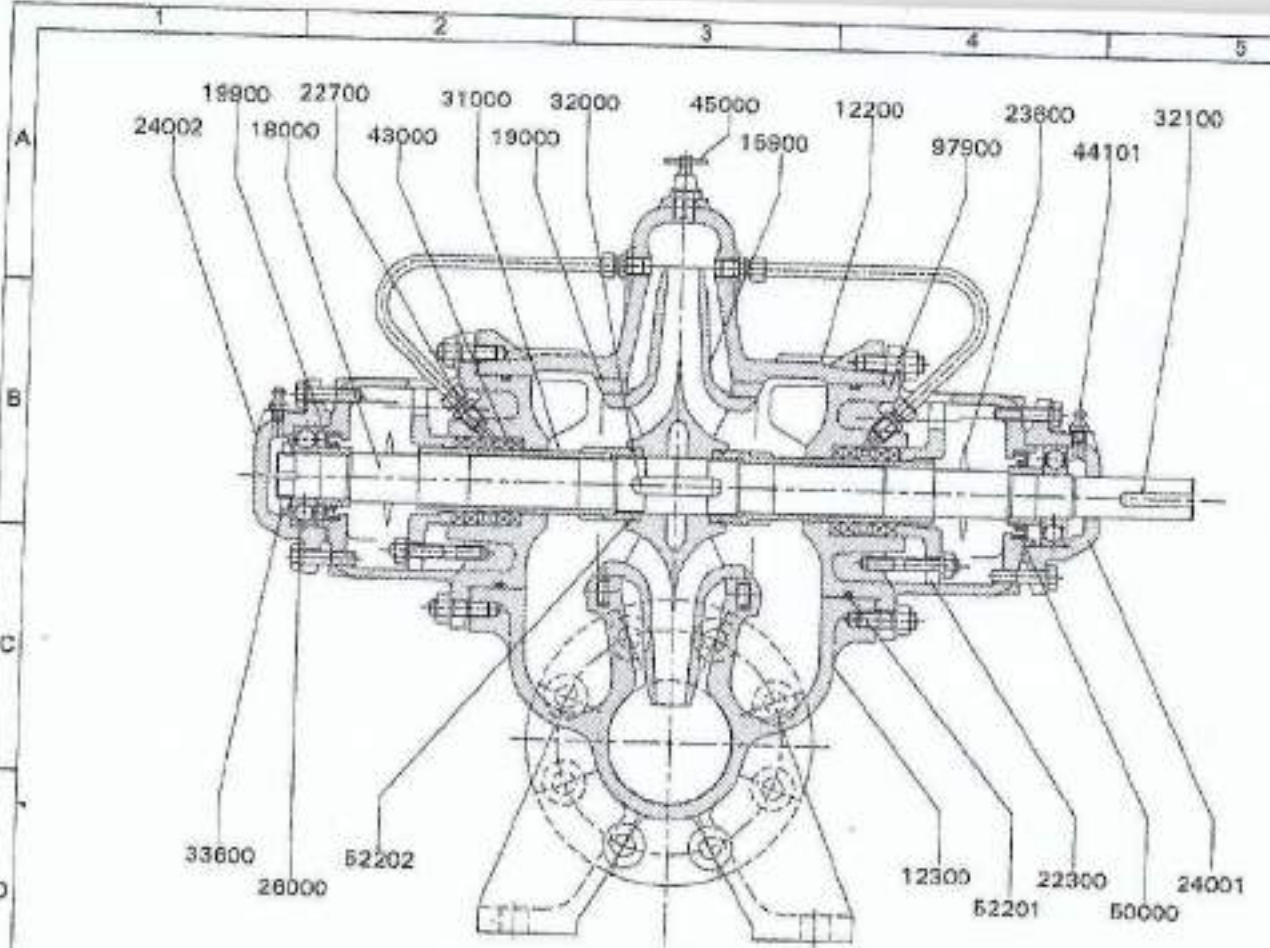
CIN No. L29113PN1500PLC000670

Pump Performance Datasheet

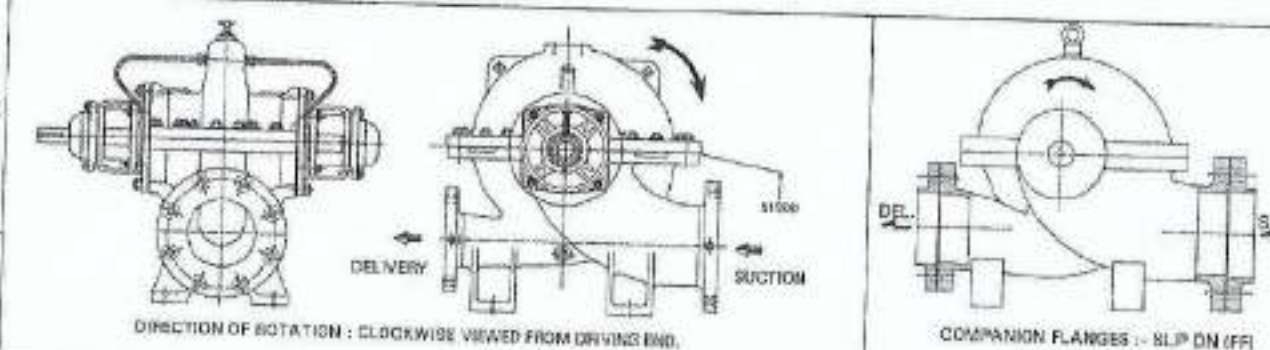
Customer : Assam Gas Based Power Plant, NEEPCO LTD,	Quote number : 509802
Customer enquiry : site visit	Pump Size : UP100/45
Project :	Stages : 1
Item number : 001	Based on curve number : HA17400009 Rev 2
Usage - Tertiary : Fire Pump	Date last saved : 12 Jun 2023 1:02 PM
Quantity : 1	Note - Only duty point is guaranteed as per testing standard.

Operating Conditions		Liquid	
Flow, rated	: 410.0 m ³ /h	Liquid Type/ Application	: Water
Differential Head (requested)	: 70.00 m	Additional liquid description	: Fire Water
Differential Head (actual)	: 70.00 m	Solids diameter, max	: 0.00 mm
Suction pressure, rated / max	: 0.00 / 0.00 barg	Solids/Bagasse/Stock consistency by volume	: 0.00 %
NPSH available, rated	: Ample	Temperature, max	: 35.00 deg C
Site Supply Frequency	: 50 Hz	Fluid density rated	: 0.998 kg/dm ³
Performance		Viscosity, rated	: 1.00 cSt
Speed, rated	: 1485 rpm	Vapor pressure, rated	: 0.02 bar.a
Impeller diameter, rated (approx.)	: 445 mm	Material	
Impeller diameter, maximum	: 450 mm	Material selected	: 02 MOC-CI260(012)/BR LTB2(110)/40C8(053)
Impeller diameter, minimum	: 360 mm	Pressure Data	
Efficiency	: 82.66 %	Maximum working pressure	: 7.93 barg
NPSH required / margin required	: 3.82 / 0.50 m	Maximum allowable working pressure	: 9.81 barg
n _q (imp. eye flow) / S (imp. eye flow)	: 14 / 131 Metric units	Maximum allowable suction pressure	: 1.96 barg
Minimum Continuous Safe Flow (MCSF)	: 79.54 m ³ /h	Hydrostatic test pressure	: 14.71 barg
Head, maximum, rated diameter (approx.)	: 81.03 m	Driver & Power Data (at Max density)	
Head rise to shutoff (approx.)	: 15.75 %	Driver sizing specification	: API 810 / ISO 13709
Flow, best eff. point	: 388.0 m ³ /h	Margin over specification	: 25.00 %
Flow ratio, rated / BEP	: 105.66 %	Service factor	: 1.00
Diameter ratio (rated / max)	: 98.89 %	Power, hydraulic	: 78.05 kW
Head ratio (rated dia / max dia)	: 97.19 %	Power, rated	: 94.42 kW
C _q /C _h /C _e /C _n [HI2010]	: 1.00 / 1.00 / 1.00 / 1.00	Power, maximum, rated diameter	: 124 kW
Selection status	: Acceptable	Minimum recommended driver rating	: 132 kW / 177 hp
Performance testing standard	: ISO 9906 / ANSI-HI 14.8 Gr 2B		





PART NO.	PART DESCRIPTION	MAT. CODE	MOC DESCRIPTION	QTY
12201	CASING HALF UPPER	012	CI 18210/PG283	1
12202	CASING HALF LOWER	012	CI 18210/PG283	1
16900*	IMPELLER	110	BR 18318 GR/LT82	1
18050*	PUMP SHAFT	033	CS 181570/40CS HOT RLD	1
32010*	WEAR RING	110	BR 18318 GR/LT82	2
19901	SHOULDER RING	012	CI 18210/PG283	1
22300	CLACK	012	CI 18210/PG283	2
22100	LANTERN RING	364	NYLON	2
23800	LIQUID DEFLECTOR	370	NATURAL RUB AS TMD20003A-TOSHORE/MPa	2
24001	BEARING HOUSING DE	012	CI 18210/PG283	1
24002	BEARING HOUSING NOB	012	CI 18210/PG283	1
28000*	DEEP GROOVE BALL BEARING	050	STEEL	2
31000*	SHAFT SLEEVE	110	BR 18318 GR/LT82	2
32000*	KEY FOR IMPELLER	263	CS 181870/40CS HOT RLD	1
32100*	KEY FOR COUPLING	353	CS 181870/40CS HOT RLD	1
33000	LOCK NUT FOR BEARING	052	CS 181870/30CS HOT RLD	1
43050*	GLAND PACKING	610	PTFE BRAIDED WITH GRAPHITE	2
44101	GREASE NIPPLE FOR BEARING	444	CS 181367 PARD CLASS 05P	2
45000	VENT VALVE	364	NYLON	2
52200	OIL SEAL	574	NITRILE RUB WITH STEEL SPRING	2
51900	GASKET BETWEEN TOP & BOTTOM	380	PAPER GALINA	1
19220*	"O" RING FOR INSERT	371	NEOPREN RUB AS TMD20003B-TOSHORE/MPa	2
97000	INSERT	012	CI 18210/PG283	2



PUMP	UP180/48	MOC	G2
ENQUIRY NO./DATE	486/15/27	QUANTITY	1
PO. NO./DATE	-	TAG NO.	501
QUOTATION NO.	809602	DATE	-
O/A. NO.	-	MSL	-
CUSTOMER	Assam Gas Based Power Plant/NEEPCO LTD.		
END USER	Assam Gas Based Power Plant/NEEPCO LTD.		
PROJECT	-		
CONSULTANT	-		
SERVICE	Fire Pump		

NOTES:
 * ** * INDICATES RECOMMENDED SPARES.
 * SLIP ON COMPANION FLANGES IN MS MOC WITH CS FASTENERS & NAMBY GASKET ARE IN MANUFACTURER SCOPE.
 * FASTENERS IN LIQUID CONTACT ARE IN CS
 IMPORTANT: THIS DRAWING IS THE PROPERTY OF Kirloskar Brothers Limited, AND MUST NOT BE USED OR COPIED WITHOUT THEIR PRIOR AUTHORITY IN WRITING.

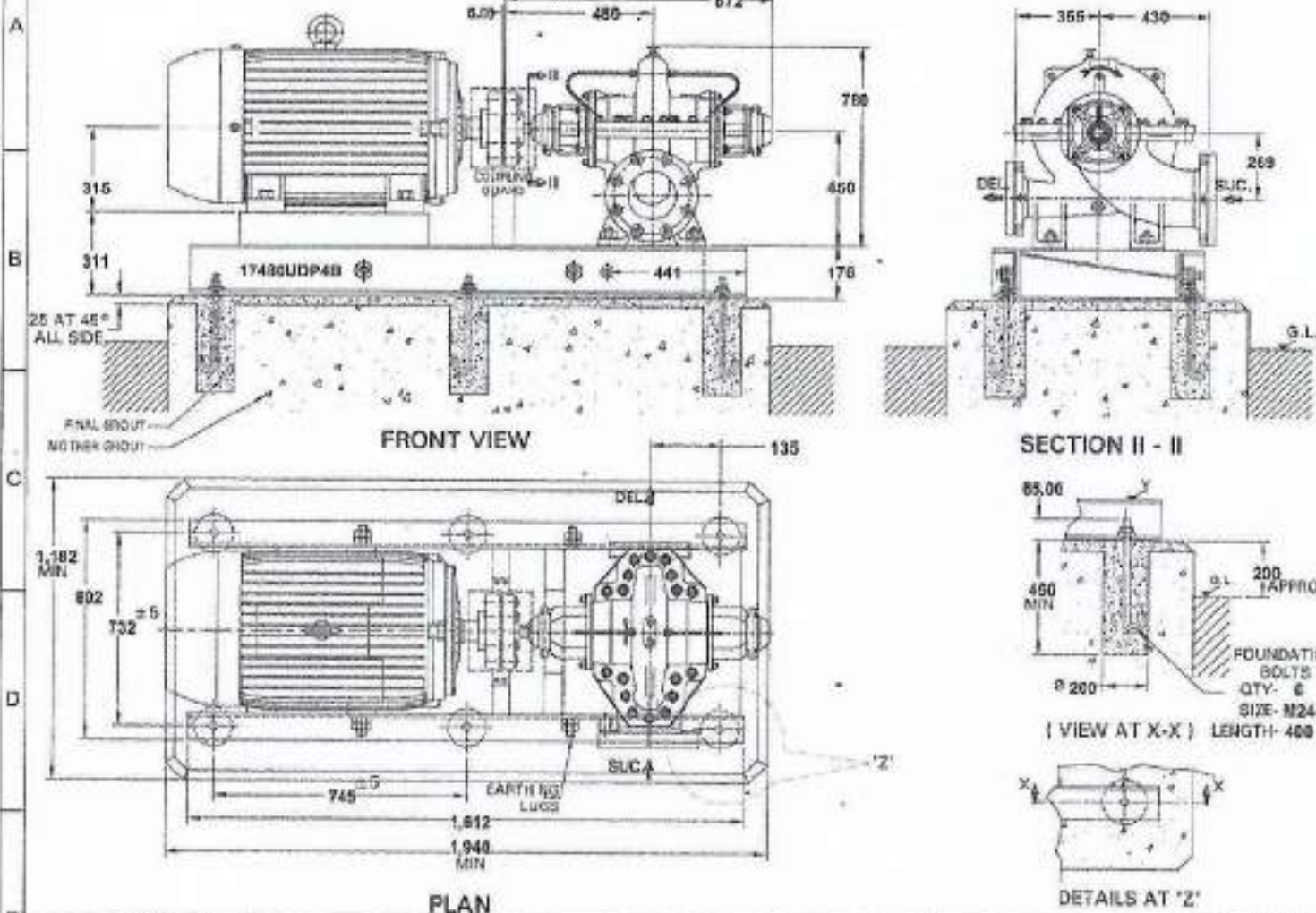
Kirloskar Brothers Limited
 KIRLOSKARVADI - 415308, DIST. - BANGLI (INDIA)

CROSS SECTIONAL DRAWING

DRAWING NO. TC7'



Enriching Lives



NOTES:

- ALL DIMENSIONS ARE IN mm. DIMENSIONS WITHOUT TOLERANCE FOR WELDED PARTS ARE AS PER ISO13920-D.
- GROUTING TO BE DONE UP TO LEVEL Y TO AVOID VIBRATIONS.
- MOTOR DETAILS-KBL IE2 S4P 132KW,4P B3 315M 415V 50Hz
- CIVIL ENGINEERING DETAILS " " SHOWN ARE TENTATIVE AND TO BE DESIGNED AND FINALIZED AT CUSTOMER END.
- BEARINGS ARE GREASE LUBRICATED

IMPORTANT: THIS DRAWING IS THE PROPERTY OF Kirloskar Brothers Limited AND MUST NOT BE USED OR COPIED WITHOUT THEIR AUTHORITY IN WRITING.

PUMP DUTIES			
CAPACITY	410.0 m ³ /h	EFFICIENCY	82.68 %
TOTAL HEAD	10.55 m	PUMP INPUT	84.42 kW
DENSITY	0.999 kg/dm ³	NPSHR	3.02 m

FLANGE DRILLING STANDARD AND DETAILS					
SUCTION	BSEN 1032 FRTG FF	DELIVERY	BSEN 1032 FRTG FF		
	NOM. SIZE	RF DIA.	P.C.D.	NO OF HOLES	HOLE SIZE
SUCTION	200 mm	N.A.	265 mm	12	22.30 mm
DELIVERY	150 mm	N.A.	240 mm	8	22.30 mm



ALLOWABLE NOZZLE LOADING

FORCES		
	SUCTION	DELIVERY
F _x	1,746.2 N	1,394.7 N
F _y	4,306.4 N	3,276.5 N
F _z	3,492.4 N	2,616.5 N

MOMENTS		
	SUCTION	DELIVERY
M _x	2,866 N.m	2,001 N.m
M _y	1,334 N.m	1,001 N.m
M _z	1,334 N.m	1,001 N.m

SHAFT END DETAILS

	D	X	Y	L
PUMP	42.00	12.00	45.00	90.00
MOTOR	60.00	22.00	85.00	170

TAPPING DETAILS			
DESCRIPTION	SIZE/TYPE	DESCRIPTION	SIZE/TYPE
SUCTION GAUGE	3/8" BSP	TRG. COOLING IN/OUT	-
DELIVERY GAUGE	3/8" BSP	IND COOLING IN/OUT	-
CASING DRAIN	1/2" BSP	PIPING INLET	1/2" BSP
CASING VERT	3/8" BSP	BASE DRAIN	1" BSP

ADDITIONAL DATA			
STATIC LOAD	1,603.5 kg	DYNAMIC LOAD	1,817.4 kg
GD ² OF PUMP	1.87 kg.m ²		
BASE TYPE	STANDARD	BASE MATERIAL	MS
COUPLING TYPE	B-FLEX	GUARD MATERIAL	MS
COUPLING SIZE	EP8C00198	F BOLT MATERIAL	MS
DIRECTION OF ROTATION FROM DE			CLOCKWISE

PUMP	UP153145	PUMP WT.	308.0 kg
DRIVER MAKE	KEL	DRIVER WT.	1,000.0 kg
DRIVER RATING	132kW	BASE WT.	187.1 kg
DRIVER SIZE	315M	COUPLING WT.	0.88 kg
RATED SPEED	1485RPM	PUMPSET WT.	1,950.9 kg
ENG. NO./DATE	986 V81.7	QUANTITY	1
PO. NO./DATE	-	TAG NO.	001
QUOTATION NO.	503812	DATE	-
QA NO.	-	VER	-

CUSTOMER Assam Gas Based Power Plant, NEEPCO LTD,
END USER Assam Gas Based Power Plant, NEEPCO LTD,
PROJECT -

CONTRACT -

SERVICE Fire Pump



Kirloskar Brothers Limited
KIRLOSKARVADI - 410508, DIST. - SANGLI (INDIA)

GENERAL ARRANGEMENT DRAWING

DRAWING NO. TF74-1-0



ISO: 9001, 14001,
& 45001

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का उद्यम)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Govt. of India Enterprise)

Office of the Executive Director, Contracts and Procurement
Brookland Compound, Lower New Colony, Shillong- 793003
Phone No.0364-2227784; E-mail: contract@neepco.co.in
Website: www.neepco.co.in; CIN - U40101ML1976GCI001658

DOCUMENT/85
1562



No.: NEEPCO/QP/ED/C&P/F/C/AGBPS(STB)/591/2023-24/ 967

Dated 21.12.2023.

To

M/s Buildrite Constructions,
3A, Puspanjali Arcade,
ABC Bus Stop, GS Road,
Guwahati - 781005,
Mob. No. 9864016114,
Email: buildriteghy@yahoo.co.in, buildriteconstructionsghy@gmail.com.

Attention: Mr Suresh Kr Gaggar, Authorised Representative

Sub:- Detailed Work Order (DWO) for "Renovation and Modernization Work of Steam Turbine Building of AGBPS, NEEPCO Ltd., Bokuloni, District Dibrugarh, Assam".

- Ref:
1. Your unconditional acceptance of LOI vide email Dated 19.12.2023.
 2. LOI No. NEEPCO/QP/ED/C&P/F/C/AGBPS(STB)/591/2023-24/956 Dated 19.12.2023.
 3. Your letter No. BC/Neepco/Bokuloni/01 Dtd. 15.12.2023 submitted vide email Dated 18.12.2023 on rates justification and confirmation on workability.
 4. Your tender submitted online in response to NEEPCO's NIB No. 436 Dated 20.10.2023.
 5. NIB No. 436 Dated 20.10.2023.

Dear Sir(s),

With reference to the above, the North Eastern Electric Power Corporation Limited (hereinafter referred to as the "Corporation") is pleased to place this Detailed Work Order for the above mentioned work with **M/s Buildrite Constructions, Guwahati**, at its quoted price as per the Bill of Quantities (BOQ) enclosed at **Annexure-A**, Scope, Terms & Conditions stipulated in the Detail Bid Document and as indicated in the LOI No. 956 Dated 19.12.2023.

Few of the salient Terms and Conditions are mentioned below for reference.

1. Scope of Work:

The overall scope of work covered under this Contract comprises of the following:

"Renovation and Modernization Work of Steam Turbine Building of AGBPS, NEEPCO Ltd., Bokuloni, District Dibrugarh, Assam" in all respect as per the Technical Specifications, Part-5 of the Detail Bid Document.

The quantities of different items of works as indicated in the Bill of Quantities (BOQ) enclosed at **Annexure-A** are tentative and may undergo changes during execution. The Contractor shall execute the entire quantity of work required for completing the job as per specifications, drawings and direction of Engineer-in-Charge at the rates entered in the Bill of Quantities.

The cost of materials and components not specifically stated in any item of Bill of Quantities but are necessary for satisfactory completion of the said item of works as per Technical Specifications in all respect, shall be deemed to have been included in the scope of work, for which no extra claim shall be entertained by the Corporation.

2. Contract Price:

The Contract Price is **Rs. 1,79,59,299.00 (Rupees One Crore Seventy Nine Lakh Fifty Nine Thousand Two Hundred Ninety Nine Only) inclusive of 18% GST**, as indicated in the BOQ enclosed at **Annexure-A**. The rates quoted against BOQ Item Nos. 3, 5.2, 10.1 & 10.2 are identified as Abnormally High Rates (AHR) and the same shall not be taken as reference to evaluate rates of extra, substituted items etc., in terms of Clause 23.1(iii), Part-3, ITB of the Bid Document.

3. Commencement of Work:

The work is to be started from the date of issue of Letter of Intent (i.e. 19.12.2023) as per the provisions of Clause 26(i), Part-3, Instruction to Bidders of the Bid Document and Clause 27, Part-4, Conditions of Contract of the Bid Document.

4. Completion Time:

The entire work under this Contract shall be completed in all respect within 365 days (Three Hundred Sixty Five) days from the date of issue of Letter of Intent. The Contractor shall strictly adhere to Approved Work Programme, Mobilisation Schedule of Manpower, Mobilisation Schedule of Plants & Equipment, Mobilisation Schedule of Materials and Quality Assurance Plan, for completing the works in all respect in 365 days from the date of issue of Letter of Intent.

5. Taxes, Duties, Levies etc.:

The rates as indicated against various items of works in the Bill of Quantities are inclusive of all applicable Indian and Non-Indian Taxes, Duties, Levies, Cess etc. that may be leviable by Government or any other agency, existing 28 (twenty eight) days prior to the latest date of submission of the bids (latest date of submission of Bid is 18.11.2023). All other provisions of Clause 61, Part-4, Conditions of Contract of the Bid Document, shall prevail in this regard.

6. Terms of Payment:

The payment to the Contractor for the performance of the works under the Contract shall be governed by the provisions of Clause 52, 53, 54 & 55 of Part-4, Conditions of Contract of the Bid Document and other relevant provisions in the Bid Document.

7. Compensation for Delay:

The compensation to be paid by the Contractor for delay in completing the work shall be governed by the provisions of Clause 25, Part-4, Conditions of Contract of the Bid Document.

8. Detailed Work Programme, Mobilisation Schedules of Manpower, Plants & Equipment and Materials and Quality Assurance Plan:

In terms of Clause 33, Part-3, Instruction to Bidders of the Bid Document, within 15(fifteen) days of issue of LOI, the Contractor shall submit the following:

- i) Detailed Work Programme indicating the sequence of various activities and the order of procedure proposed to be adopted for carrying out and to complete the work in all respect within the stipulated time of completion.
- ii) Mobilisation Schedule of Manpower.
- iii) Mobilisation Schedule of Plants & Equipment.
- iv) Mobilisation Schedule of Materials required for the job indicating the source.
- v) Quality Assurance Plan (QAP) relevant for the said works.

The above documents shall be submitted to the Head of Power Station, Assam Gas Based Power Station, AGBPS, NEEPCO Ltd., Bokuloni, District Dibrugarh, Assam, for his approval. The Contractor shall strictly adhere to such Approved Work Programme, Mobilisation Schedules and QAP, and the same shall form an integral part of the Contract Agreement.

9. Power Supply:

The supply of power for the Contract shall be governed by the provisions of Clause 31, Part-3, Instruction to Bidders of the Bid Document.

10. Labour:

The Contractor shall employ the labour for the Contract as per the provisions of Clause 35, Part-4, Conditions of Contract of the Bid Document.

11. Construction Plant and Equipment:

The Contractor shall deploy all necessary plant, equipment and machinery required for execution of the work, as per Clause 41, Part-4, Conditions of Contract and Clause 29, Part-3, Instruction to Bidders of the Bid Document.

12. Materials:

The Contractor shall arrange and supply all materials, consumables including reinforcement and/or structural steel, cement, P.O.L. etc. required for the works at his own expense, as per provisions of Clause 30, Part-3, Instruction to Bidders and Clause 48, Part-4, Conditions of Contract of the Bid Document.

13. Safety and Security:

The Contractor shall ensure the Safety, Security and Protection measures as per provisions of Clause 64, Part-4, Conditions of Contract of the Bid Document.

14. Environmental Protection Measures:

The Contractor shall ensure the Environmental Protection Measures as per provisions of Clause 16, Part-4, Conditions of Contract of the Bid Document.

15. Security Deposit:

Security Deposit of 10% (Ten percent) on the total value of the work actually executed and value of extra works etc. will be deducted from every interim payment made on account of this work for the due performance of the Contract as per provisions of Clause 3, Part-4, Conditions of Contract of the Bid Document.

16. Signing of Agreement:

- i) The Contract Agreement shall be signed by the Corporation and the Contractor following the issue of Detailed Work Order and acceptance of the Initial Security Deposit (ISD) by the Corporation, in terms of Clause 26(iii), Part-3, Instruction to Bidders of the Bid Document. The Contractor shall submit 3(three) Nos. of Non-Judicial Stamp Papers of Rs.100.00 (Rupees One Hundred Only) each to be purchased by the Contractor in the State of Meghalaya for signing of the Contract Agreement.
- ii) Until a formal Contract Agreement is executed, the LOI, DWO read in conjunction with Bid Documents shall constitute a binding Contract between the Contractor and the Purchaser in terms of Clause 26(ii), Part-3, Instruction to Bidders of the Bid Document.

You are requested to kindly acknowledge the receipt of this Detailed Work Order and convey your unconditional acceptance of the same within 5(five) days from the date of issue of this DWO to enable signing of the Contract Agreement.

Thanking you,

Encl: Annexure-A

Yours sincerely,

Executive Director
Contracts & Procurement

NOT IN ORIGINAL

Memo No. NEEPCO/QP/ED/C&P/F/C/AGBPS(STB)/591/2023-24/ 968-975

Dated 21.12.2023.

Copy to,

1. Director (Technical), NEEPCO, for favour of kind information please.
2. ED(O&M), NEEPCO, Guwahati, for kind information please.
3. ED(D&E), NEEPCO, Guwahati, for kind information please.
4. ED(Tech)/ HoPS, AGBPS, NEEPCO, Bokuloni, Assam, for kind information please.
5. CGM(E/M), CPMG, NEEPCO, Guwahati, for kind information please.
6. CGM(Finance) - Concurrence, NEEPCO, Shillong, for kind information please.
7. DGM(E/M), IC&A, NEEPCO, Shillong, for information please.
8. Head of Finance, AGBPS, NEEPCO, Bokuloni, Assam, for information and needful please.

Ryoman
21/12/23
Executive Director (C&P)
Ry

ANNEXURE-ABILL OF QUANTITIES FOR

Renovation and Modernization Work of Steam Turbine Building of AGBPS, NEEPCO Ltd.,
Bokuloni, District Dibrugarh, Assam.

Sl. No.	Description of items	Unit	Quantity	Rates inclusive of 18% GST (in Rs.)	Amount inclusive of 18% GST (in Rs.)
1	Providing and fixing double scaffolding system (cup lock type) on the exterior side, upto seven story height made with 40 mm dia M.S. tube 1.5 m centre to centre, horizontal & vertical tubes joining with cup & lock system with M.S. tubes, M.S. tube challies, M.S. clamps and M.S. staircase system in the scaffolding for working platform etc. and maintaining it in a serviceable condition for the required duration as approved and removing it there after. The scaffolding system shall be stiffened with bracings, runners, connection with the building etc. wherever required for inspection of work at required locations with essential safety features for the workmen etc. complete as per directions and approval of Engineer in -charge. The elevational area of the scaffolding shall be measured for payment purpose. The payment will be made once, irrespective of duration of scaffolding.	Sqm	11,688.40	230.00	26,88,332.00
2	Providing & Applying a multicoat, anticorrosive, Priming, Epoxy and Polyurethane paint on Structural metal surface. Scope of the work: Cleaning of the existing structural metal surface by manual method using emery papers, grinding wheels and necessary power tools. All consumable such as Safety belts Emery paper, Grindings wheels, wire brush, painting brush etc. will be in applicator's scope. 1) Priming coat: RUSTO Cap, DFT-80 micron (one layer) from Asian paint.	Sqm	12,738.00	560.00	71,33,280.00

ANNEXURE-A

Sl. No.	Description of items	Unit	Quantity	Rates inclusive of 18% GST (in Rs.)	Amount inclusive of 18% GST (in Rs.)
	2) Epoxy paint: Asian epoxy H.B finish, DFT 50 micron (one layer) from Asian paint. 3) Polyurethane paint: Apcothane CF 675 from Asian paint DFT 40 micron (one layer) excluding Scaffolding work.				
3	Demolishing cement concrete manually / by mechanical means including disposal of material within 50 metres lead as per direction of Engineer-in-charge. Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix).	Cum	66.80	3,500.00	2,33,800.00
4	Providing and inserting 12 mm dia galvanised steel injection nipple in honey comb area and along crack line including drilling of holes of required diameter (20 mm to 30 mm) upto depth from 30 mm to 80 mm at required spacing and making the hole & crack dust free by blowing compressed air, sealing the distance between injection nipple with adhesive chemical of approved make and allow it to cure complete as per direction of Engineer-In-Charge.	Each	668.00	200.00	1,33,600.00
5	Providing and injecting approved grout in proportion recommended by the manufacturer into cracks / honey-comb area of concrete / masonry by suitable gun / pump at required pressure including cutting of nipples after curing etc. complete as per directions of Engineer-in-Charge.				
5.1	Stirrer mixed Acrylic Polymer of approved make @ 2% of weight of cement used modified Cement slurry made with non shrink compound in concrete / RCC work.	Kg	100.00	55.00	5,500.00




ANNEXURE-A

Sl. No.	Description of items	Unit	Quantity	Rates inclusive of 18% GST (in Rs.)	Amount inclusive of 18% GST (in Rs.)
5.2	Epoxy injection grout in concrete / RCC work of approved make.	Kg	134.00	1,750.00	2,34,500.00
6	Application: Providing and applying 3 coats of Fosroc Brush bond roof guard, single component acrylic polymer Brush bond roof guard, single component acrylic polymer modified reinforced high build water proofing compound after priming on the roof to get a minimum dry thickness of 1 mm as per manufacturers specification. No toping required over the grading. The cured membrane should exhibit the tensile strength of 1.1 Mpa as per ASTM 0412 with elongation 100% as ASTM D12 with very low penetration to rapid chloride as per ASTM C 1202-03 with pull of Adhesion 0.92 Mpa as per ASTM D4541. The cured membrane should also have resistance to algae growth as per ASTM 05589-97 with permeability of 5 mm as per BSEN12390 Part8, with water vapour transmission 6Kg / Sqm/h as per BSEN 12390 part 8.	Sqm	3,913.05	780.00	30,52,179.00
7	Guniting concrete surface with single component, fibre reinforced shrinkage compensated, polymer modified structural grade repair mortar like Fosroc Renderoc SP 40 or equivalent at a thickness of 25 mm. The repair mortar should have a compressive strength 45N / mm ² , flexure strength 7N/mm ² and tensile strength 2.5 N/mm ² at 28 days.	Sqm	4.20	1,500.00	6,300.00
8	Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of Engineer - in- charge.	Cum	1.75	3,000.00	5,250.00
9	Supplying fixing and fixing approved uPVC pipes of different sizes, with all necessary 'R' brand or approved				




ANNEXURE-A

Sl. No.	Description of items	Unit	Quantity	Rates inclusive of 18% GST (in Rs.)	Amount inclusive of 18% GST (in Rs.)
	uPVC Fitting such as bend, tee, elbow, reducer, nipple, plug, long screw fitting, clams etc. complete at all levels including above G.L as directed and specified.				
9.1	150 mm Nominal Dia pipes.	Metre	1,736.00	2,000.00	34,72,000.00
9.2	80 mm Nominal Dia pipes	Metre	28.00	1,200.00	33,600.00
10	Dismantling G.I pipes (external work) including excavation and refilling trenches after taking out the pipes, manually/ by mechanical means including stacking of pipes within 50 metres lead as per direction of Engineer-in charge.				
10.1	15 mm to 40 mm nominal bore	Metre	28.00	500.00	14,000.00
10.2	Above 40 mm nominal bore	Metre	1,736.00	500.00	8,68,000.00
11	Finishing with Deluxe Multi surface paint system for interiors and exteriors using Primer as per manufacturers specifications: Two or more coats applied on walls @1.25 ltr / 10 sqm over and including one coat of Special primer applied @ 0.75 ltr /10 sqm.	Sqm	394.79	200.00	78,958.00
Total Amount inclusive of 18% GST (in Figure)					1,79,59,299.00
Rupees One Crore Seventy Nine Lakh Fifty Nine Thousand Two Hundred Ninety Nine Only					

[Signature]
21/12/2023

[Signature]
21/12/2023



ISO: 9001, 14001,
& 45001

नॉर्थ ईस्टर्न इलेक्ट्रिक पावर कॉर्पोरेशन लिमिटेड

(भारत सरकार का उद्यम)

NORTH EASTERN ELECTRIC POWER CORPORATION LTD.

(A Govt. of India Enterprise)

Office of the Executive Director, Contracts and Procurement
Brookland Compound, Lower New Colony, Shillong- 793003
Phone No.0364-2227784; E-mail: contract@neepco.co.in
Website: www.neepco.co.in; CIN - U40101ML1976GOI001658

DOC1570/NT/86



No. NEEPCO/QP/ED/C&P/F/C/AGBPS(CT)/590/2023-24/ 976

Dated 21.12.2023.

To

M/s Loknath & Co.,
No. 2 Kathalguri, P.O. Bhadoi Panchali,
District Dibrugarh,
Assam, PIN-786191
Mob. No. 6900719944
E-mail: loknathsonowal2015@gmail.com.

Attention: Mr Loknath Sonowal, Proprietor

Sub:- Detailed Work Order (DWO) for "Repairing and Re-strengthening of Cooling Tower at Plant area of AGBPS, NEEPCO Ltd., Bokuloni, District Dibrugarh, Assam".

- Ref:
1. Your unconditional acceptance of the LOI vide email Dated 21.12.2023.
 2. LOI No. NEEPCO/QP/ED/C&P/F/C/AGBPS(CT)/590/2023-24/945 Dated 19.12.2023.
 3. Your letter No. Nil Dated 16.12.2023 submitted vide email Dated 16.12.2023 on rates justification and confirmation on workability.
 4. Your tender submitted online in response to NEEPCO's NIB No. 435 Dated 18.10.2023.
 5. NIB No. 435 Dated 18.10.2023.

Dear Sir,

With reference to the above, the North Eastern Electric Power Corporation Limited (hereinafter referred to as the "Corporation") is pleased to place this Detailed Work Order for the above mentioned work with **M/s Loknath & Co., Kathalguri**, at its quoted price as per the Bill of Quantities (BOQ) enclosed at **Annexure-A**, Scope, Terms & Conditions stipulated in the Detail Bid Document and as indicated in the LOI No. 945 Dated 19.12.2023.

Few of the salient Terms and Conditions are mentioned below for reference.

1. Scope of Work:

The overall scope of work covered under this Contract comprises of the following:

"Repairing and Re-strengthening of Cooling Tower at Plant area of AGBPS, NEEPCO Ltd., Bokuloni, District Dibrugarh, Assam" in all respect as per the Technical Specifications, Part-5 of the Detail Bid Document.

The quantities of different items of works as indicated in the Bill of Quantities (BOQ) enclosed at **Annexure-A** are tentative and may undergo changes during execution. The Contractor shall execute the entire quantity of work required for completing the job as per specifications, drawings and direction of Engineer-in-Charge at the rates entered in the Bill of Quantities.

The cost of materials and components not specifically stated in any item of Bill of Quantities but are necessary for satisfactory completion of the said item of works as per Technical Specifications in all respect, shall be deemed to have been included in the scope of work, for which no extra claim shall be entertained by the Corporation.

2. Contract Price:

The Contract Price is **Rs. 54,14,909.18 (Rupees Fifty Four Lakh Fourteen Thousand Nine Hundred Nine and Paise Eighteen Only) inclusive of 18% GST**, as indicated in the BOQ enclosed at **Annexure-A**.

3. Commencement of Work:

The work is to be started from the date of issue of Letter of Intent (i.e. 19.12.2023) as per the provisions of Clause 26(i), Part-3, Instruction to Bidders of the Bid Document and Clause 27, Part-4, Conditions of Contract of the Bid Document.

4. Completion Time:

The entire work under this Contract shall be completed in all respect within 180 (One Hundred Eighty) days from the date of issue of Letter of Intent. The Contractor shall strictly adhere to Approved Work Programme, Mobilisation Schedule of Manpower, Mobilisation Schedule of Plants & Equipment, Mobilisation Schedule of Materials and Quality Assurance Plan, for completing the works in all respect in 180 days from the date of issue of Letter of Intent.

5. Taxes, Duties, Levies etc.:

The rates as indicated against various items of works in the Bill of Quantities are inclusive of all applicable Indian and Non-Indian Taxes, Duties, Levies, Cess etc. that may be leviable by Government or any other agency, existing 28 (twenty eight) days prior to the latest date of submission of the bids (latest date of submission of Bid is 15.11.2023). All other provisions of Clause 61, Part-4, Conditions of Contract of the Bid Document, shall prevail in this regard.

6. Terms of Payment:

The payment to the Contractor for the performance of the works under the Contract shall be governed by the provisions of Clause 52, 53, 54 & 55 of Part-4, Conditions of Contract of the Bid Document and other relevant provisions in the Bid Document.

7. Compensation for Delay:

The compensation to be paid by the Contractor for delay in completing the work shall be governed by the provisions of Clause 25, Part-4, Conditions of Contract of the Bid Document.

8. Detailed Work Programme, Mobilisation Schedules of Manpower, Plants & Equipment and Materials and Quality Assurance Plan:

In terms of Clause 33, Part-3, Instruction to Bidders of the Bid Document, within 15(fifteen) days of issue of LOI, the Contractor shall submit the following:

- i) Detailed Work Programme indicating the sequence of various activities and the order of procedure proposed to be adopted for carrying out and to complete the work in all respect within the stipulated time of completion.
- ii) Mobilisation Schedule of Manpower.
- iii) Mobilisation Schedule of Plants & Equipment.
- iv) Mobilisation Schedule of Materials required for the job indicating the source.
- v) Quality Assurance Plan (QAP) relevant for the said works.

The above documents shall be submitted to the Head of Power Station, Assam Gas Based Power Station, AGBPS, NEEPCO Ltd., Bokuloni, District Dibrugarh, Assam, for his approval. The Contractor shall strictly adhere to such Approved Work Programme, Mobilisation Schedules and QAP and the same shall form an integral part of the Contract Agreement.

9. Power Supply:

The supply of power for the Contract shall be governed by the provisions of Clause 31, Part-3, Instruction to Bidders of the Bid Document.

10. Labour:

The Contractor shall employ the labour for the Contract as per the provisions of Clause 35, Part-4, Conditions of Contract of the Bid Document.

11. Construction Plant and Equipment:

The Contractor shall deploy all necessary plant, equipment and machinery required for execution of the work, as per Clause 41, Part-4, Conditions of Contract and Clause 29, Part-3, Instruction to Bidders of the Bid Document.

12. Materials:

The Contractor shall arrange and supply all materials, consumables including reinforcement and/or structural steel, cement, P.O.L. etc. required for the works at his own expense, as per provisions of Clause 30, Part-3, Instruction to Bidders and Clause 48, Part-4, Conditions of Contract of the Bid Document.

13. Safety and Security:

The Contractor shall ensure the Safety, Security and Protection measures as per provisions of Clause 64, Part-4, Conditions of Contract of the Bid Document.

14. Environmental Protection Measures:

The Contractor shall ensure the Environmental Protection Measures as per provisions of Clause 16, Part-4, Conditions of Contract of the Bid Document.

15. Security Deposit:

Security Deposit of 10% (Ten percent) on the total value of the work actually executed and value of extra works etc. will be deducted from every interim payment made on account of this work for the due performance of the Contract as per provisions of Clause 3, Part-4, Conditions of Contract of the Bid Document.

16. Signing of Agreement:

- i) The Contract Agreement shall be signed by the Corporation and the Contractor following the issue of Detailed Work Order and acceptance of the Initial Security Deposit (ISD) by the Corporation, in terms of Clause 26(iii), Part-3, Instruction to Bidders of the Bid Document. The Contractor shall submit 3(three) Nos. of Non-Judicial Stamp Papers of Rs.100.00 (Rupees One Hundred Only) each to be purchased by the Contractor in the State of Meghalaya for signing of the Contract Agreement.
- ii) Until a formal Contract Agreement is executed, the LOI, DWO read in conjunction with Bid Documents shall constitute a binding Contract between the Contractor and the Purchaser, in terms of Clause 26(ii), Part-3, Instruction to Bidders of the Bid Document.

You are requested to kindly acknowledge the receipt of this Detailed Work Order and convey your unconditional acceptance of the same within 5(five) days from the date of issue of this DWO to enable signing of the Contract Agreement.

Thanking you,

Encl: Annexure-A

Yours sincerely,

Executive Director
Contracts & Procurement



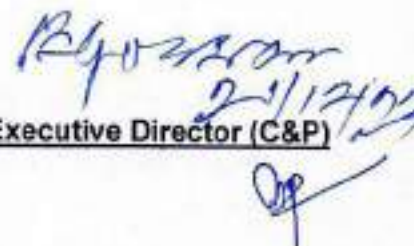
NOT IN ORIGINAL

Memo No. NEEPCO/QP/ED/C&P/F/C/AGBPS(CT)/590/2023-24/ 977-984

Dated 21.12.2023.

Copy to,

1. Director (Technical), NEEPCO, for favour of kind information please.
2. ED(O&M), NEEPCO, Guwahati, for kind information please.
3. ED(D&E), NEEPCO, Guwahati, for kind information please.
4. ED(Tech)/ HoPS, AGBPS, NEEPCO, Bokuloni, Assam, for kind information please.
5. CGM(E/M), CPMG, NEEPCO, Guwahati, for kind information please.
6. CGM(Finance) - Concurrence, NEEPCO, Shillong, for kind information please.
7. DGM(E/M), IC&A, NEEPCO, Shillong, for information please.
8. Head of Finance, AGBPS, NEEPCO, Bokuloni, Assam, for information and needful please.


Executive Director (C&P)

ANNEXURE-ABILL OF QUANTITIES FOR

Repairing and Re-strengthening of Cooling Tower at Plant area of AGBPS, NEEPCO Ltd.,
Bokuloni, District Dibrugarh, Assam.

Sl. No.	Description of Items	Unit	Quantity	Rates inclusive of 18% GST (in Rs.)	Amount inclusive of 18% GST (in Rs.)
1	Chipping of unsound / weak concrete materials from slabs, beam, columns etc. with manual chisel and/ or by standard power driven percussion type of approved make including tapering of all edges, making square shoulders of cavities including cleaning the exposed concrete surface and reinforcement with wire brushes etc. and disposal of debris for all lead and lifts all complete as per direction of Engineer-in-charge. 25 mm average thickness.	Sqm	224.44	50.00	11,222.00
2	Cleaning of reinforcement from rust from the reinforcing bars to give it a total rust free steel surface by using alkaline chemical rust remover of approved make with paint brush and removing loose particles after 24 hours of its application with wire brush and thoroughly washing with water and allowing it to dry, all complete as per direction of Engineer-In-Charge.				
2.1	Bars upto 12 mm diameter.	Metre	32.50	2.00	65.00
2.2	Bars above 12 mm diameter.	Metre	8.00	2.00	16.00
3	Supplying and applying two coats of Zinc rich anti-corrosive protective coating with "Nitozinc primer" of Fosroc or equivalent @ 0.20 Lit per Sqm over thoroughly cleaned and prepared steel bars including form work as directed and specified by the department complete.	Sqm	16.50	200.00	3,300.00
4	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level. Thermo-Mechanically Treated bars of grade Fe-500D or more.	Kg	15.40	20.00	308.00




ANNEXURE-A

Sl. No.	Description of items	Unit	Quantity	Rates inclusive of 18% GST (in Rs.)	Amount inclusive of 18% GST (in Rs.)
5	Providing, mixing and applying bonding coat of approved adhesive on chipped portion of RCC as per specifications and direction of Engineer-In-charge complete in all respect. SBR Polymer (@10% of cement weight) modified cementitious bond coat @ 2.2 kg cement per sq m of surface area mixed with specified proportion of approved polymer.	Sqm	232.09	90.00	20,888.10
6	Providing and inserting 12 mm dia galvanised steel injection nipple in honey comb area and along crack line including drilling of holes of required diameter (20 mm to 30 mm) up to depth from 30 mm to 80 mm at required spacing and making the hole & crack dust free by blowing compressed air, sealing the distance between injection nipple with adhesive chemical of approved make and allow it to cure complete as per direction of Engineer-In-Charge.	Each	438.00	150.00	65,700.00
7	Providing and injecting approved grout in proportion recommended by the manufacturer into cracks/honey-comb area of concrete / masonry by suitable gun / pump at required pressure including cutting of nipples after curing etc. complete as per directions of Engineer-in-Charge.				
7.1	Stirrer mixed Acrylic Polymer of approved make @ 2 % of weight of cement used) modified Cement slurry made with no shrink compound in concrete / RCC work.	Kg	65.00	80.00	5,200.00
7.2	Epoxy injection grout in concrete / RCC work of approved make.	Kg	89.00	600.00	53,400.00
8	Providing, mixing and applying SBR polymer (of approved make) modified Cement mortar in proportion of 1:4 (1 cement: 4 graded coarse sand with polymer minimum 2% by wt. of cement used) as per specifications and directions of Engineer-in-charge.	Sqm	232.09	400.00	92,836.00




ANNEXURE-A

Sl. No.	Description of items	Unit	Quantity	Rates inclusive of 18% GST (in Rs.)	Amount inclusive of 18% GST (in Rs.)
	25 mm average thickness in 2 layers.				
9	Providing and applying Deckguard E2000 of Masterseal 878 of BASF or equivalent, a High Performance Anticarbonation Protective Coating System, over the prime surface using an airless spray or roller at right angles to each other @ coverage of 5 Sqm per litre per coat @200 microns wft/100microns DFT with an intercoat period of minimum 12hrs@35°C. The coverage per litre for 2 coats shall be 2.5 Sqm @ 200 microns DFT. The protective coating system should have CO2 diffusion resistance not less than 240 mm equivalent of air thickness and 60 cm equivalent of 30 N concrete along with a water vapour transmission resistance of less than 1.0 metre (Taywood method), the coating should have static crack accommodation of not less than 2 mm (BRE)and adhesion greater than 1.0 N / mm ² as per BS 1881.	Sqm	6,348.40	533.75	33,88,458.50
10	Finishing with Deluxe Multi surface paint system for interiors and exteriors using Primer as per manufacturers specifications: Two or more coats applied on walls @ 1.25 ltr / 10 sqm over and including one coat of Special primer applied @ 0.75 ltr /10.	Sqm	2,644.46	130.00	3,43,779.80
11	Painting with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade: One or more coats on old work.	Sqm	123.48	50.00	6,174.00
12	12 mm cement plaster of mix 1:4 (1 cement: 4 fine sand).	Sqm	2,450.22	250.00	6,12,555.00
13	Dismantling old plaster or skirting raking out joints and cleaning the surface for plaster including disposal of rubbish to the dumping ground within 50 metres lead.	Sqm	2,399.36	23.00	55,185.28




ANNEXURE-A

Sl. No.	Description of items	Unit	Quantity	Rates inclusive of 18% GST (in Rs.)	Amount inclusive of 18% GST (in Rs.)
14	Scaffolding: Providing and fixing double scaffolding system (cup lock type) on the exterior side, upto seven story height made with 40 mm dia M.S. tube 1.5 m centre to centre, horizontal & vertical tubes joining with cup & lock system with M.S. tubes, M.S. tube challies, M.S. clamps and M.S. staircase system in the scaffolding for working platform etc. and maintaining it in a serviceable condition for the required duration as approved and removing it there after. The scaffolding system shall be stiffened with bracings, runners, connection with the building etc. wherever required for inspection of work at required locations with essential safety features for the work men etc. complete as per directions and approval of Engineer in-charge. The elevational area of the scaffolding shall be measured for payment purpose. The payment will be made once irrespective of duration of scaffolding.	Sqm	2,242.23	250.00	5,60,557.50
15	Cleaning of exposed concrete surface of sticking material including loose and foreign material by sand blasting with coarse sand followed by and including cleaning with oil free air blast as per direction of Engineer in charge.	Sqm	650.88	300.00	1,95,264.00
Total Amount inclusive of 18% GST (in Figure)					54,14,909.18
Rupees Fifty Four Lakh Fourteen Thousand Nine Hundred Nine and Paise Eighteen Only					


21/12/2023


21/12/2023

ESTIMATE

**Name of work: Renovation work of Clarified water storage tank, plant area
AGBPS, NEEPCO Ltd. Bokuloni Dist. Dibrugarh Assam.**

Sl No	Description of item	Unit	Quantity	Rate	Amount	Remarks
1/26.37	Cleaning of exposed concrete surface of sticking material including loose and foreign material by sand blasting with coarse sand followed by and including cleaning with oil free air blast as per direction of Engineer in charge.	Sqm	947.67	370.21	350836.91	CPWD DSR 2021- Item No-26.37
2/26.28	Chipping of unsound/weak concrete material from slabs, beams, columns etc. with manual Chisel and/ or by standard power driven percussion type or of approved make including tapering of all edges, making square shoulders of cavities including cleaning the exposed concrete surface and reinforcement with wire brushes etc. and disposal of debris for all lead and lifts all complete as per direction of Engineer-In-Charge					
	26.28.3 25 mm average thickness	Sqm	40.43	104.60	4228.98	CPWD DSR 2021- Item No-26.28.3
3/26.29	Cleaning of reinforcement from rust from the reinforcing bars to give it a total rust free steel surface by using alkaline chemical rust remover of approved make with paint brush and removing loose particles after 24 hours of its application with wire brush and thoroughly washing with water and allowing it to dry, all complete as per direction of Engineer-In-Charge.					
	26.29.1 Bars upto 12 mm diameter	Metre	20.35	6.65	135.33	CPWD DSR 2021-Item No-26.29.1
	26.29.2 Bars above 12 mm diameter	Metre	3.45	13.35	46.06	CPWD DSR 2021- Item No-26.29.2
4/16.27	Anticorrosive treatment					
A	Supplying and applying two coats of Zinc rich anti-corrosive protective coating with " Nitozinc primer " of Fosroc or equivalent @ 0.20 Lit per Sqm over thoroughly cleaned and prepared steel bars including formwork as directed and specified by the department complete.	Sqm	9.52	539.00	5131.28	APWD, SOR(National Highway),2020-21,Item No-16.27 A
5/5.22B	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level.					
	5.22B.1 Thermo-Mechanically Treated bars of grade Fe-500D or more.	Kg	5335.75	83.50	445535.13	CPWD DSR 2021 ,Item No-5.22B.1

6/26.39	Providing and inserting 12mm dia galvanised steel injection nipple in honey comb area and along crack line including drilling of holes of required diameter (20mm to 30mm) up to depth from 30mm to 80mm at required spacing and making the hole & crack dust free by blowing compressed air, sealing the distance between injection nipple with adhesive chemical of approved make and allow it to cure complete as per direction of Engineer-In-Charge.	Each	886	202.70	179592.20	CPWD DSR 2021,Item No- 26.39
7	Providing grouting in RCC Column and slab by drilling hole upto required depth in a Zigzag manner or as per drawing using a drill machine & fixing a nozzle (Grouting operation pressure shall be between 2 to 4 Kg per Sqm) Followed by cutting the exposed nozzle so as to make the surface of the column or slab free from the grouting pipes & seal the gap with polymer modified mortar as specified & directed by department complete at all levels. All the complete machine and material to be arranged by the contractor	Kg	190.00	1482.28	281633.20	Earlier Approved estimated rate.
	Polyurathane injection grout in concrete/RCC work of approved make.					
	Materials description:Fosroc-Nitofill WS60					
8/16.56	Supply and fixing of rebaring chemical FOSROC LOKFIX E75-Pure Chemical chemical anchor grout or equivalent for various diameters of reinforcement bar provide embedment depth as per manufacturer's specifications and instructions for use in concrete applications as directed by engineer in charge					
	b)10mm dia rebar at 150mm depth	No	1512	270.00	408240.00	APWD, SOR(National Highway),Item No-16.56
	c)12mm dia rebar at 180mm depth	No	2128	402.00	855456.00	"
9/16.30	Concreting of the structure with free flow nonshrink cementitious microconcrete with Renderoc RG of Fosroc or equivalent after proper mixing with cleanwater including formwork followed by proper curing for 28 days as per manufacturer's specifications complete and as directed by the Department .	Cum	44.776	129750.00	5809686.00	APWD, SOR,2020- 21(National Highway),Item No-16.30

10/26.32	Providing, mixing and applying SBR polymer (of approved make) modified Cement mortar in proportion of 1:4 (1 cement: 4 graded coarse sand with polymer minimum 2% by wt. of cement used) as per specifications and directions of Engineer-in-charge Note: Measurement and payment: The pre measurement of thickness shall be done just after the surface preparation is completed and Payment under this item shall be made only after proper wet curing has been done and surface has been satisfactorily evaluated by sounding / tapping with a blunt metal instrument and/or the 75mm size cube crushing strength at the end of 28 days to be not less than 30 N/Sqmm2).					
	26.32.2 25 mm average thickness in 2 layers.	Sqm	59.28	510.50	30262.44	CPWD DSR 2021- Item No-26.32
11/16.36	Providing and applying Deckguard E 2000 or Masterseal 878 of BASf or equivalent, a High Performance Anticarbonation Protective Coating System, over the prime surface using an airless spray or roller at right angles to each other @ coverage of 5 Sqm per litre per coat @ 200 microns wft / 100 microns DFT with an intercoat period of minimum 12 hrs @ 35°C. The coverage per litre for 2 coats shall be 2.5 Sqm @ 200 microns DFT. The protective coating system should have CO2 diffusion resistance not less than 240mm equivalent of air thickness and 60cm equivalent of 30N concrete along with a water vapour transmission resistance of less than 1.0 metre (Taywood method), the coating should have static crack accommodation of not less than 2mm (BRE) and adhesion greater than 1.0 N/mm ² as per BS 1881.	Sqm	988.10	646.00	638312.60	APWD, SOR 2020-21(National Highway),Item No-16.36
	Note: The estimate has been prepared base on CPWD DSR 2021 and APWD NH 2021.and earlier approved analysis rate.and applicable GST on item no.1,2,35,6,&10.				Total Rs. 9009096.12	
					Say Rs. 9009096.00	
	GST 18% on iten No.4,8,9&11 Rs.5131.28+Rs.408240.00+Rs.855456.00+Rs .5809686+Rs.638312.60) Rs.7716825.88				1389028.00	
					Total Rs. 10398124.00	
	Rupees one crore three lakh ninety eight thousand one hundred twenty-four, only.					

CALCULATION SHEET								
NAME OF WORK:Renovation work of Clarified water Storage tank at plant area AGBPS NEEPCO Ltd. Bokuloni Assam.								
Item no	Description of item	Unit	No	L	B	H	Quantity	Remarks
1	Cleaning of exposed concrete	Sqm						
	F-FACE, WALL	"				.....	
	f1-face,wall	"	1	4.17	2.90		12.09	
	f2-face,wall	"	1	4.27	2.90		12.38	
	f3-face,wall	"	1	4.26	2.90		12.35	
	f4-face,wall	"	1	4.20	2.90		12.18	
	f5-face,wall	"	1	4.20	2.90		12.18	
	f6-ace,wall	"	1	4.23	2.90		12.27	
	f7-face,wall	"	1	4.20	2.90		12.18	
	f8-face,wall	"	1	4.30	2.90		12.47	
	f9-face,wall	"	1	4.27	2.90		12.38	
	f10 face wall	"	1	4.21	2.90		12.21	
	Post outer side							
	corner post between R8 and F 1	"	1	1.00	3.55		3.55	
	Post f1	"	1	0.85	3.55		3.02	
	Post f2	"	1	0.85	3.55		3.02	
	Post f3	"	1	0.88	3.55		3.12	
	Post f4	"	1	0.85	3.55		3.02	
	Post f5	"	1	1.02	3.55		3.62	
	Post f6	"	1	0.88	3.55		3.12	
	Post f7	"	1	0.88	3.55		3.12	
	Post f8	"	1	0.88	3.55		3.12	
	Post f9	"	1	0.85	3.55		3.02	
	Post f10	"	1	1.03	3.55		3.66	
	Post inner face	"	1	(0.7+0.35+0.7+0.7+0.7+0.7+0.7+0.7+0.7+0.35+0.35)			23.57	
	(-) deduct for top area	"	16	0.15	0.65	(-)	1.56	
	Wall face,Near F-1	"	1	2.50	3.55		8.88	
	"	"	2	0.60	2.90		3.48	
	Wall face near,F-9	"	1	2.47	3.55		8.77	
	Wall face,Near F-9	"	2	0.55	2.90		3.19	
	"	"						
	Top Portion	"	1	42.31	(0.65+0.15)		33.85	
						Total	238.29	
	L Face,Wall							
	L1 Face,Wall	"	1	4.40	2.90		12.76	
	L2Face,Wall	"	1	4.32	2.90		12.53	
	L3 Face,Wall	"	1	4.57	2.90		13.25	
	L4 Face,Wall	"	1	4.48	2.90		12.99	
	L5Face,Wall	"	1	4.40	2.90		12.76	
	L6 Face,Wall	"	1	4.37	2.90		12.67	
	L7 Face,Wall	"	1	4.31	2.90		12.50	

1	L8Face,Wall	"	1	4.42	2.90		12.82
	L9Face,Wall	"	1	4.42	2.90		12.82
	L10Face,Wall	"	1	4.31	2.90		12.50
	Post,outer side						
	Corner Between F10 and L1	"	1	1.01	3.55		3.59
	L-1 face	"	1	0.87	3.55		3.09
	L2 face	"	1	0.85	3.55		3.02
	L3 face	"	1	0.87	3.55		3.09
	L4 face	"	1	0.87	3.55		3.09
	L5 face	"	1	0.9	3.55		3.20
	L6 face	"	1	0.87	3.55		3.09
	L7 face	"	1	0.87	3.55		3.09
	L8 face	"	1	0.85	3.55		3.02
	L9 face	"	1	0.85	3.55		3.02
	L10 face	"	1	1.05	3.55		3.73
	Post , Inner side	"	20	0.7	3.55		49.70
	Top portion	"	44.00	(0.65+0.15)			35.20
	(-) Deduct top area	"	2x9	0.65	0.15	(-)	1.76
						Total	245.77
	B1 face		1	4.10	2.90		11.89
	B2face	"	1	4.35	2.90		12.62
	B3 face		1	4.22	2.90		12.24
	B4 face		1	4.20	2.90		12.18
	B5 face		1	4.20	2.10		8.82
	B6 face		1	4.20	2.10		8.82
	B7 face		1	4.35	2.90		12.62
	B8face		1	4.12	2.90		11.95
	B9 face		1	4.12	2.90		11.95
	B10face		1	4.12	2.90		11.95
	B11face		1	4.35	2.90		12.62
	B12 face		1	4.55	2.90		13.20
	Post,outer side						
	Between L10 and B1		1	1.00	3.55		3.55
	B1 face		1	0.85	3.55		3.02
	B2 face		1	0.85	3.55		3.02
	B3 face		1	0.85	3.55		3.02
	B4 face		1	1.04	3.55		3.69
	B5 face		1	1.03	3.55		3.66
	B6 face		1	0.88	3.55		3.12
	B7 face		1	0.87	3.55		3.09
	B8 face		1	1.04	3.55		3.69
	B9 face		1	1.00	3.55		3.55
	B10 face		1	1.04	3.55		3.69
	B11 face		1	1.02	3.55		3.62
	B12 face		1	1.02	3.55		3.62
	Post,Inner side		7	0.70	3.55		17.40
			8	0.66	3.55		18.74
			7	0.70	3.55		17.40

1			1	0.50	3.55		1.78	
	(-) deduct		23	0.65	0.15	(-)	2.24	
	Top portion		1	33.78	0.80		27.02	
	Top channel entry portion		2	1.40	0.40		1.12	
	"		1	8.40	0.40		3.36	
	"		1	8.40	0.50		4.20	
	roof		1	8.40	2.10		17.64	
						Total	291.62	
	R-FACE, WALL							
	R-1 face		1	4.31	2.90		12.50	
	R-2 face		1	4.35	2.90		12.62	
	R-3 face		1	4.55	2.90		13.20	
	R-4 face		1	4.20	2.90		12.18	
	R-5 face		1	4.50	2.90		13.05	
	R-6 face		1	4.42	2.90		12.82	
	R-7 face		1	4.46	2.90		12.93	
	R-8 face		1	4.30	2.90		12.47	
	Post outsider between B12 and R1		1	1.000	3.55		3.55	
	R-1 face		1	0.870	3.55		3.09	
	R-2 face		1	0.900	3.55		3.20	
	R3 face		1	0.850	3.55		3.02	
	R4 face		1	0.860	3.55		3.05	
	R5 face		1	0.860	3.55		3.05	
	R6 face		1	0.870	3.55		3.09	
	R7 face		1	0.850	3.55		3.02	
	R8 face		1	1.020	3.55		3.62	
	Post inner side face		11	0.700	3.55		27.34	
	"		2	0.650	3.55		4.62	
	"		1	0.500	3.55		1.78	
	"		2	0.72	3.55		5.11	
	"		2	0.67	3.55		4.76	
	"		2	0.72	3.55		5.11	
	(-) deduct		20	0.65	0.15	(-)	1.95	
	Top portion		1	43.99	(0.65 +.15)		35.19	
						Total	212.42	
	Grand Total,Fface						238.29	
	Grand Total,Lface						245.77	
	Grand Total,Bface						291.62	
	Grand Total,Rface						212.42	
						Total	988.10	
	Deduct chipping area from item no 2.					(-)	40.43	
						Net Qty.	947.67	

Item No 2	Chipping of Unsound /weak concrete							
	F-1,face ,box	Sqm	1	2.50	0.20		0.50	
	F-3 ,face	"	1	2.50	0.30		0.75	
	F-5 face	"	1	1.50	0.35		0.53	
	F-7 face	"	1	2.50	0.30		0.75	
2	F-8 Face	"	1	2.50	0.30		0.75	
	F-9 face	"	1	2.00	0.25		0.50	
	F-9 face(box		1	2.50	0.30		0.75	
	F-10,Face	"	1	2.50	0.30		0.75	
	L-1 face	"	1	3.50	0.30		1.05	
	L-2 face	"	1	3.00	0.30		0.90	
	L-3 face	"	1	4.00	0.30		1.20	
	L-4 face	"	1	4.00	0.30		1.20	
	L-5 face	"	1	2.50	0.30		0.75	
	L-6face	"	1	3.00	0.30		0.90	
	L-7 face	"	1	4.00	0.30		1.20	
	L-5 face	"	1	6.00	0.30		1.80	
	L-9 face	"	1	4.00	0.30		1.20	
	L-10 face	"	1	3.00	0.50		1.50	
	B-1 Face	"	1	3.00	0.3		0.90	
	B-2 face	"	1	6.00	0.3		1.80	
	B-3 face	"	1	4.00	0.3		1.20	
	B-4 face	"	1	5.00	0.3		1.50	
	B-5 face	"		.....			
	B-6 face			.....			
	B-7 face		1	3.00	0.30		0.90	
	B-8 face		1	2.50	0.30		0.75	
	B-9 face	"	1	2.50	0.30		0.75	
	B-10 face	"	1	5.00	0.30		1.50	
	B-11 face	"	1	5.00	0.30		1.50	
	B-12 face	"	1	4.00	0.30		1.20	
	R-1 Face	"	1	4.00	0.30		1.20	
	R-2 Face		1	4.00	0.30		1.20	
	R-3 Face			.....			
	R-4 Face	"	1	2.00	0.30		0.60	
	R-5 Face			.....			
	R-6 Face		1	2.00	0.30		0.60	
	R-7 Face		1	3.00	0.40		1.20	
	R-8 Face		1	2.00	0.20		0.40	
	B-4 face	"	1	3.00	0.30		0.90	
	B-5 face	"	1	4.00	0.30		1.20	
	B-6 face	"	1	3.50	0.30		1.05	
	L-2 ,face	"	1	2.50	0.30		0.75	
	L-3,face	"	1	2.00	0.35		0.70	
	L-6,face	"	1	2.50	0.30		0.75	
	L-7,face	"	1	3.00	0.3		0.90	
						Total	40.43	
Item no.3.1	Bar upto 12 mm dia							
	B-1 face	Rm	3	0.40			1.20	
	B-2 face	"	2	1.00			2.00	
	B-4 face	"	3	0.50			1.50	

3.1	B-4 post	"	3	0.30			0.90	
	B-5 face	"	6	0.15			0.90	
	B-8 face	"	3	0.60			1.80	
	B-12 face	"	2	0.30			0.60	
	R-4 Face	"	2	1.00			2.00	
	R-7 Face	"	3	1.00			3.00	
3.1	F-1face	"	2	0.30			0.60	
	F-3face	"	3	0.30			0.90	
	F-5 face	"	4	0.15			0.60	
	F-7 face	"	3	0.50			1.50	
	F-8 face	"	4	0.15			0.60	
	F-9 face	"	4	0.15			0.60	
	L-9 face	"	8	0.15			1.20	
	L-10 face	"	3	0.15			0.45	
						Total	20.35	
Item no.3.2	Bar above 12 mm dia							
	F9 face	"	5	0.15			0.75	
	L-6,face	"	3	0.50			1.50	
	L-7,face	"	4	0.30			1.20	
						Total	3.45	
Item no-4	Supplying and applying two coats of zinc rich anti corrosive protective coating Bar upto 12 mm dia							
	B-1 face	Rm	3	0.40	0.40		0.48	
	B-2 face	"	2	1.00	0.40		0.80	
	B-4 face	"	3	0.50	0.40		0.60	
	B-4 post	"	3	0.30	0.40		0.36	
	B-5 face	"	6	0.15	0.40		0.36	
	B-8 face	"	3	0.60	0.40		0.72	
	B-12 face	"	2	0.30	0.40		0.24	
	R-4 Face	"	2	1.00	0.40		0.80	
	R-7 Face	"	3	1.00	0.40		1.20	
	F-1 face	"	2	0.30	0.40		0.24	
	F-3 face	"	3	0.30	0.40		0.36	
	F-5 face	"	4	0.15	0.40		0.24	
	F7 face	"	3	0.50	0.40		0.60	
	F-8 face	"	4	0.15	0.40		0.24	
	F-9face	"	4	0.15	0.40		0.24	
	L-9 face	"	8	0.15	0.40		0.48	
	L-10 face	"	3	0.15	0.40		0.18	
						Total	8.14	
	Bar above 12 mm dia							
	F-9 face	"	5	0.15	0.40		0.30	
	L-6,face	"	3	0.50	0.40		0.60	
	L-7,face	"	4	0.3	0.40		0.48	
						Total	1.38	
Item No-5	Steel reinforcement of RCC work	"						

5	5.1,Thermo mechanically treated bar	"						
	Vertical rod ,12 mm dia T.@ 0.17 m C/C							
	B1 face(2.9+0.18+0.18+.05)	Kg	25	3.31	0.89	73.65	(4.1/.17)+1=25	
	B2 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.35/0.17)+1=26	
	B3 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.22/0.17)+1=26	
	B4 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.20/0.17)+1=26	
	B5 face(2.1+0.18+0.18+.05)	"	26	2.51	0.89	58.08	(4.20/0.17)+1=26	
	B6 face(2.1+0.18+0.18+.05)	"	26	2.51	0.89	58.08	(4.20/0.17)+1=26	
	B7 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.35/0.17)+1=26	
	B8 face(2.9+0.18+0.18+.05)	"	25	3.31	0.89	73.65	(4.12/0.17)+1=25	
	B9 face(2.9+0.18+0.18+.05)	"	25	3.31	0.89	73.65	(4.12/0.17)+1=25	
	B10 face(2.9+0.18+0.18+.05)	"	25	3.31	0.89	73.65	(4.12/0.17)+1=25	
	B11face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.35/0.17)+1=26	
	B12 face(2.9+0.18+0.18+.05)	"	28	3.31	0.89	82.49	(4.55/0.17)+1=28	
	R1 face(2.9+.18+.18+.05)	"	26	3.31	0.89	76.59	(4.31/0.17)+1=26	
	R2 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.35/0.17)+1=26	
	R3 face(2.9+0.18+0.18=.05)	"	28	3.31	0.89	82.49	(4.55/0.17)+1=28	
	R4 face(2.9+0.18+.18+.05)	"	26	3.31	0.89	76.59	(4.2/0.17)+1=26	
	R5 face(2.9+0.18+0.18+.05)	"	27	3.31	0.89	79.54	(4.50/0.17)+1=27	
	R6 face(2.9+0.18+0.18+.05)	"	27	3.31	0.89	79.54	(4.42/0.17)+1=27	
	R7 face(2.9+0.18+0.18+.05)	"	28	3.31	0.89	82.49	(4.46/0.17)+1=28	
	R8 face(2.9+0.18+0.18+.05)	"	27	3.31	0.89	79.54	(4.30/0.17)+1=27	
	F1 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.17/0.17)+1=26	
	Near f1 (2.9+0.18+0.18+.05)	"	6	3.31	0.89	17.68	(0.8/0.17)+1=6	
	F2 face(2.9+0.18+.018+.05)	"	26	3.31	0.89	76.59	(4.27/0.17)+1=26	
	F3 face(2.9+0.18+0.18+0.05)	"	26	3.31	0.89	76.59	(4.26/0.17)+1=26	
	F4 face(2.9+.18+.18+.05)	"	26	3.31	0.89	76.59	(4.2/0.17)+1=26	
	F5 face(2.9+.18+.18+.05)	"	26	3.31	0.89	76.59	(4.2/0.17)+1=26	
	F6 face(2.9+.18+.18+.05)	"	26	3.31	0.89	76.59	(4.23/0.17)+1=26	
	F7 face(2.9+0.18+0.18+0.05)	"	26	3.31	0.89	76.59	(4.20/0.17)+1=26	
	F8 face(2.9+0.18+0.18+0.05)	"	26	3.31	0.89	76.59	(4.30/0.17)+1=26	
	F9 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.27/0.17)+1=26	
	Near F9 face	"	6	3.31	0.89	17.68	(0.8/0.17)=5+1=6	
	F10 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.21/0.17)+1=26	
	L1 face(2.9+0.18+0.18+0.05)	"	27	3.31	0.89	79.54	(4.44/0.17)+1=27	
	L2 face(2.9+0.18+0.18+.05)	"	26	3.31	0.89	76.59	(4.32/0.17)+1=26	
	L3 face(2.9+0.18+0.18+.05)	"	28	3.31	0.89	82.49	(4.57/0.17)+1=28	
	L4 face(2.9+0.180+0.18+0.05)	"	27	3.31	0.89	79.54	(4.48/0.17)+1=27	
	L5 face(2.9+0.18+0.18+0.05)	"	27	3.31	0.89	79.54	(4.40/0.17)+1=27	
	L6 face(2.9+.018+0.18+0.05)	"	27	3.31	0.89	79.54	(4.37/0.17)+1=32	
	L7 face(2.9+0.18+0.18+0.05)	"	26	3.31	0.89	76.59	(4.31/0.17)+1=26	
	L8 face(2.9+.0.18+.018+.05)	"	27	3.31	0.89	79.54	(4.42/0.17)+1=27	
	L9 face(2.9+0.18+0.18+0.05)	"	27	3.31	0.89	79.54	(4.42/0.17)+1=27	
	L10 face(2.9+0.18+0.18=0.05)	"	26	3.31	0.89	76.59	(4.31/0.17)+1=26	

5							(12/3.31),3 pieces full and 2.00 m remaing. therefore one lapping required every 7 nos.reinforceme nt ,So Quantity of lapping 1065/7=152 nos
	Lapping,50 dia	"	152	0.6	0.89	81.17	
	Horizontal bar ,10 mm dia T.@ 0.17 mC/C						
	B1 face	Kg	18	4.45	0.62	49.66	(2.9/0.17)+1=18
	B2 face	"	18	4.70	0.62	52.45	(2.9/0.17)+1=18
	B3 face	"	18	4.57	0.62	51.00	(2.9/0.17)+1=18
	B4face	"	18	4.55	0.62	50.78	(2.9/0.17)+1=18
	B5 face	"	13	4.55	0.62	36.67	(2.9/0.17)+1=18
	B6 face	"	13	4.55	0.62	36.67	(2.9/0.17)+1=18
	B7 face	"	18	4.70	0.62	52.45	(2.9/0.17)+1=18
	B8 face	"	18	4.47	0.62	49.89	(2.9/0.17)+1=18
	B9 face	"	18	4.47	0.62	49.89	(2.9/0.17)+1=18
	B10 face	"	18	4.47	0.62	49.89	(2.9/0.17)+1=18
	B11 face	"	18	4.70	0.62	52.45	(2.9/0.17)+1=18
	B12 face	"	18	4.90	0.62	54.68	(2.9/0.17)+1=18
	R1 face	"	18	4.66	0.62	52.01	(2.9/0.17)+1=18
	R2 face	"	18	4.7	0.62	52.45	(2.9/0.17)+1=18
	R3 face	"	18	4.9	0.62	54.68	(2.9/0.17)+1=18
	R4 face	"	18	4.55	0.62	50.78	(2.9/0.17)+1=18
	R5 face	"	18	4.85	0.62	54.13	(2.9/0.17)+1=18
	R6face	"	18	4.77	0.62	53.23	(2.9/0.17)+1=18
	R7 face	"	18	4.81	0.62	53.68	(2.9/0.17)+1=18
	R8 face	"	18	4.65	0.62	51.89	(2.9/0.17)+1=18
	F1 face	"	18	4.52	0.62	50.44	(2.9/0.17)+1=18
	Near F1	"	18	1.15	0.62	12.83	(2.9/0.17)+1=18
	F2 bface	"	18	4.62	0.62	51.56	(2.9/0.17)+1=18
	F3 bface	"	18	4.60	0.62	51.34	(2.9/0.17)+1=18
	F4 face	"	18	4.55	0.62	50.78	(2.9/0.17)+1=18
	F5 face	"	18	4.55	0.62	50.78	(2.9/0.17)+1=18
	F6 face	"	18	4.58	0.62	51.11	(2.9/0.17)+1=18
	F7 face	"	18	4.55	0.62	50.78	(2.9/0.17)+1=18
	F8 face	"	18	4.65	0.62	51.89	(2.9/0.17)+1=18
	F9 face	"	18	4.62	0.62	51.56	(2.9/0.17)+1=18
	Near f 9 face	"	18	1.15	0.62	12.83	(2.9/0.17)+1=18
	F10 face	"	18	4.56	0.62	50.89	(2.9/0.17)+1=18
	L1 face	"	18	4.75	0.62	53.01	(2.9/0.17)+1=18
	L2face	"	18	4.67	0.62	52.12	(2.9/0.17)+1=18
5	L3 face	"	18	4.92	0.62	54.91	(2.9/0.17)+1=18
	L4 face	"	18	4.83	0.62	53.90	(2.9/0.17)+1=18
	L5 face	"	18	4.75	0.62	53.01	(2.9/0.17)+1=18
	L6 face	"	18	4.82	0.62	53.79	(2.9/0.17)+1=18
	L7 face	"	18	4.66	0.62	52.01	(2.9/0.17)+1=18

5	L8 face	"	18	4.77	0.62		53.23	(2.9/0.17)+1=18
	L9 face	"	18	4.77	0.62		53.23	(2.9/0.17)+1=18
	L10 face	"	18	4.66	0.62		52.01	(2.9/0.17)+1=18
	lapping 50 dia	"	248	0.50	0.62		76.88	Nos of lapping ,one lapping required every three nos. reinforcement .746/3=248
						Total	5335.75	
Item no-6	Providing and inserting 12 mm dia galvanised steel injection nipple							
	B Face wall							
	B1 face	No	25				25	
	B2 face	"	24				24	
	B3 face	"	20				20	
6	B4face	"	25				25	
	B4 face	"	23				23	
	B5 face	"	15				15	
	B6 face	"	20				20	
	B7 face	"	20				20	
	B8 face	"	20				20	
	B9 face	"	15				15	
	B10 face	"	25				25	
	B11 face	"	24				24	
	B12 face	"	26				26	
	R Face wall							
	R 1 face	"	22				22	
	R 2face	"	23				23	
	R 3 face	"	10				10	
	R 4 face	"	10				10	
	R 4 face	"	15				15	
	R 5face	"	20				20	
	R6 face	"	15				15	
	R7 face	"	15				15	
	R8 face	"	17				17	
	F Face wall							
	F1 face	"	20				20	
	F1 face box wall		10				10	
	F2 face	"	5				5	
	F3 face	"	20				20	
	F4 face	"	10				10	
	F5 face	"	11				11	
	F6 face	"	10				10	
	F7 face	"	15				15	
	F8 face	"	10				10	
	F9 face	"	15				15	
	F9 face box wall		10				10	
	F10 face	"	25				25	
	L Face,wall							
	L1 face	"	20				20	

6	L2 face	"	30				30	
	L3 face	"	25				25	
	L4 face	"	15				15	
	L5 face	"	20				20	
	L6 face	"	25				25	
	L7 face	"	25				25	
	L8 face	"	35				35	
	L9 face	"	25				25	
	L10 face	"	20				20	
	RCC post	"						
	B4 face	"	5				5	
	B5 face	"	15				15	
	B6 face	"	9				9	
	L2 face	"	8				8	
	L3 face	"	6				6	
	L6 face	"	6				6	
	L7 face	"	7				7	
						Total	886	
Item no.7	Providing grouting in R.C.C Column and slab							
	B Face wall							
	B1 face	Kg	25	0.25			6.25	
	B2 face	"	24	0.25			6.00	
	B3 face	"	20	0.25			5.00	
	B4 face	"	25	0.25			6.25	
	B4 face	"	23	0.25			5.75	
	B5 face	"	15	0.20			3.00	
	B6 face	"	20	0.20			4.00	
	B7 face	"	20	0.20			4.00	
	B8 face	"	20	0.20			4.00	
	B9 face	"	15	0.20			3.00	
	B10 face	"	25	0.15			3.75	
	B11 face	"	24	0.15			3.60	
	B12 face	"	26	0.15			3.90	
	R Face wall							
	R 1 face	"	22	0.25			5.50	
	R 2face	"	23	0.25			5.75	
	R 3 face	"	10	0.25			2.50	
	R 4 face	"	10	0.20			2.00	
	R 4 face	"	15	0.20			3.00	
	R 5 face	"	20	0.20			4.00	
	R6 face	"	15	0.20			3.00	
	R7 face	"	15	0.20			3.00	
	R8 face	"	17	0.20			3.40	
	F Face wall						0.00	
	F1 face	"	20	0.25			5.00	
	F1 face box wall	"	10	0.25			2.50	
	F2 face	"	5	0.25			1.25	
	F3 face	"	20	0.25			5.00	
	F4 face	"	10	0.25			2.50	
	F5 face	"	11	0.25			2.75	
	F6 face	"	10	0.25			2.50	

7	F7 face	"	15	0.25			3.75	
	F8 face	"	10	0.25			2.50	
	F9 face	"	15	0.2			3.00	
	F9 face box wall	"	10	0.15			1.50	
	F10 face	"	25	0.15			3.75	
	L Face,wall						0.00	
	L1 face	"	20	0.25			5.00	
	L2 face	"	30	0.25			7.50	
	L3 face	"	25	0.25			6.25	
	L4 face	"	15	0.25			3.75	
	L5 face	"	20	0.25			5.00	
	L6 face	"	25	0.25			6.25	
	L7 face	"	25	0.20			5.00	
	L8 face	"	35	0.20			7.00	
	L9 face	"	25	0.15			3.75	
	L10 face	"	20	0.15			3.00	
	RCC post							
	B1 face	"	5	0.25			1.25	
	B5 face	"	15	0.25			3.75	
	B6 face	"	9	0.2			1.80	
	L2 face	"	8	0.15			1.20	
	L3 face	"	6	0.15			0.90	
	L6 face	"	6	0.15			0.90	
	L7 face	"	7	0.15			1.05	
						Total	190.00	
Item No8	Supply and fixing of rebaring Chemical Fosroc							
	Vertical rod ,12 mm dia T.@ 0.17m C/C							
	B1 face	No	2x25				50	
	B2 face	"	2x26				52	
	B3 face	"	2x26				52	
	B4 face	"	2x26				52	
	B5 face	"	2x26				52	
	B6 face	"	2x26				52	
	B7 face	"	2x26				52	
	B8 face	"	2x25				50	
	B9 face	"	2x25				50	
	B10 face	"	2x25				50	
	B11 face	"	2x26				52	
	B12 face	"	2x28				56	
	R1 face	"	2x26				52	
	R2 face	"	2x26				52	
	R3 face	"	2x28				56	
	R4 face	"	2x26				52	
	R5 face	"	2x27				54	
	R6 face	"	2x27				54	
	R7 face	"	2x27				54	
	R8 face	"	2x27				54	
	F1 face	"	2x26				52	
	Near F1	"	2x6				12	

8	F2 face		2x26				52	
	f3 face	"	2x26				52	
	f4 face		2x26				52	
	F5 face		2x26				52	
	F6 face		2x26				52	
	F7 face	"	2x26				52	
	F8 face	"	2x26				52	
	Near F9	"	2x6				12	
	F9 face	"	2x26				52	
	F10 face	"	2x26				52	
	L1 face	"	2x27				54	
	L2 face		2x26				52	
	L3 face		2x28				56	
	L4 face		2x27				54	
	L5 face		2x27				54	
	L6 face		2x27				54	
	L7 face		2x26				52	
	L8 face		2x27				54	
	L9 face		2x27				54	
	L10 face		2x26				52	
							2128	
	Horizontal bar ,10 mm dia T.@ 0.17 m C/C							
	B1 face	No	2x18				36	
	B2 face	"	2x18				36	
	B3 face	"	2x18				36	
	B4 face	"	2x18				36	
	B5 face	"	2x13				36	
	B6 face	"	2x13				36	
	B7 face	"	2x18				36	
	B8 face	"	2x18				36	
	B9 face	"	2x18				36	
	B-10 face	"	2x18				36	
	B11 face	"	2x18				36	
	B12 face	"	2x18				36	
	R1 face	"	2x18				36	
	R2 face	"	2x18				36	
	R3 face		2x18				36	
	R4 face	"	2x18				36	
	R5 face	"	2x18				36	
	R6 face	"	2x18				36	
	R7 face	"	2x18				36	
	R8 face	"	2x18				36	
	F1 face		2x18				36	
	Near f1	"	2x18				36	
	F2 face		2x18				36	
	f3 face	"	2x18				36	
	F4 face		2x18				36	
	F5 face		2x18				36	
	F6 face		2x18				36	
	F7 face	"	2x18				36	
	F8 face	"	2x18				36	

8	F9 face	"	2x18				36	
	Near f-9 face	"	2x18				36	
	F10 face	"	2x18				36	
	L1 face	"	2x18				36	
	L2face	"	2x18				36	
	L3 face	"	2x18				36	
	L4 face	"	2x18				36	
	L5 face	"	2x18				36	
	L6 face	"	2x18				36	
	L7 face	"	2x18				36	
	L8 face	"	2x18				36	
	L9 face	"	2x18				36	
	L10 face	"	2x18				36	
						Total	1512	
Item no.9	Concreting of the structure with free flow nonsrink cementious microconcrete with Rende R.G of Fosrocroc							
	F-FACE, WALL							
	F1,face,wall		1	4.17	2.90	0.09	1.088	
	Near F1 face , WALL	CUM	1	0.80	2.90	0.09	0.209	
	F2 face,Wall	"	1	4.27	2.90	0.09	1.114	
	F3face , WALL	"	1	4.26	2.90	0.09	1.112	
	F4face , WALL	"	1	4.20	2.90	0.09	1.096	
	F5face , WALL	"	1	4.20	2.90	0.09	1.096	
	F6face , WALL	"	1	4.23	2.90	0.09	1.104	
	F7face , WALL	"	1	4.20	2.90	0.09	1.096	
	F8face , WALL	"	1	4.30	2.90	0.09	1.122	
	F9face , WALL	"	1	4.27	2.90	0.09	1.114	
	Near F9 face , WALL		1	0.80	2.90	0.09	0.209	
	F10 face , WALL	"	1	4.21	2.90	0.09	1.099	
	L Face,Wall					0.09		
	L1 face wall	"	1	4.40	2.90	0.09	1.148	
	L2 face wall	"	1	4.32	2.90	0.09	1.128	
	L3 face wall	"	1	4.57	2.90	0.09	1.193	
	L4 face wall	"	1	4.48	2.90	0.09	1.169	
	L5 face wall	"	1	4.40	2.90	0.09	1.148	
	L6 face wall	"	1	4.37	2.90	0.09	1.141	
	L7 face wall	"	1	4.31	2.90	0.09	1.125	
	L8 face wall	"	1	4.42	2.90	0.09	1.154	
	L9 face wall	"	1	4.42	2.90	0.09	1.154	
	L10 face wall	"	1	0.00	2.90	0.09	0.000	
	B Face					0.09		
	B1 Face wall	"	1	4.10	2.90	0.09	1.070	
	B2 Face wall		1	4.35	2.90	0.09	1.135	
	B3 Face wall		1	4.22	2.90	0.09	1.101	
	B4 Face wall		1	4.20	2.90	0.09	1.096	
	B5 Face wall		1	4.20	2.10	0.09	0.794	
	B6 Face wall		1	4.20	2.10	0.09	0.794	
	B7 Face wall		1	4.35	2.90	0.09	1.135	

9	B8 Face wall		1	4.12	2.90	0.09	1.075	
	B9 Face wall		1	4.12	2.90	0.09	1.075	
	B10 Face wall		1	4.12	2.90	0.09	1.075	
	B11 face		1	4.35	2.90	0.09	1.135	
	B12 face		1	4.55	2.90	0.09	1.188	
	R-FACE,WALL							
	R1 face		1	4.31	2.90	0.09	1.125	
	R2 face		1	4.35	2.90	0.09	1.135	
	R3 face		1	4.55	2.90	0.09	1.188	
	R4 face		1	4.20	2.90	0.09	1.096	
	R5 face		1	4.50	2.90	0.09	1.175	
	R6 face		1	4.42	2.90	0.09	1.154	
	R7 face		1	4.46	2.90	0.09	1.164	
	R8 face		1	4.30	2.90	0.09	1.122	
						Total	44.776	
Item no.10	Providing ,mixing and applying SBR polymer (of approved make)							
	ii.25 mm average thickness in layers.							
	Chipping of Unsound /weak concrete							
	F1 face	Sqm	1	2.00	0.30		0.60	
	"		1	1.00	0.40		0.40	
	F-3 ,face	"	1	2.50	0.30		0.75	
			1	2.00	0.40		0.80	
	F-5 face	"	1	1.50	0.35		0.53	
			1	2.00	0.50		1.00	
	F-6,plaster	"	1	2.00	0.50		1.00	
	F-7 face	"	2	2.50	0.40		2.00	
	F-8 Face	"	1	3.00	0.50		1.50	
	F-9 face	"	1	2.00	0.50		1.00	
	F-9 face(box		1	2.00	0.50		1.00	
	F-10,Face	"	1	2.50	0.50		1.25	
	"		1	1.50	0.50		0.75	
	L-1 face	"	1	3.50	0.40		1.40	
	L-2 face	"	1	4.00	0.40		1.60	
	L-3 face	"	1	4.00	0.30		1.20	
	"		1	2.00	0.40		0.80	
	L4 face	"	1	4.00	0.25		1.00	
	L5 face	"	1	2.50	0.30		0.75	
	"		1	2.00	0.40		0.80	
	L6face	"	1	3.00	0.30		0.90	
	L7 face	"	1	4.00	0.40		1.60	
	"		2	2.00	0.40		1.60	
	"		1	1.50	0.50		0.75	
	"	"	1	6.00	0.30		1.80	
	"		1	3.00	0.40		1.20	
	L9 face	"	1	4.00	0.30		1.20	
	"	"	1	2.00	0.40		0.80	
	L 10 face	"	1	3.00	0.50		1.50	

10	B1 Face	"	1	3.00	0.30		0.90	
			2	2.50	0.30		1.50	
	B2 face	"	1	6.00	0.40		2.40	
	B3 face	"	1	4.00	0.40		1.60	
			1	1.00	0.40		0.40	
	B4 face	"	1	5.00	0.40		2.00	
			1	2.00	0.40		0.80	
	B5 face	"	1	2.00	0.50		1.00	
	B6 face			.....			
	B7 face		1	3.00	0.40		1.20	
	B8 face		1	2.00	0.50		1.00	
	B9 face	"	1	2.00	0.30		0.60	
	B10 face	"	1	5.00	0.30		1.50	
	"		1	3.00	0.40		1.20	
	B11 face	"	1	5.00	0.30		1.50	
	"	"	1	1.50	0.60		0.90	
	B12 face	"	1	4.00	0.30		1.20	
	"		1	2.50	0.40		1.00	
	R1 Face	"	1	4.00	0.40		1.60	
	R2 Face		1	4.00	0.40		1.60	
	R3 Face			.....			
	R4 Face		1	2.00	0.40		0.80	
	R5 Face			.....			
	R6 Face		1	2.00	0.30		0.60	
	R7 Face		1	3.00	0.50		1.50	
	R8 Face		1	2.50	0.40		1.00	
						Total	59.28	
Item no.	Providing applying Deckguard e							
11	2000 ot Masterseal 878 of BASF							
	F-FACE, WALL							
	F1 FACE, WALL	"	1	4.17	2.90	.....	12.09	
	2 FACE, WALL	"	1	4.27	2.90		12.38	
	F3 FACE, WALL	"	1	4.26	2.90		12.35	
	F4 FACE, WALL	"	1	4.20	2.90		12.18	
	F5 FACE, WALL	"	1	4.20	2.90		12.18	
	F6 FACE, WALL	"	1	4.23	2.90		12.27	
	F7 FACE, WALL	"	1	4.20	2.90		12.18	
	F8 FACE, WALL	"	1	4.30	2.90		12.47	
	F9 FACE, WALL	"	1	4.27	2.90		12.38	
	F10 FACE, WALL	"	1	4.21	2.90		12.21	
	Post outer side	"	1	1.00	3.55		3.55	
	F1 FACE, WALL	"	1	0.85	3.55		3.02	
	F2 FACE WALL	"	1	0.85	3.55		3.02	
	F3 FACE, WALL	"	1	0.88	3.55		3.12	
	F4 FACE, WALL	"	1	0.85	3.55		3.02	
	F5 FACE, WALL	"	1	1.02	3.55		3.62	
	F6 FACE, WALL	"	1	0.88	3.55		3.12	
	F7 FACE, WALL	"	1	0.88	3.55		3.12	
	F8 FACE, WALL	"	1	0.88	3.55		3.12	
	F9 FACE, WALL	"	1	0.85	3.55		3.02	
	F10 FACE, WALL	"	1	1.03	3.55		3.66	

				(0.7+0.35+0.7+0.7+0.7+0.7+0.7+0.7+0.7+0.35+0.35) x3.55			
11	Post inner face	"	1				23.6
	(-) deduct for top area	"	16	0.15	0.65	(-)	1.56
	Wall face,Near F-1	"	1	2.5	3.55		8.88
	"		2	0.6	2.9		3.48
	"		1	2.47	3.55		8.77
	Wall face,Near F-9		2	0.55	2.9		3.19
	"						201.96
	Top Portion	"	1	42.31	(0.65 +0.15)		33.85
						Total	238.29
	L Face,Wall						
	L 1 Face,Wall	"	1	4.40	2.90		12.76
	L 2 Face,Wall	"	1	4.32	2.90		12.53
	L 3 Face,Wall	"	1	4.57	2.90		13.25
11	L 4 Face,Wall	"	1	4.48	2.90		12.99
	L 5 Face,Wall	"	1	4.40	2.90		12.76
	L 6 Face,Wall	"	1	4.37	2.90		12.67
	L 7 Face,Wall	"	1	4.31	2.90		12.50
	L 8 Face,Wall	"	1	4.42	2.90		12.82
	L 9 Face,Wall	"	1	4.42	2.90		12.82
	L10 face,wall	"	1	4.31	2.90		12.50
	Post,outer side	"					
	Corner p[ost Between F10 and L1	"	1	1.01	3.55		3.59
	L1 face	"	1	0.87	3.55		3.09
	L2 face	"	1	0.85	3.55		3.02
	L3 face	"	1	0.87	3.55		3.09
	L4 face	"	1	0.87	3.55		3.09
	L5 face	"	1	0.9	3.55		3.20
	L6 face	"	1	0.87	3.55		3.09
	L7 face	"	1	0.87	3.55		3.09
	L8 face	"	1	0.85	3.55		3.02
	L9 face	"	1	0.85	3.55		3.02
	L10 face	"	1	1.05	3.55		3.73
	Post , Inner side	"	20	0.7	3.55		49.70
	Top portion	"	4.1	(0.65+0.15)			35.20
	(-) Deduct top area	"	2x9	0.65	0.15		1.76
						Total	245.77
	B1 face		1	4.10	2.90		11.89
	B2 face	"	1	4.35	2.90		12.6
	B3 face		1	4.22	2.90		12.2
	B4 face		1	4.20	2.90		12.2
	B5 face		1	4.20	2.10		8.8
	B6 face		1	4.20	2.10		8.8
	B7 face		1	4.35	2.90		12.62
	B8face		1	4.12	2.90		11.95
	B9 face		1	4.12	2.90		11.95
	B10face		1	4.12	2.90		11.95
	B11face		1	4.35	2.90		12.62

	B12 face		1	4.55	2.90		13.20	
	Post,outer side							
	Between L10 and B1		1	1.00	3.55		3.55	
	B1 face		1	0.85	3.55		3.02	
	B2 face		1	0.85	3.55		3.02	
	B3 face		1	0.85	3.55		3.02	
	B4 face		1	1.04	3.55		3.69	
	B5 face		1	1.03	3.55		3.66	
	B6 face		1	0.88	3.55		3.12	
	B7 face		1	0.87	3.55		3.09	
	B8 face		1	1.04	3.55		3.69	
	B9 face		1	1.00	3.55		3.55	
	B10 face		1	1.04	3.55		3.69	
	B11 face		1	1.02	3.55		3.62	
	B12 face		1	1.02	3.55		3.62	
	Post,Inner side		7	0.70	3.55		17.40	
	"		8	0.66	3.55		18.74	
	"		7	0.70	3.55		17.40	
	"		1	0.50	3.55		1.78	
	(-) deduct		23	0.65	0.15		2.24	
	Top portion		1	33.78	0.8		27.02	
	Top channel entry portion		2	1.4	0.4		1.12	
	"		1	8.4	0.4		3.36	
	"		1	8.4	0.5		4.20	
	roof		1	8.4	2.1		17.64	
						Total	291.62	
11	R-FACE,WALL							
	R-1FACE,WALL		1	4.31	2.90		12.50	
	R-2FACE,WALL		1	4.35	2.90		12.62	
	R-3FACE,WALL		1	4.55	2.90		13.20	
	R-4FACE,WALL		1	4.20	2.90		12.18	
	R-5FACE,WALL		1	4.50	2.90		13.05	
	R-6FACE,WALL		1	4.42	2.90		12.82	
	R-7FACE,WALL		1	4.46	2.90		12.93	
	R-8FACE,WALL		1	4.30	2.90		12.47	
	Post outsider							
	between B12 and R1		1	1.00	3.55		3.55	
	R1 face		1	0.87	3.55		3.09	
	R2 face		1	0.9	3.55		3.20	
	R3 face		1	0.85	3.55		3.02	
	R4 face		1	0.86	3.55		3.05	
	R5 face		1	0.86	3.55		3.05	
	R6 face		1	0.87	3.55		3.09	
	R7 face		1	0.85	3.55		3.02	
	R8 face		1	1.02	3.55		3.62	
	Post inner side face		11	0.7	3.55		27.34	
	"		2	0.65	3.55		4.62	
	"		1	0.5	3.55		1.78	
	"		2	0.72	3.55		5.11	
	"		2	0.67	3.55		4.76	
	"		2	0.72	3.55		5.11	

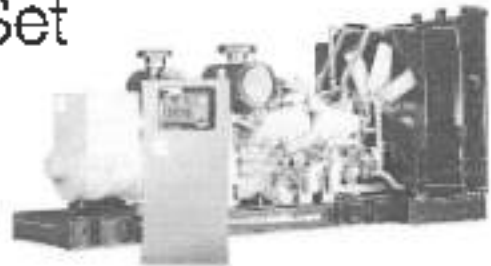
11							
	(-) deduct		20	0.65	0.15	(-)	1.95
	Top portion		1	43.99	(0.65 +.15)		35.19
						Total	212.42
	Grand Total,F face						238.29
	Grand Total,L face						245.77
	Grand Total,B face						291.62
	Grand Total,R face						212.42
						Total	988.10



Specification sheet

Diesel Generator Set K38 Series

808 kW_e, 1010 kVA Prime



Reliable and durable

Cummins® 'K38 series' diesel engine with strong regradable crankshaft, high strength connecting rod, low pressure fuel lines, STC (Step Timing Control) injectors and high volume coolant system make 'K38 series' generating sets, more reliable and durable. Engines have clocked millions of hours, operating in some of the world's most demanding conditions. Current engines are regularly upgraded with new technologies for better performance and economy. The ultimate proof of superior performance and reliability is the fact that Cummins® entities worldwide source these engines from Cummins India for their markets.

Unmatched warranty

- Cummins® 'K38 series' diesel engine generator sets are a truly cost effective solution to long term power need backed by industry best, 2 years / 5000 hrs warranty, for the entire generator set.
- With superior experience in technology, design capability and commitment to quality and reliability, we offer an unmatched 5 years or 5000 hours (including above 2 years) warranty coverage on 5 critical components (5C) of the engine - Cylinder head, Conrod, Crankshaft, Cylinder Block, Connecting Rod against manufacturing defect.



Cummins advantage

Special features of Cummins® 'K38 series' engines like STC (Step Timing Control) injectors, low temperature aftercooler, square combustion chamber, optimised turbocharging and precision heavy duty camshaft make these engines the ultimate in exceptional fuel efficiency all across the operating range.

Single source power assurance

Design, manufacture and testing of engine, alternator and other accessories is done by Cummins Group of companies for optimum performance and is backed by a countrywide product support network with a single source responsibility for the entire coverage.

Standard scope

- Engine:** Cummins 'K38 series' direct injection, water cooled engine - 12 cylinder, 4 stroke, rated at 1500 RPM, conforming to ISO 3046 has the following specifications:
- Cummins PT fuel pump
 - Cummins STC injectors
 - Cummins turbocharger, Pulse tuned exhaust manifold, Stainless steel exhaust flexible connections
 - Radiator or Heat exchanger, Coolant inhibitor,
 - Plate type tube oil cooler
 - Outboard aftercoolers
 - Full flow paper element filters - fuel, tube oil and by-pass
 - Dry type replaceable paper element air cleaner with restriction indicator
 - Flywheel housing & flywheel to suit single / double bearing alternator
 - Flexible coupling for double bearing alternator
 - Starting motor - Electric, Battery charging alternator
 - Electronic control panel
 - Cummins PowerCommand® microprocessor based genset controller
 - First fill tube oil

Alternators: Standard brushless AC alternator

- Separately excited, self-regulated
- Class HF insulation
- Salient pole revolving field
- Single / double bearing
- Automatic voltage regulator
- PNG standard

Accessories:

- Silence suite/optimized to reduce noise
- Sturdy base rail
- 500 ltrs. free standing fuel tank
- Suitable batteries with connecting leads and terminals

Options

Engine: Heavy duty air cleaner, Lube oil / Coolant heater with thermostat switch

Alternator: Space heater, RTDs, BTDs

Control Panel: AMF control panel, Battery charger, Remote/Auto start panel, Auto/Manual synchronizing panel, Audio/Visual annunciation for faults

Control panel: PowerCommand PC 3.0



The PowerCommand® control system is an integrated microprocessor based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing.

AmpSentry – Includes integral AmpSentry protection which provides a full range of alternator protection functions which are matched to the alternator provided.

Power management – Control function provides battery monitoring, testing and a smart starting control system.

Advanced control methodology – Three phase sensing, FET based full wave rectified voltage regulation and a PWM output for stable operation with all load types.

Communications interface – Control comes standard with PCNet and Modbus interface.

Regulation compliant – Prototype tested UL, CSA and CE compliant

Service - InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.

Reliable design – For reliable operation in harsh environment.

Multi-language support

Independent of PC/ laptop for setting up

Operator panel features

Operator panel features - The operator panel, in addition to the alternator, displays the Utility/ AC Bus data.

Operator/ display functions

- 320 x 240 pixels graphic LED backlight LCD with bar graph for displaying electrical parameters
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- LED lamps indicating generator running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions

- Digital frequency synchronization and voltage matching
- Isochronous kW and over/under sharing controls
- Droop kW and kvar control
- Sync check
- Extended paralleling (Peak Shave/Base Load)
- Digital power transfer control (AMF) provides load transfer operation in open or closed transition or soft (ramping) transfer mode

Alternator data

- Line-to-neutral and line-to-line AC volts
- 3-phase AC current
- Frequency
- kW, kvar, power factor (kVA (three phase and) total)

Engine data

- DC voltage
- Engine speed
- Lube oil pressure
- Coolant temperature/ low level
- Comprehensive FAE data (where applicable)

Other data

- Genset model data
- Start attempts, starts, running hours, kW hours
- Load profile (operating hours at % load in 5% increments)
- Fault history
- Data logging and fault simulation requires InPower

Standard control functions

Digital governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase, 4-wire line-to-line sensing
- Configurable long in maintaining

AmpSentry AC protection

- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse var shutdown
- Field overload

Engine protection

- Battery voltage monitoring, protection and testing
- Over speed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- Fail to start (over crank) shutdown
- Fail in crank shutdown
- Cranking lockout
- Sensor failure indicator
- Low fuel level warning or shutdown

Control functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exercise clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed/ dump as per configurable priority
- Configurable inputs and outputs (e)
- Remote emergency stop

Options

- Auxiliary output relays and remote annunciators

Technical Data

Generator set specifications

Model	C1010 D5 P
Prime Power Rating (kW)	1010
Output Voltage and Frequency	415 Volts, 50 Hz
Power Factor	0.8 (lag)
No. of Poles	3 phase

Engine specifications

Make	Cummins
Model	KTA38-G6
No. of cylinders	12 Valve
Aspiration	Turbocharged-Aftercooled
Bore and Stroke	159 mm x 159 mm
Displacement	37.8 liter
Output - Prime	1130 kW (880 kW) @
Fuel consumption @ 75% load with Rectifier & Fan	150.3 liter/hr
Fuel consumption @ 100% load with Rectifier & Fan	203.8 liter/hr
Rate of combustion @ full load	11.24 mm
Total wet weight (engine + radiator)	6000 kg
Length x Width x Height (mm)	2265 x 1400 x 1652 mm
Compression Ratio	13.8:1
Piston Speed	7.68 m/s
Governing / Class	Electronic / A1
Lubricating oil sump capacity	145 liter
Coolant capacity (engine + radiator)	280 liter
Combustion air intake @ 100% load (at 500)	65.9 m ³ /min
Fan air flow across radiator	434.3 m ³ /min
Exhaust Temperature	540 °C

Alternator specifications

Make	Stamtec
Frame size / Model No.	H25Y
Voltage Regulation	± 0.5%
Insulation	Class H
Standard Endframe	IP 23
Winding Pitch	2 / 3 Pitch
Stator Winding	Double Star / Δ
Bearing	Dynamic / helical
Wave form distortion	No load < 1.8 %, no distorting / balanced input load < 5 %
Teletone interference Factor	Better than 80
Total Harmonic Factor	Better than 2%

Conformance standards

IS/IEC 60034-1, IS 1460, ISO 8528, ISO 3046, IS 13018, ISO 9001

Rating definitions

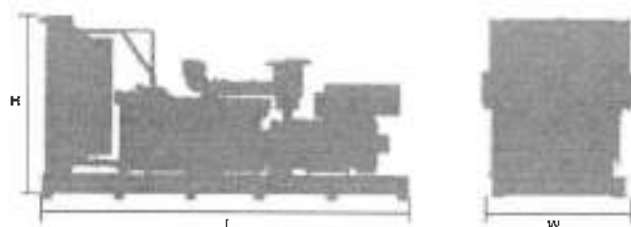
Prime Power (PPP)

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046.

- Fuel consumption data is based on diesel having specific gravity of 0.85 and conforming to IS: 1460
- Oil consumption data is based on oil having specific gravity of 0.89 and meeting CH4 API categories
- Fuel consumption tolerance is +5%

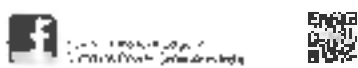
Typical diesel genset dimensions*

Genset Model	Rating (kW)	Length (mm)	Width (mm)	Height (mm)	Weight (kg)	Std Fuel Tank Capacity (Litres - External)
C1010 36 P	1010 kW	5660	2205	2695	9700 (with PCC)	900



Customer Power Generation Offices

- Beijing** Tel: 8610 5709 4111 Fax: 8610 5709 4122
- Bangkok** Tel: 662 252 2222 Fax: 662 252 2222
- Chengde** Tel: 8629 234 2222 Fax: 8629 234 2222
- Guangzhou** Tel: 8620 234 2222 Fax: 8620 234 2222
- Hong Kong** Tel: 852 234 2222 Fax: 852 234 2222
- London** Tel: 4420 234 2222 Fax: 4420 234 2222
- Manila** Tel: 632 234 2222 Fax: 632 234 2222
- Shanghai** Tel: 8621 234 2222 Fax: 8621 234 2222
- Singapore** Tel: 65234 2222 Fax: 65234 2222
- Taipei** Tel: 8862 234 2222 Fax: 8862 234 2222
- Yokohama** Tel: 8144 234 2222 Fax: 8144 234 2222



"Our energy working for you."

© 2013 Cummins Power Generation (Singapore) Pte Ltd
 Cummins Power Generation (Singapore) Pte Ltd is a wholly owned subsidiary of Cummins Power Generation (China) Limited. All rights reserved. Cummins Power Generation (Singapore) Pte Ltd is a registered company in Singapore. All other trademarks are the property of their respective owners. Cummins Power Generation (Singapore) Pte Ltd is a registered company in Singapore. All other trademarks are the property of their respective owners.



Cummins India Limited
 Power Generation Business Unit
 Cummins House, 2nd Floor,
 100, Park Road, Chennai - 600 029
 India. Tel: +91 44 234 2222
 Fax: +91 44 234 2222


Garuda Power Private Ltd Chhatrapati Road, Belduar Mega, Thiruvalla Thiruvalla, Pin No 786125, Dist: Thiruvalla Assam, India Contact Parts Department :- 9700051111 Contact Service Department :- 9700083110	Quotation	Quot No: 8400000224874 Dt: 22/11/2021 16:34:27 Cons Quot Ref:
	Customer Attendance Cell No. : 9435040000 E-Mail: enquiry@garudapower.com Tel No: 9173496285 Fax No: 03742305340 Web Site:	GSTIN No: 18AAACG3909132P PAN NO: AADCG3909A CIN NO: MSME NO:

Customer Ref: ve08l Dt: 22/11/2021 Product Group: Cummins BU Power Gen Price Tag: L1M	Supplier: 26439 GSTIN No.: 18AAACN999132P MSME NO:	Consigner: 26439 GSTIN No.: 18AAACN999132P MSME NO:
North Eastern Electric Power Corporation Assam Gas Based Power Project, Bokuloni Charak, DIBRUGARH Dist: Dibrugarh, Assam, India		North Eastern Electric Power Corporation Assam Gas Based Power Project, Bokuloni Charak, DIBRUGARH Dist: Dibrugarh, Assam, India

Sl No	Product No	Dist Part No	Description	HSN SAC	Unit	Qty	Rate	PAF %	PAF Amt	WSD %	F&D Amt	Ext Pst	GSST%	TGST Amt	SGST%	SUB Amt	RST %	RST Amt	GST Amt	Other Amt
0001	M-100V4-S601		100KVA Automatic DG Set powered by Cummins Engine Model M7A3905(MMF)	85824200	Pc	1.00	9646150.00	0	<0.00	0	0.00	0646150.00	9.00	58815.50	9.00	068152.50	0.00	0.00	1736307.00	11382457.00
Commercial Terms & Conditions																				
1. Delivery Schedule		Within 3-4 months of Order receipt																		
2. Payment Terms		30% advance and balance 70% on port stage receipt & ready for shipment by who transfer.																		
3. PRD Clause		Price is firm through the validity of the offer																		
4. Transportation		FOB destination																		
5. Insurance damages		Not acceptable																		
6. Insurance		Insurance to be done by you. We will intimate the document details as soon as the tender is successful to the transporter																		

Note: Flooring (PCC floor), Earth Pit Preparation (including materials), Roof, Arrangements for power distribution cables, Chargeover system etc are not within our scope	Total: 9646150.00												
Foot Note: * In case there be any GST related issue against our invoice Customer is requested to inform us in 30 days of submission of invoice. After expiry of 30 days we will not be in a position to entertain any change requests	<table border="1" style="width:100%; border-collapse: collapse; font-size: 8px;"> <tr> <th>Taxable Amt</th> <th>Tax Type</th> <th>Tax %</th> <th>Tax Value</th> </tr> <tr> <td>9646150.00</td> <td>TGST Charge @</td> <td>9%</td> <td>868153.50</td> </tr> <tr> <td>9646150.00</td> <td>SGST Debit @</td> <td>9%</td> <td>868153.50</td> </tr> </table>	Taxable Amt	Tax Type	Tax %	Tax Value	9646150.00	TGST Charge @	9%	868153.50	9646150.00	SGST Debit @	9%	868153.50
Taxable Amt	Tax Type	Tax %	Tax Value										
9646150.00	TGST Charge @	9%	868153.50										
9646150.00	SGST Debit @	9%	868153.50										
Total Taxable Amount : 9646150.00 Total GST Tax Amount : 1736307.00													

For: Garuda Power Private Ltd Authorized Signature:	Currency: Rupee Amount in words: One Crore Thirteen Lacs Eighty Two Thousand Four Hundred Fifty Seven Only	Validity: 22/11/2021 17:30:16 Round off: 0.00 Grand Total: 11382457.00
---	---	--

Garuda Power Private Ltd				Quotation										Quot No: 0488099221874		Dt: 22/11/2021 16:34:27							
 Gillepukhram Road, Bendorji Nagar, Tirunelveli Tirunelveli Pin No 788125 Dist Tirunelveli Assam, India Contact Parts Department - 9706009111 Contact Service Department - 9706009110				Customer Assistance Cell No 9435040000										Color Code Ref		GSTIN No: 18AAACG3908M12Q							
				E-Mail enquiry@garudapower.com										GSTIN No: 18AAACG3908M12Q		PAN NO: AADGG3908M							
Contact Parts Department - 9706009111				Tel No 9178458285										CIN NO:		MSME NO: -							
Contact Service Department - 9706009110				Fax No 03742385343																			
Web Site -																							
Customer Ref:				DI:				Product Group						Price Tag:									
Reference: 26439				GSTIN No: 18AAACG9991J32P				MSME NO:				Consignee: 26439				GSTIN No: 18AAACG9991J32P				MSME NO:			
North Eastern Electric Power Corporation																							
Sd no	Product No	Cost Part No	Description	MSH1 SAC	Un L	Qty	Rate	Net %	MSF Amt	FSD %	FSD Amt	En Amt	CGST%	CGST Amt	SGST%	SGST Amt	IGST %	IGST Amt	DBT Amt	Grand Amt			
7	Warranty for Garuda Branded M		Five years from the date of delivery of 9000 hp water pumps under no any manufacturing defect.																				
8	INSPECTION		Inspection to be done by company at our premises																				
9	SVC Clause		The statutory changes in local and central government laws shall be applicable from the date they are made effective.																				
10	Main Power Dependency		Unplanned power outage to be provided by the customer																				
11	Consumables		Consumables like Diesel, Water, Oil for Wp, Lub Oil is required to be provided by customer																				
Notes: Flooring (POC Floor), Earth P4 Preparation (including Materials), Roof, Arrangement for goods distribution cable, Changeover system etc are not within our scope										Total:		9646150.00						1738307.00		11342457.00			
										Taxable Amt		Tax Type		Tax %		Tax Value		Total Taxable Amount :		9646150.00			
										9646150.00		CGST Order @		9 %		868153.50		Total GST Tax Amount :		1738307.00			
										8644150.00		SGST Order @		9 %		864415.00							
Foot Note: * In case there be any GST related issues against our invoice Customer is requested to inform us in 30 days of submission of invoice. After expiry of 30 days we will not be in a position to entertain any change requests																							
For Garuda Power Private Ltd				Currency				Paper				Validly				22/12/2021 17:30:46							
Authorized Signature				Amount in Word				₹				One Crores Thirteen Lakhs Eighty Two Thousand Four Hundred Fifty Seven Only				Round off				0.00			
																Grand Total				11342457.00			