E-T E N D E R S P E C I F I C A T I O N

E- TENDER SPECIFICATION NUMBER
BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754

FOR

1. Erection and assistance for commissioning & Trial Operation including handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site of; Boiler and its auxiliaries, Boiler integral piping, Structure for bunker (BHEL Mfg units Supplied items), Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, SCR ready items, Lining and Insulation, Supply and application of touchup painting, (As and wherever required) package of Unit #1 at 2X660 MW NTPC Talcher Odisha

   And

2. Erection of Bunker & allied works, including supply & installation of items as per BOQ of Unit #1 at 2X660 MW NTPC Talcher Odisha

VOLUME I – TECHNICAL BID

THIS TENDER SPECIFICATION CONSISTS OF:

Notice Inviting Tender	
Volume-IA	**Technical Conditions of Contract**
Volume-IB	**Special conditions of Contract**
Volume-IC	**General conditions of Contract**
Volume-ID	**Forms & Procedures**
Volume-IE	**Technical Annexure**
Volume-II	**Price Bid**

Bharat Heavy Electricals Limited
(*A Government of India Undertaking*)
Power Sector - Western Region
345-Kingsway, Nagpur-440001

CONTENTS		
Volume No	Description	Hosted in website ww.bhel.com (Briefly) and detailed in BHEL e-Procurement Portal as files titled
NIL	Tender Specification Issue Details	(Part of **Vol-I-A-2754**)
NIL	Notice Inviting Tender	(Part of **Vol-I-A-2754**)
I-A	Technical Conditions of Contract	Vol-I-A-2754
I-B	Special Conditions of Contract	(Part of Vol-I-BCD-2754)
I-C	General Conditions of Contract	(Part of Vol-I-BCD-2754)
I-D	Forms & Procedures	(Part of Vol-I-BCD-2754)
I-E	Technical Annexure	Vol-I-E-2754
II	Price Bid Specification as specified in E-Procurement Portal	**Volume-II-PRICE-BID-2754**

E-T E N D E R S P E C I F I C A T I O N

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BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754

FOR

1. Erection and assistance for commissioning & Trial Operation including handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site of; Boiler and its auxiliaries, Boiler integral piping, Structure for bunker (BHEL Mfg units Supplied items), Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, SCR ready items, Lining and Insulation, Supply and application of touchup painting, (As and wherever required) package of Unit #1 at 2X660 MW NTPC Talcher Odisha

   And

2. Erection of Bunker & allied works, including supply & installation of items as per BOQ of Unit #1 at 2X660 MW NTPC Talcher Odisha

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION: Refer Notice Inviting Tender

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING VOLUME-I AND VOLUME- II ARE ISSUED TO:

M/s. ……

……..

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

GM (Purchase)
Place: Nagpur
Date:

2754

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Date: 19/04/2023

NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES

To,

Dear Sir/Madam,

Sub : NOTICE INVITING E-TENDER

Sealed offers in two part bid system (National competitive bidding (NCB) ~~or International Co07/11mpetitive Bidding (ICB~~ are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-1) through E-Procurement Portal https://eprocurebhel.co.in only, for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1.0 Salient Features of NIT

S No.	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754	
ii	**Broad Scope of job**	1. Erection and assistance for commissioning & Trial Operation including handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site of; Boiler and its auxiliaries, Boiler integral piping, Structure for bunker (BHEL Mfg units Supplied items), Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, SCR ready items, Lining and Insulation, Supply and application of touchup painting, (As and wherever required) package of Unit #1 at 2X660 MW NTPC Talcher Odisha And 2. Erection of Bunker & allied works, including supply & installation of items as per BOQ of Unit #1 at 2X660 MW NTPC Talcher Odisha	
iii	**DETAILS OF TENDER DOCUMENT**		
A	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc.*	*Applicable*
B	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
C	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
D	Volume-ID	*Forms and Procedures*	*Applicable*
~~E~~	Volume-IE	*Technical Specification*	*Applicable*
F	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	**Tender documents will be available for downloading from BHEL website (www.bhel.com) or e-procurement portal (https://eprocurebhel.co.in) as per schedule below:** ***Start: 19/04/2023, Time :18:00 Hrs***	*Applicable*

S No.	ISSUE	DESCRIPTION	
		Closes: 01/05/2023, Time: 13:00 Hrs Brief information of the tenders shall also be available at central public procurement portal. (***https://eprocure.gov.in/epublish/app***)	
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date: 01/05/2023, Time :13:00 Hrs*** The bidder should submit their offer online only in e-Procurement portal at https://eprocurebhel.co.in ***Bidders are requested to upload their offer well in advance in order to avoid last minute congestion at this website.*** Hard copy bid or bids through E-mail / fax shall not be accepted.	*Applicable*
vi	**OPENING OF TENDER (Techno-Commercial Bid)**	***Date: 01/05/2023, Time: 17:00 Hrs*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the opening of tender. For e-Tender, Bidder may witness the opening of tender through e-Procurement portal only.*	*Applicable*
vii	**EMD AMOUNT**	***Rs 90,00,000/- (Rupees Ninety Lakhs Only)*** ***Important Note: Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and procedure indicated in the NIT/GCC..***	*Applicable*
viii	**COST OF TENDER**	*NIL*	*Not Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	**One day before due date of offer submission.** Along with soft version also, addressing to undersigned & to others as per contact address given below: 1) Name: Tapish Kumar Designation: Manager Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Mobile-9010903666 Email :tapishkhandelwal@bhel.in 2) Mr. Kamlesh Kumar Designation: DGM Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001	*Applicable*

S No.	ISSUE	DESCRIPTION	
		Email: kamleshbhel@bhel.in Mob: 9425554615 3) Name: R. M. Malhotra Designation: GM Deptt: Purchase Address: Floor no. 5 & 6, Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Email :rmalhotra@bhel.in	
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	ONLINE PRE BID DISCUSSION through **Microsoft Teams meeting** shall start **at 11:00AM on 24/04/2023.** Details of online meeting are following- **Meeting ID: 455 268 012 271** **Passcode: 4XspQ8** **Meeting Link-** https://bit.ly/41x9TbB	***Applicable***
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	*1) Shri Otem Dai, IAS (Retd.)* *2) Shri Bishwamitra Pandey, IRAS (Retd.)* *3) Shri Mukesh Mittal, IRS (Retd.)*	***Applicable***
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com**-->**Tender Notifications →View Corrigendum), Central Public Procurement portal (https://eprocure.gov.in/epublish/app) & on e-tender portal https://eprocurebhel.co.in **and not in the newspapers**. Bidders to keep themselves updated with all such information.	

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed digitally using Class III DSC & uploaded in E-Procurement Portal, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 Not Used

4.0 Unless specifically stated otherwise, bidder shall deposit EMD as per clause 1.9 of General Conditions of Contract.

For Electronic Fund Transfer the details are as below-:

NAME OF THE BENEFICIARY	BHARAT HEAVY ELECTRICALS LTD
ADDRESS OF THE COMPANY	5th Floor, SHREE MOHINI COMPLEX 345, KINGSWAY,NAGPUR
NAME OF BANK	STATE BANK OF INDIA
NAME OF BANK BRANCH AND BRANCH CODE	SBI,NAGPUR MAIN BRANCH ,CODE-00432

CITY	NAGPUR
ACCOUNT NUMBER	40227423158
ACCOUNT TYPE	MC-C C Clean (C&I)
IFSC CODE OF THE BENEFICIARY BANK BRANCH	SBIN0000432
MICR CODE OF THE BANK BRANCH	440002002

(Note -: In case of E-Tenders, proof of remittance of EMD should be uploaded in the E-Procurement Portal and originals, as applicable, shall be sent to the officer inviting tender within a reasonable time, failing which the offer is liable to be rejected.

(Note -: In case of E-Tenders, proof of remittance of EMD should be uploaded in the E-Procurement Portal and originals, as applicable, shall be sent to the officer inviting tender within a reasonable time, failing which the offer is liable to be rejected.

5.0 **Procedure for Submission of Tenders**:

This is an E-tender floated online through our E-Procurement Site **(https://eprocurebhel.co.in)**. The bidder should respond by submitting their offer online only in our e-Procurement platform at **(https://eprocurebhel.co.in).** Offers are invited in two-parts only.

Documents Comprising the e-Tender

The tender shall be submitted online ONLY EXCEPT EMD (in physical form) as mentioned below:

a. Technical Tender (UN priced Tender)

All Technical details (e.g. Eligibility Criteria requested (as mentioned below)) should be attached in e-tendering module, failing which the tender stands invalid & may be REJECTED. Bidders shall furnish the following information along with technical tender (preferably in pdf format):

- ~~**i.**~~ Earnest Money Deposit (EMD) furnished in accordance with NIT Clause 4.0. ~~Alternatively, documentary evidence for claiming exemption as per clause 29 of NIT.~~
- **ii.** Technical Bid (without indicating any prices).

b. Price Bid:

i. Prices are to be quoted in the attached Price Bid format online on e-tender portal.
ii. The price should be quoted for the accounting unit indicated in the e-tender document.

Note:

- It is the responsibility of tenderer to go through the Tender document to ensure furnishing all required documents in addition to above, if any. Any deviation would result in REJECTION of tender and would not be considered at a later stage at any cost by BHEL.
- A person signing (manually or digitally) the tender form or any documents forming part of the contract on behalf of another shall be deemed to warrantee that he has authority to bind such other persons and if, on enquiry, it appears that the persons so signing had no authority to do so, the purchaser may, without prejudice to other civil and criminal remedies, cancel the contract and hold the signatory liable for all cost and damages.

- A tender, which does not fulfil any of the above requirements and/or gives evasive information/reply against any such requirement, shall be liable to be ignored and rejected.

DO NOT'S

Bidders are requested NOT to submit the hard copy of the Bid. In case offer is sent through hard copy/fax/telex/cable/electronically in place of e-tender, the same shall not be considered. **Also, uploading of the price bid in prequalification bid or technical bid may RESULT IN REJECTION of the tender**.

Digital Signing of e-Tender

Tenders shall be uploaded with all relevant PDF/zip format. The relevant tender documents should be uploaded by an authorized person having Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION digital signature certificate (DSC).

The Requirement:

1. A PC with Internet connectivity &
2. DSC (Digital Signature Certificate) (**Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION**)

BHEL has finalized the e-procurement service Provider-:
NIC PORTAL (https://eprocurebhel.co.in)

For E-PROCUREMENT ASSISTANCE & TRAINING, NIC PORTAL HELPDESK CONTACTS AS PER FOLLOWING:

For any technical related queries, please call at 24 x 7 Help Desk Number
0120-4001 002
0120-4200 462
0120-4001 005
0120-6277 787
1. Peter Raj, NIC, Ph: 9942069052
Email Support: support-eproc@nic.in
Other details/update yourself from : https://eprocurebhel.co.in

The process of utilizing e-procurement necessitates usage of **DSC (Digital Signature Certificate) (Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION)** and you are requested to procure the same immediately, if not presently available with you. Please note that only with DSC, you will be able to login the e-procurement secured site and take part in the tendering process.

The contact details of the DSC certifying authority:-
please refer http://www.mca.gov.in/ →MCA SERVICES → DSC SERVICES

Vendors are requested to go through seller manual available on https://eprocurebhel.co.in.

~~**Procedure for Submission of Tenders (To be used in case of Paper bid only):** The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:~~

- ~~PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)~~
- ~~PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)~~

One set of tender documents shall be retained by the bidder for their reference

6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped) (To be used in case of Paper bid only):**

Sl. no.	Description	Remarks
	Part-I A	
	ENVELOPE – I superscribed as: PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING:**	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc. as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph. no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc. pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled in annexures, formats etc. as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc.	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD)	

	~~TENDER NO :~~ ~~NAME OF WORK :~~ ~~PROJECT:~~ ~~DUE DATE OF SUBMISSION:~~ ~~**CONTAINING THE FOLLOWING:**~~	
	~~Earnest Money Deposit (EMD) in the form as indicated in this Tender~~	

	~~**PART-II**~~	
	~~**PRICE BID** consisting of the following shall be enclosed~~	
	~~**ENVELOPE-III**~~ ~~superscribed as:~~ ~~PART-II (PRICE BID)~~ ~~TENDER NO :~~ ~~NAME OF WORK :~~ ~~PROJECT:~~ ~~DUE DATE OF SUBMISSION:~~ ~~**CONTAINING THE FOLLOWING**~~	
~~i~~	~~Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I~~	
~~ii~~	~~Volume II – PRICE BID (Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures)~~	

	~~**OUTER COVER**~~	
	~~**ENVELOPE-IV** (MAIN ENVELOPE / OUTER ENVELOPE)~~ ~~superscribed as:~~ ~~TECHNO-COMMERCIAL BID, PRICE BID & EMD~~ ~~TENDER NO:~~ ~~NAME OF WORK:~~ ~~PROJECT:~~ ~~DUE DATE OF SUBMISSION:~~ ~~**CONTAINING THE FOLLOWING:**~~	
~~i~~	~~o Envelopes I~~ ~~o Envelopes II~~ ~~o Envelopes III~~	

- **SPECIAL NOTE: All documents/ annexures to be submitted should be uploaded in respective places in the E-Tender portal as per the list mentioned given in this NIT. BHEL shall not be responsible for any in-complete documents.**

7.0 Deviation with respect to tender clauses and additional clauses/suggestions in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.

8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9.0 Assessment of Capacity of Bidders:

Bidder's capacity for executing the job under tender shall be assessed based on its 'LOAD and PERFORMANCE' and 'AVERAGE ANNUAL TURNOVER', as per the following:

I. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The cut off month

for reckoning 'Load' shall be the 3rd Month preceding the month corresponding to the 'latest date of bid submission', in the following manner -

(**Note:** For example, if latest bid submission is in Jan 2017, then the 'load' shall be calculated up to and inclusive of Oct 2016)

Total number of Packages in hand = Load (P)

Where 'P' is the sum of all unit wise identified packages (refer table-1) under execution with BHEL Regions as on the cut off month defined above, including packages yet to be commenced, excepting packages which are on Long Hold.

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (under execution/ executed during the 'Period of Assessment' in all Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding and including the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the 3rd Month preceding the month corresponding to 'latest date of bid submission', in the following manner:

(**Note**: For example, if 'latest date of bid submission' is in Jan 2017, then the 'performance' shall be assessed for a 6 months' period up to and inclusive of Oct 2016 (i.e. from May 2016 to Oct 2016), for all the unit wise identified packages (refer Table I))

i). Calculation of Overall 'Performance Rating' for 'Similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) P_1, P_2, P_3, P_4, P_5 , …. P_N etc. be the packages (under execution/ executed during the 'Period of Assessment' in all Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \ldots P_N$)

b) Number of Months 'T_1' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1. Similarly T_2 for package P_2,T_3 for package P_3, etc. for the tendered scope. Now calculate cumulative total months '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + \ldots T_N$)

c) Sum 'S_1 'of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$…. $S_{1\text{-}T1}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e. $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}T1}$). Similarly, S_2 for package P_2 for period T_2, S_3 for package P_3 for period T_3 etc. for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly

Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. 'S_T '= S_1+ S_2+ S_3+ S_4+ S_5+…. S_N.)

d) **Overall Performance Rating 'R_{BHEL}' for the Similar Package/Packages** (under execution/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL

$$= \frac{\text{Aggregate of Performance scores for all similar packages in all the Regions}}{\text{Aggregate of months for each of the similar packages for which performance should have been evaluated in all the Regions}}$$

$$= \frac{S_T}{T_T}$$

e) Bidders to note that the risk of non-evaluation or non-availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder.

f) Table showing methodology for calculating 'a', 'b' and 'c' above

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No. of similar packages for all Regions = $\mathbf{P_T}$ i.e. Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment' for corresponding Similar Packages (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$

Sl. No.	**Item Description**	**Details for all Regions**							**Total**
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	--------
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

ii). Calculation of Overall 'Performance Rating' (**R_{BHEL}**) in case at least 6 evaluation scores for 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. 'R_{BHEL}' shall be calculated subject to availability of 'performance scores' for at least 6 'package months' in the order of precedence below:

a) 'Period of Assessment' i.e. 6 months preceding and including the cut-off month

b) 12 months preceding and including the cut-off month

c) 24 months preceding and including the cut-off month

In case, R_{BHEL} cannot be calculated as above, then Bidder shall be treated as 'NEW VENDOR'. Further eligibility and qualification of this bidder shall be as per definition of 'NEW VENDOR' described in 'Explanatory Notes'.

iii). Factor "L" assigned based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions:

Sl. no.	Overall Performance Rating (R_{BHEL})	Corresponding Value of 'L'
1	=60	NA
2	> 60 and ≤ 65	0.5
3	> 65 and ≤ 70	0.45
4	> 70 and ≤ 75	0.4
5	> 75 and ≤ 80	0.375
6	> 80 and < 90	0.35
7	≥90	0.33

iv). Performance Systems: The performance rating as mentioned in II (i) and (ii) above, shall be calculated as per Online Systems i.e. Contractor Performance Evaluation System (CPES) and Safety Performance Evaluation System (HSEPES). The scores assigned in HSEPES shall be scaled down to 10 and assigned in CPES against the category "HSE" (mentioned in Form F-15).

III. i) 'Assessment of Capacity based on 'LOAD and PERFORMANCE':

a) 'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:
Max number of packages P_{Max}= (R_{BHEL} - 60) divided by corresponding value of 'L', i.e. (R_{BHEL}-60)/L

Note:

i). In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number

ii). For R_{BHEL} = 60, P_{Max} = '1'

The Bidder shall be considered 'Qualified' on 'Performance basis' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$
(Where P is calculated as per clause 'I' above)

b) In addition to above, in case contractor fails to score 5 or more than 5 (five) marks in the scaled down scores of HSEPES for "3 or more than 3 months in a period of 6 months preceding and including the cut-off month in any single package", the contractor shall be considered disqualified for ongoing tender(s) of BHEL. Qualification of bidder for further tendering process shall be subject to qualifying this condition in addition to qualifying requirements mentioned in PQR. Bidders who did not qualify this condition shall not be considered under the provisions of clause 9 IV (iv) of NIT.

ii) Assessment of Capacity based on 'AVERAGE ANNUAL TURNOVER':

If the 'value of contracts in hand' across all PS Regions by a contractor is less than the product of "annual average turnover of the Contractor and multiplying factor", then such bidder shall be considered qualified on 'Annual Average Turnover basis'. The 'value of contracts in hand' will be computed by summing up "50% of the annualized awarded value of each contract" unless performance evaluation is not closed in the online CPES.

Based on the performance rating of the Contractor, the above mentioned multiplying factor shall be as below:

Sl. no.	Overall Performance Rating (R_{BHEL})	(Multiplying factor to Average Annual Turnover)
1	≥ 60 and ≤ 70	1
2	> 70 and ≤ 80	2
3	> 80	3

'Assessment of Capacity of Bidder':

The bidder will be considered qualified for the tender if it qualifies on 'Load and Performance basis' as well as on 'Average Annual Turnover basis'.

However, 'New Vendor'/ 'Consortium Partner' shall be considered qualified based on only 'Load and Performance' (they will be regarded pre-qualified on 'Average Annual Turnover' criteria).

IV. **Explanatory note**:

i). Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or C&I etc. at the individual level irrespective of rating of Plant and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, C&I, Civil, Structure etc. is considered individual level of package. For example, in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e. the 'identified packages as per TabIe-1 below), the 'PERFORMANCE' part against sl.no. II above, needs to be evaluated considering all the identified packages (i.e. Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above.

ii). Identified Packages (Unit wise)

Table-1

Civil	Electrical and C&I	Mechanical
i). Enabling works	i). Electrical	i). Boiler & Aux (All types including CW Piping if applicable)
ii). Pile and Pile Caps	ii). C&I	ii). Power Cycle Piping/Critical Piping
iii). Civil Works including foundations	iii). Others (Elect. and C&I)	iii). ESP
iv). Structural Steel Fabrication & Erection	iv). Electrical Enabling Works	iv). LP Piping
v). Chimney		v). Steam Turbine Generator set & Aux
vi). Cooling Tower		vi). Gas Turbine Generator set & Aux
vii). Others (Civil)		vii). Hydro Turbine Generator set & Aux
		viii). Turbo Blower (including Steam Turbine)
		ix). Material Management
		x). FGD

		xi). ACC xii). Others (Mechanical)

iii). Bidders who have not been evaluated for at least six package months in the last 24 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions, shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions.

A 'NEW VENDOR' if awarded a job (of package/packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI from BHEL.

The "FIRST TIMER" tag shall remain till completion of all the contracts against which vendor has been tagged as First Timer or availability of 6 evaluation scores within last 24 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions.

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Assessment of Capacity of Bidders'.

iv). Consequent upon applying the criteria of 'Assessment of Capacity of Bidders' detailed above on all the bidders qualified against Technical and Financial Qualification criteria, if the number of qualified bidders reduces to less than four, then for further processing of the Tender, BHEL at its discretion reserves the right to also consider the bidders who are "not qualified" as per criteria of 'Assessment of Capacity of Bidders' and for this, procedure described in following three options shall be followed:

a) All the bidders having Overall Performance Rating ('R_{BHEL}') ≥60 shall be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
b) If even after using option "a", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a", "First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
c) If even after using option "a" and "b", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a" and "b", "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

Note:- In case, the number of bidders qualified against Technical and Financial Qualification criteria itself is less than four, then all bidders (a)- having Overall Performance Rating ('R_{BHEL}') ≥60, (b)- First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month, (c)- "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall be considered qualified against criteria of 'Assessment of Capacity of Bidders' for further processing of tender.

v). 'Under execution' shall mean works in progress as per the following:

a. Up to execution of 90% of anticipated Contract Value in case of Civil, MM, Structural and Turbo Blower Packages

b. Up to Steam Blowing in case of Boiler/ESP/Piping Packages

c. Up to Synchronization in all Balance Packages

Note: BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (a), (b) and (c) above, depending upon the balance scope of work to be completed.

vi). Contractor shall provide the latest contact details i.e. mail-ID and Correspondence Address to SCT Department, so that same can be entered in the Contractor Performance Evaluation System, and in case of any change/discrepancy same shall be informed immediately. Login Details for viewing scores in Contractor Performance Evaluation System shall be provided to the Contractor by SCT Department.

vii). Performance Evaluation for Activity Month shall be completed in Evaluation Month (i.e. month next to Activity Month) or in rare cases in Post Evaluation Month (i.e. month next to Evaluation Month) after approval from Competent Authority. In case scores are not acceptable, Contractor can submit Review Request to GM Site/ GM Project latest by 27th of Evaluation Month or 5 days after approval of score, whichever is later. However, acceptance/rejection of 'Review Request' solely depends on the discretion of GM Site/GM Project. After acceptance of Review Request, evaluation score shall be reviewed at site and the score after completion of review process shall be acceptable and binding on the contractor.

viii). Project on Hold due to reasons not attributable to bidder -

a. **Short hold:** Evaluation shall not be applicable for this period, however, Loading will be considered.

b. **Long hold:** Short hold for continuous six months and beyond or hold on account of Force Majeure shall be considered as Long Hold. Evaluation as well as Loading shall not be considered for this period.

ix). Performance evaluation as specified above in this clause is applicable to Prime bidder and Consortium partner (or Technical tie up partner) for their respective scope of work

10.0 Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc. before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail and/or through e-procurement portal **https://eprocurebhel.co.in**, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc. or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.

15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**

"Integrity Pact (IP)"

(a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

Sl. No.	IEM	Email
1.	*Shri Otem Dai, IAS (Retd.)*	iem1@bhel.in
2.	*Shri Bishwamitra Pandey, IRAS (Retd.)*	Iem2@bhel.in
3.	*Shri Mukesh Mittal, IRS (Retd.)*	Iem3@bhel.in

(b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

(c) Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only.

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:

Details of contact person(s):

Name:	R M Malhotra/ GM (Purchase)	Tapish Kumar/Manager (Purchase)
Dept:	Purchase Department	
Address:	Floor No. 5 & 6, Shreemohini Complex, 345 Kingsway, Nagpur-440001	
Email:	rmalhotra@bhel.in	tapishkhandelwal@bhel.in
Phone:		9010903666

16.0 The Bidder has to satisfy the Pre-Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre-Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.

17.0 In case BHEL decides on a `Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorized representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.

18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.

19.0 **Reverse Auction:** "BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) (https://www.bhel.com/guidelines-reverse-auction-2021) for this tender. RA shall be conducted among the techno-commercially qualified bidders.

Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."

Note:-

1. No benefits to MSE bidders w.r.t Reverse Auction Guidelines as available on www.bhel.com against works contract.

2. In case of enquiry through e-procurement the sealed electronic price bid (e-bid) is to be treated as sealed envelope price bid.

20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.

21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.

22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.

23.0 ~~Consortium Bidding (or Technical Tie up) shall be allowed only if specified in Pre-Qualifying Requirement (PQR) criteria, and in such a case the following shall be complied with:~~

~~23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement for the said contract with a validity period of six months initially. In case bidder becomes L1, Consortium Agreement valid till contractual completion period shall be submitted to BHEL before signing the contract. Consortium Agreement shall be kept valid till scope of work awarded to consortium partner(s) as per contract is completed.~~

~~23.2 'Standalone' bidder cannot become a '**Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non-compliance, consortium bids of such Prime bidders will be rejected.~~

~~23.3 Number of partners for a Consortium Bidding (or Technical Tie up) including Prime Bidder shall be NOT more than 3 (three).~~

~~23.4 Prime Bidder shall be as specified in the Pre-Qualification Requirement, else the bidder who has the major share of work.~~

~~23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder' as specified in clause 9.0.~~

~~23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'.~~

~~23.7 Prime Bidder shall comply with all other Pre-Qualifying criteria for the Tender unless otherwise specified~~

~~23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.~~

~~23.9 Prime Bidder shall be responsible for the overall execution of the contract.~~

~~23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats.~~

~~23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL and BHEL shall take necessary action as per extant guidelines. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.~~

~~23.12 In case Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL.~~

~~23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of one work with a consortium partner under direct order of BHEL, the Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders.~~

~~23.14 The consortium partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 0.5% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value. However, Prime Bidder has also option for submission of SD on behalf of consortium partner (s).~~

~~SD submitted by Consortium Partner(s) may be released in case corresponding scope of work of the respective Consortium partner(s) has been completed upto the extent of 80% based on certification by Construction Manager and concurrence by the prime bidder.~~

~~23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also.~~

24.0 The bidder shall submit/upload documents in support of possession of 'Qualifying Requirements' duly self-certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

25.0 The bidder may have to produce original document for verification if so decided by BHEL.

26.0 The consultant / firm (and any of its affiliates) shall not be eligible to participate in tender(s) for the related works or services for the same project, if they were engaged for the consultancy services.

27.0 Guidelines/rules in respect of Suspension of Business dealings, Vendor evaluation format, Quality, Safety & HSE guidelines, Experience Certificate, etc. may undergo change from time to time and the latest one shall be followed. The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' is available on www.bhel.com on "**supplier registration page**".

28.0 The offers of the bidders who are on the banned/ hold list and also the offer of the bidders, who engage the services of the banned/ hold firms, shall be rejected. The list of **banned/ hold firms** is available on BHEL web site www.bhel.com.

28.1 Integrity commitment, performance of the contract and punitive action thereof:

28.1.1 Commitment by BHEL:

BHEL commits to take all measures necessary to prevent corruption in connection with the tender Process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

28.1.2 Commitment by Bidder/ Supplier/ Contractor:

(i) The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.

(ii) The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.

(iii) The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage indulges in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the prices or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extent guidelines of the company available on www.bhel.com and / or under applicable legal provisions.

29.0 ~~Micro and Small Enterprises (MSE)~~

~~Any Bidder falling under MSE category, shall furnish the following details & submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer.~~

~~Type under MSE~~	~~SC/ST owned~~	~~Women owned~~	~~Others (excluding SC/ ST & Women Owned)~~
~~Micro~~			
~~Small~~			

~~**Note: -** If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.~~

~~*a)* MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS & DC, MSME) only if they submit along with the offer, attested copies of either Udyam Registration Certificate or EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or Udyog Aadhar Memorandum (UAM) & Acknowledgement or EM-II Certificate along with attested copy of a CA certificate (format enclosed as Annexure – 3) where deemed validity of EM-II certificate of five years has expired applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the last date of Technical Bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer. Documents submitted by the bidder may be verified by BHEL for rendering the applicable benefits.~~

30.0 The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

31.0 **PREFERENCE TO MAKE IN INDIA:**

For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/Non-Local Supplier and purchase preferences to Class I local supplier, is as defined I Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT.

31.1 Compliance to Restrictions under Rule 144 (xi) of GFR 2017

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. The Competent Authority for the purpose of this Clause shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Clause means: -

a. An entity incorporated established or registered in such a country; or
b. A subsidiary of an entity incorporated established or registered in such a country; or
c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
d. An entity whose beneficial owner is situated in such a country; or
e. An Indian (or other) agent of such an entity; or
f. A natural person who is a citizen of such a country; or
g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

IV. The beneficial owner for the purpose of (III) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.
   Explanation
   a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company.
   b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.
2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.
3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person has ownership of or entitlement to more than fifteen percent of the property or capital or profits of the such association or body of individuals.
4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

Note:

(i) The bidder shall provide undertaking for their compliance to this Clause, in the Format provided in **Annexure-11.**

(ii) Registration of the bidder with Competent Authority should be valid at the time of submission as well as acceptance of the bids.

32.0 ~~Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection.~~
~~All overwriting/cutting, etc., will be numbered by bid opening officials and announced during bid opening~~.

33.0 In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.

In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/ draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).

Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.

34.0 The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.

35.0 Order of Precedence:

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments/Clarifications/Corrigenda/Errata etc. issued in respect of the tender documents by BHEL
b. Notice Inviting Tender (NIT)
c. Price Bid
d. Technical Conditions of Contract (TCC)—Volume-1A
e. Special Conditions of Contract (SCC) —Volume-1B
f. General Conditions of Contract (GCC) —Volume-1C
g. Forms and Procedures —Volume-1D

It may please be noted that guidelines/ circulars/ amendments/ govt. directives issued from time to time shall also be applicable.

For BHARAT HEAVY ELECTRICALS LTD

(General Manager - Purchase)

Enclosure:

1.0 Annexure-1: Pre Qualifying Requirements.
2.0 Annexure-2: Check List.
~~3.0 Annexure-3: Certificate by Chartered Accountant~~
4.0 Annexure-4: Reverse Auction Process Compliance Form
5.0 Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process

6.0 Annexure-6: RA Price Confirmation and Breakup
7.0 Annexure-7: Integrity Pact
8.0 Annexure-8: Undertaking as per PQR C4 of Annexure-1 i.e. PQR
9.0 Annexure-9: Declaration reg. Related Firms & their areas of Activities
10.0 Annexure-10: Declaration regarding minimum local content
11.0 Annexure-11: Declaration regarding compliance to restrictions under rule 144 (xi) of GFR 2017
12.0 Annexure 12: Important information.

ANNEXURE-1

PRE QUALIFYING CRITERIA

E-Tender Spec No: BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754	
JOB	1. Erection and assistance for commissioning & Trial Operation including handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site of; Boiler and its auxiliaries, Boiler integral piping, Structure for bunker (BHEL Mfg units Supplied items), Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, SCR ready items, Lining and Insulation, Supply and application of touchup painting, (As and wherever required) package of Unit #1 at 2X660 MW NTPC Talcher Odisha And 2. Erection of Bunker & allied works, including supply & installation of items as per BOQ of Unit #1 at 2X660 MW NTPC Talcher Odisha

S No	**PRE QUALIFICATION CRITERIA**	**Bidders claim in respect of fulfilling the PQR Criteria**	
		Applicability	
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder ~~& Consortium /Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder~~)	**Applicable**	
B	**B) <u>Technical PQR</u>** **B.1: Not Applicable** **B.2:** Bidder should have Executed One Boiler (Consisting of "Pressure Parts" and "Structure" of same unit as standalone Bidder (i.e. without any consortium)) of Unit rating ≥190 MW.	Applicable	
C-1	**FINANCIAL TURNOVER** Bidders must have achieved an average annual financial turnover (audited) of **₹ 2400 Lakhs or more over last three Financial Years (FY) i.e. '2019-20, 2020-21 & 2021-22'.**	Applicable	
C-2	**<u>NETWORTH</u>** (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive.	Applicable	
C-3	**<u>PROFIT</u>** Bidder must have earned profit in any one of the three Financial Years as applicable in the last three Financial Years as furnished for 'C-1 above.	Applicable	

C-4	Bidder must not be under Insolvency Resolution Process or Liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render him ineligible for participation in this tender, and shall submit undertaking (**Annexure-8**) to this effect	Applicable	
D	**Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)** Applicable, The "Assessment of Capacity of Bidders" for this Tender shall be carried out by considering the identified packages i.e. **"BOILER"**.	Applicable	
~~**E**~~	**Approval of Customer (if applicable)**	**Not Applicable**	
F	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E		BY BHEL
~~**G**~~	~~Consortium tie-ups~~	**Not Applicable**	

Explanatory Notes for the PQR (unless otherwise specified in the PQR):

Explanatory Notes for PQR B.1 (Technical)

1. The evaluation currency for this tender shall be INR.
2. For the criteria (B.1), actual executed value shall be considered**.**

3. Value of work is to be updated with indices for "All India Avg. Consumer Price index for industrial workers" and "Monthly Whole Sale Price Index for All Commodities" with base month as per last month of work execution and indexed up to three (3) months prior to the month of latest due date of bid submission as per following formula-

$$P = R + 0.425 \times R \times \frac{(X_N - X_0)}{X_0} + 0.425 \times R \times \frac{(Y_N - Y_0)}{Y_0}$$

Where

P = Updated value of work

R = Value of executed work

X_N = All India Avg. Consumer Price index for industrial workers for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).

X_0 = All India Avg. Consumer Price index for industrial workers for last month of work execution

Y_N = Monthly Whole Sale Price Index for All Commodities for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).

Y_0 = Monthly Whole Sale Price Index for All Commodities for last month of work execution

Explanatory Notes for Technical Criteria (B2):

1. VOID
2. Unless otherwise specified, for the purpose of "B2 Technical Criteria", the word 'EXECUTED' means achievement of milestones as defined below -
   a. "ACHIEVEMENT OF PHYSICAL QUANTITIES" as per PQRs.
   b. "READINESS FOR COAL FILLING" of at least one Bunker, in respect of Mill Bunker Structure.

c. "CHARGING" in respect of Power Transformers/ Bus Ducts/ "HT/LT Switchgears" / "HT/LT Cabling".
d. For C&I works: "SYNCHRONISATION" in case of power project (Excluding Nuclear Projects) / "WORK EXECUTION of the value as defined in PQR" in case of industry & Nuclear Projects.
e. "BOILER LIGHT UP" in respect of Boiler / CFBC / ESP.
f. "CHARGING OF ATLEAST ONE PASS" in respect of ESP(R&M)
g. "GAS IN" in respect of HRSG.
h. "STEAM BLOWING" in respect of Power Cycle Piping.
i. "HYDRAULIC TEST"/ ANY OTHER EQUIVALENT TEST LIKE "100% RT/UT OF WELDED JOINTS" of the system in respect of Pressure parts/ LP Piping/CW Piping.
j. "FULL LOAD OPERATION OF THE UNIT" in respect of Insulation work.
k. "SYNCHRONISATION" in respect of STG / GTG.
l. "SPINNING" in respect of HTG.
m. "GAS IN" in respect of FGD

3. Boiler means HRSG or WHRB or any other types of Steam Generator.
4. Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass.
5. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5 TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating of the same in terms of MW shall be considered for evaluation.

Explanatory Notes for PQR -C (Financial):

C-1:

i. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above.
ii. Evaluation of Turnover criteria shall be calculated from the Audited Balance Sheet and Profit & Loss Account for the three Financial Years (FY).
iii. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years.
iv. If financial statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant.

C-2: Net Worth (Only in case of companies) of the bidder should be positive.

Note: Net worth shall be calculated based on the latest Audited Accounts as furnished for 'C-1' above.
Net worth = Paid up share capital + Reserves

C-3: Bidder must have earned profit in any one of the three financial years as applicable in the last three financial years as furnished for 'C-1' above.

Note: PROFIT shall be PBT earned during any one year of last three financial years as in 'C-1' above.

C-4: Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR, which will render him ineligible for participation in this tender, and shall submit undertaking to this effect.

Common Explanatory Notes:

1. For evaluation of PQR, in case Bidder alone does not meet the pre-qualifying technical criteria B1 above, bidder may utilize the experience of its Parent/ Subsidiary Company along with its own experience, subject to following:
   a. The parent company shall have a controlling stake of ≥50% in the subsidiary company (as per Format-1).

b. The Parent Company/ Subsidiary Company of which experience is being utilized for bidding shall submit Security Deposit(SD) equivalent to 1% of the total contract value
c. The parent/ subsidiary company and bidder shall provide an undertaking that they are jointly or severally responsible for successful performance of the contract (as per Format-2).
d. In case Bidder is submitting bid as a Consortium Partner, option of utilizing experience of parent/subsidiary Company can be availed by Prime Bidder only.
e. Parent Company/ Subsidiary Company of which experience is being used for bidding, cannot participate as a 'Standalone Bidder' or as a 'Consortium bidder'.

2. Completion date for achievement of the technical criteria specified in the 'B' above should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work. Completion date shall be reckoned from the " Financial Year quarter of bid submission". (for e.g. -Work completed on 01.01.2014 shall be considered even if latest date of bid submission is 20.03.2021).
3. "Executed" means the bidder should have achieved the technical criteria specified in the Common QR even if the Contract has not been completed or closed.
4. In case the Experience/PO/WO certificate enclosed by bidders do not have separate break up of prices for the E&C portion for Electrical and C&I works (i.e. the certificates enclosed are for composite order for supply and erection of Electrical and C&I and other works if any), then value of Erection & Commissioning for the Electrical and C&I portion shall be considered as 15% of the price for supply & erection of Electrical and C&I.
5. Following shall be complied with in case of consortium:
   a. The Prime Bidder and Consortium Partner(s) are required to enter in to a consortium agreement and certify to BHEL regarding existence and validity of their consortium agreement in line with validity period mentioned in NIT.
   b. Prime Bidder and Consortium partners shall be approved by Customer for being considered for the tender (applicable if customer approval is required).
   c. Number of partners including prime Bidder shall be NOT more than 3 (three).
   d. Prime Bidder alone shall necessarily comply with "B1Technical Criteria" except for mechanical package where B1 criteria is not applicable.
   e. Prime Bidder and Consortium Partner shall together comply with the 'Pre-Qualification Requirements' specified for the respective category of technical requirement as per "B2 technical criteria".
   f. Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified.
   g. All other conditions shall be read in conjunction with clause no 23.0 of NIT.
   h. Prime Bidder shall be the Bidder who has a major share of work.
   i. Prime Bidder shall be responsible for the overall execution of the Contract.
   j. Performance shall be evaluated for Prime Bidder and the Consortium partner for their respective scope of work.
   k. In case the Consortium partner backs out, another consortium partner meeting the QRs, has to be engaged by Prime Bidder and if not, the respective work will be withdrawn and executed on risk and cost basis of the prime bidder.
   l. In case Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL
   m. After successful execution of one work with a consortium partner under direct orders of BHEL, the

Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders.

n. The Consortium partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value.

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT INCLUSIVE OF WORK ORDER AND WORK COMPLETION CERTIFICATE ETC IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

Credentials submitted by the bidder against "PRE QUALIFYING CRITERIAS" shall be verified for its authenticity. In case, any credential (s) is/are found unauthentic, offer of the bidder is liable to the rejection. BHEL reserves the right to initiate any further action as per extant guidelines for Suspension of Business Dealings.

Format-1

Certificate for relationship between Parent Company / Subsidiary Company and the bidder

To,
.....

.....

Dear Sir,

Sub: Bid for NIT No .....dated..... for "....." (name of the tender).

We hereby certify that M/s..... is Parent Company/ Subsidiary Company of M/s.....(the bidder) and details of equity holding of the Parent Company in Subsidiary Company as on .....(not earlier than seven days prior to the Bid Submission Date) are given as below:

Name of Parent Company	Name of Subsidiary Company	Percentage of Equity Holding of Parent Company in Subsidiary Company

(Insert Name and Signature of Statutory Auditor or practicing Company Secretary of the Bidder)

Format-2

Undertaking from the Parent Company/ Subsidiary Company of the bidder

(On the Letter Head of Parent Company/ Subsidiary Company, as applicable)

From,
Name:
Full Address:

Telephone No.:
E-mail address:
Fax/No.:

To,
.....
.....

Dear Sir,

We refer to the NIT No ..... dated..... for "....." (name of the Tender).

"We have carefully read and examined in detail the NIT/Tender Terms and Conditions, including in particular, Clause .... of the NIT/Tender, regarding submission of an Undertaking, as per the prescribed Format 1 of the NIT/ Tender.

We confirm that M/s.....(the Bidder) has been authorized by us to use our Technical capability for meeting the Technical Criteria as specified in Clause.....of the PQR of the NIT/Tender referred above.

We agree to submit the Security Deposit equivalent to 1% of the total contract value in addition to Security Deposit to be submitted by Bidder as per Clause.....of the NIT/Tender for fulfillment of all obligations in terms of provisions of the contract, in the event of .....(the Bidder) being selected as the Successful Bidder.

We confirm that we along with M/s.....(the bidder), are jointly or severally responsible for successful performance of the contract.
We confirm that our company shall not participate in the above tender as a 'Standalone Bidder' or as a 'Consortium bidder' and also shall not authorize any other bidder to use our Technical capability for the above tender.

All the terms used herein but not defined, shall have the meaning as ascribed to the said terms under the referred NIT/Tender.

Signature of Managing Director/Authorized signatory of Parent/ Subsidiary Company

ANNEXURE-2

CHECK LIST

NOTE: - Tenderers are required to fill in the following details and no column should be left blank

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3.a	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
3.b	Details of alternate Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ~~ONE TIME EMD /~~ ONLY FOR THIS TENDER	
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE	
		APPLICABILITY (BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/~~Not Applicable~~	YES/NO
8	Copy of GST & PAN Card	Applicable/~~Not Applicable~~	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc. are read understood and signed	Applicable/~~Not Applicable~~	YES/NO
10	Integrity Pact	Applicable/~~Not Applicable~~	YES/NO
11	Offer Forwarding Letter / Tender Submission Letter	Applicable/~~Not Applicable~~	YES/NO
12	Declaration by Authorized Signatory	Applicable/~~Not Applicable~~	YES/NO
13	No Deviation Certificate	Applicable/~~Not Applicable~~	YES/NO

14	Declaration confirming knowledge about Site Conditions	Applicable/~~Not Applicable~~	YES/NO
15	Declaration for relation in BHEL	Applicable/~~Not Applicable~~	YES/NO
16	Non-Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO
17	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
18	Capacity Evaluation of Bidder for current Tender	~~Applicable~~/Not Applicable	YES/NO
~~19~~	~~Tie Ups/Consortium Agreement are submitted as per format~~	~~Applicable~~/Not Applicable	YES/ NO
20	Power of Attorney for Submission of Tender/Signing Contract Agreement ~~Power of Attorney of Consortium Partner.~~	Applicable/~~Not Applicable~~	YES/NO
21	Analysis of Unit rates	Applicable/~~Not Applicable~~	YES/NO
22	Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process	Applicable/~~Not Applicable~~	YES/NO
23	Annexure-6: RA Price Confirmation and Breakup	Applicable/~~Not Applicable~~	YES/NO
24	Annexure-8: Undertaking as per PQR C4 of Annexure-1 i.e. PQR	Applicable/~~Not Applicable~~	YES/NO
25	Annexure-9: Declaration reg. Related Firms & their areas of Activities (x) Other Tender documents as per this NIT.	Applicable/~~Not Applicable~~	YES/NO
26	Annexure-10 Declaration regarding minimum local content	Applicable/~~Not Applicable~~	YES/NO
27	Annexure-11: Declaration regarding compliance to restrictions under rule 144 (xi) of GFR 2017	Applicable/~~Not Applicable~~	YES/NO

NOTE: STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

DATE :

AUTHORISED SIGNATORY

(With Name, Designation and Company seal)

ANNEXURE-3

Certificate by Chartered Accountant on letter head

(applicable upto 31st March'2021 in line with MSME notification no. S.O. 2119 (E), dated 26th June'2020)

This is to Certify that M/S ....., (hereinafter referred to as 'company') having its registered office at ..... is registered under MSMED Act 2006, (Entrepreneur Memorandum No (Part—II)/ Udyam Registration Certificate No. ..... dtd: ....., Category: (Micro/Small/Medium)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as per the latest audited financial year..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No. S.O.1722(E) dated October 5, 2006:
   Rs..... Lacs

2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the **MSMED** Act, 2006:
   Rs..... Lacs

3. **For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs..... Lacs and turnover is Rs. ..... Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)

4. **For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs..... Lacs and turnover is Rs. ..... Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)

(Strike off whichever is not applicable)

The above investment of Rs ..... Lacs is within permissible limit of Rs..... Lacs for .....Micro / Small/ Medium *(Strike off which is not applicable)* Category under MSMED Act 2006.

Or

The enterprise has been graduated upward from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise shall maintain its prevailing status till expiry of one year from the close of year of registration, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.

Or

The enterprise has been reverse-graduated from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise will continue in its present category till the closure of the financial year and it will be given the benefit of the changed status only with effect from 1st April of the financial year following the year in which such change took place, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.

Date:

(Signature)

Name:
Membership Number:
Seal of the Chartered Accountant

ANNEXURE-4

Reverse Auction Process Compliance Form

(The bidders are required to print this on their company's letterhead and sign, stamp before RA)

To

- M/s. {*Service provider*
- *Postal address}*

Sub: Agreement to the Process related Terms and Conditions

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the RFQ document for {Items} against BHEL enquiry/ RFQ no. { BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754} dt. {…….}
This letter is to confirm that:

1) The undersigned is authorized official/ representative of the company to participate in RA and to sign the related documents.
2) We have studied the Reverse Auction guidelines (as available on www.bhel.com), and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
4) We also confirm that, in case we become L1 bidder, we will FAX/ email the price confirmation & break up of our quoted price as per *Annexure - 6* within **two** working days (of BHEL) after completion of RA event, besides sending the same by registered post/ courier both to M/s. BHEL and M/s. {*Service provider.}*

We, hereby confirm that we will honor the Bids placed by us during the auction process.

With regards

Signature with company seal

Name:
Company / Organization:
Designation within Company / Organization:
Address of Company / Organization:

Sign this document and FAX/ email it to M/s *{Service provider}* at *{……..}* prior to start of the Event.

ANNEXURE-5

Authorization of representative who will participate in the on line Reverse Auction Process:

1	NAME OF THE BIDDER	
2	NAME & DESIGNATION OF OFFICIAL	
3	POSTAL ADDRESS (COMPLETE)	
4	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

ANNEXURE-6

Reverse Auction price confirmation and breakup
(To be submitted by L1 bidder after completion of Reverse Auction)

To
- M/s. *Service provider*
- *Postal address*

CC: M/s BHEL
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Sub: **Final price quoted during Reverse Auction and price breakup**

Dear Sir,

We confirm that we have quoted.

Rs.{___in value & in words_____} for item(s) covered under tender enquiry No. { BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754**} dt.{...}**

Total price of the items covered under above cited enquiries is inclusive of {*Packing & forwarding, GST, E.D., C.S.T., freight and insurance charges up to {……..} District,{……..} State and Type Test Charges etc., (exclusive of service tax)*, *other as per NIT*}

as our final landed prices as quoted during the Reverse Auction conducted today {*date*} which will be valid for a period of {___ **in nos. & in words** ___} days.

The price break-up is as given below.

========
Total - Rs. **in value & in words**
========

Yours sincerely,

For _____

Name:
Company:
Date:
Seal:

ANNEXURE-7

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi -110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for **E-Tender Spec No:** BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754 (Job Description: Erection and assistance for commissioning & Trial Operation including handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site of; Boiler and its auxiliaries, Boiler integral piping, Structure for bunker (BHEL Mfg units Supplied items), Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, SCR ready items, Lining and Insulation, Supply and application of touchup painting, (As and wherever required) package of Unit #1 at 2X660 MW NTPC Talcher Odisha
And
Erection of Bunker & allied works, including supply & installation of items as per BOQ of Unit #1 at 2X660 MW NTPC Talcher Odisha)(hereinafter referred to as "Contract"). The Principal values full compliance with all relevant laws
of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint panel of Independent External Monitor(s) (IEMs), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1-Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 -Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. The Bidder(s)/ Contractor(s) commits himself to observe the following principles during participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and shall await their decision in the matter.

Section 3 -Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process , terminate the contract, if already awarded, exclude from future business dealings and/ or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 -Compensation for Damages

4.1 If the Principal has disqualified the Bidder (s) from the tender process before award / order acceptance according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal is entitled to terminate the Contract according to Section 3, or terminates the Contract in application of Section 3 above , the Bidder(s)/ Contractor (s) transgression through a violation of Section 2 above shall be construed breach of contract and the Principal shall be entitled to demand and recover from the Contractor an amount equal to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee , whichever is higher, as damages, in addition to and without prejudice to its right to demand and recover compensation for any other loss or damages specified elsewhere in the contract.

Section 5 -Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 (three) years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason or action can be taken as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 6 -Equal treatment of all Bidder (s)/ Contractor (s) / Sub-contractor (s)

6.1 The Principal will enter into Integrity Pacts with identical conditions as this Integrity Pact with all Bidders and Contractors.

6.2 In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor(s) and ensure that all Sub-contractors also sign the Integrity Pact.

6.3 The Principal will disqualify from the tender process all Bidders who do not sign this Integrity Pact or violate its provisions.

Section 7 -Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 -Independent External Monitor(s)

8.1 The Principal appoints competent and credible panel of Independent External Monitor (s) (IEMs) for this Integrity Pact. The task of the IEMs is to review independently and objectively, whether and to what extent the parties comply with the obligations under this Integrity Pact.

8.2 The IEMs are not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The IEMs shall be provided access to all documents/ records pertaining to the Contract, for which a complaint or issue is raised before them as and when warranted. However, the documents/records/information having National Security implications and those documents which have been classified as Secret/Top Secret are not to be disclosed.

8.4 The Principal will provide to the IEMs sufficient information about all meetings among the parties related to the Contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the IEMs the option to participate in such meetings.

8.5 The advisory role of IEMs is envisaged as that of a friend, philosopher and guide. The advice of IEMs would not be legally binding and it is restricted to resolving issues raised by a Bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some Bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process or during execution of Contract, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to the CMD, BHEL at the earliest. They may also send their report directly to the CVO, in case of suspicion of serious irregularities requiring legal/ administrative action. Only in case of very serious issue having a specific, verifiable Vigilance angle, the matter should be reported directly to the Commission. IEMs will tender their advice on the complaints within 30 days.

8.8 The CMD, BHEL shall decide the compensation to be paid to the IEMs and its terms and conditions.

8.9 IEMs should examine the process integrity; they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the

Principal should be looked into by the CVO of the Principal.

8.10 If the IEMs have reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code / Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the IEMs may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 After award of work, the IEMs shall look into any issue relating to execution of Contract, if specifically raised before them. As an illustrative example, if a Contractor who has been awarded the Contract, during the execution of Contract, raises issue of delayed payment etc. before the IEMs, the same shall be examined by the panel of IEMs. Issues like warranty/ guarantee etc. shall be outside the purview of IEMs.

8.12 However, the IEMs may suggest systemic improvements to the management of the Principal, if considered necessary, to bring about transparency, equity and fairness in the system of procurement.

8.13 The word `Monitor' would include both singular and plural.

Section 9 -Pact Duration

9.1 This Integrity Pact shall be operative from the date this Integrity Pact is signed by both the parties till the final completion of contract for successful Bidder, and for all other Bidders 6 months after the Contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

9.2 If any claim is made/ lodged during currency of this Integrity Pact, the same shall be binding and continue to be valid despite the lapse of this Pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 -Other Provisions

10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.

10.2 Changes and supplements as well as termination notices need to be made in writing.

10.3 If the Bidder(s)/ Contractor(s) is a partnership or a consortium or a joint venture, this Integrity Pact shall be signed by all partners of the partnership or joint venture or all consortium members.

10.4 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact

would be a preliminary qualification.

10.6 In the event of any dispute between the Principal and Bidder(s)/ Contractor(s) relating to the Contract, in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms & conditions of the Contract. The fees/expenses on dispute resolution through mediation shall be shared by both the parties. Further, the mediation proceedings shall be confidential in nature and the parties shall keep confidential all matters relating to the mediation proceedings including any settlement agreement arrived at between the parties as outcome of mediation. Any views expressed, suggestions, admissions or proposals etc. made by either party in the course of mediation shall not be relied upon or introduced as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the dispute that is the subject of mediation proceedings. Neither of the parties shall present IEMs as witness in any Alternative Dispute Resolution or judicial proceedings in respect of the dispute that was subject of mediation.

For & On behalf of the Principal

(Office Seal)

Place--Nagpur---

Date--19/04/2023

Witness:_____

(Name & Address) _____

_____

For & On behalf of the Bidder/ Contractor

(Office Seal)

Witness:_____

(Name & Address) _____

_____

ANNEXURE-8

UNDERTAKING

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,
GM-PURCHASE
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Dear Sir/Madam,

Sub: DECLARATION REGARDING INSOLVENCY/ LIQUIDATION/ BANKRUPTCY PROCEEDINGS

Ref: NIT/Tender Specification No: BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754

I/We, _____ declare that, I/We am/are not under insolvency resolution process or liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render us ineligible for participation in this tender.

Sign. of the AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Place:
Date:

ANNEXURE-9

DECLARATION

Date:_____

To,
GM-PURCHASE
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Sub: **Details of related firms and their area of activities**

Dear Sir/ Madam,

Please find below details of firms owned by our family members that are doing business/ registered for same item with BHEL,_____(NA, if not applicable).

1	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	
2	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	

Note: I certify that the above information is true and I agree for penal action from BHEL in case any of the above information furnished is found to be false.

Regards,
(_____)

From: M/s _____
Supplier Code: _____
Address: _____
_____

Annexure-10

DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017 DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,
GM-PURCHASE
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Dear Sir,

Sub: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 04th June, 2020 and subsequent order(s).

Ref : 1) NIT/Tender Spec No: BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754
2) All other pertinent issues till date

We hereby certify that the items/works/services offered by…… *(specify the name of the organization here)* has a local content of _____ **%** and this meets the local content requirement for **'Class-I local supplier' / 'Class II local supplier' **** as defined in Public Procurement (Preference to Make in India), Order 2017-Revision dated 04.06.2020 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:

1. _____ 2. _____
3. _____ 4. _____

…
…
…

Thanking you,
Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of the Bidder)

****** - *Strike out whichever is not applicable.*

Note:

1. Bidders to note that above format Duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per BHEL Guidelines shall be initiated against the bidder.

ANNEXURE-11

DECLARATION REGARDING COMPLIANCE TO RESTRICTIONS UNDER RULE 144 (xi) OF GFR 2017

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,
GM-PURCHASE
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Dear Sir,

Sub: Declaration regarding compliance to Restrictions under Rule 144 (xi) of GFR 2017

Ref : 1) NIT/Tender Spec No: BHE/PW/PUR/TLRPT-BLR-MECH-U1/2754,
2) All other pertinent issues till date

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries. I certify that _____ *(specify the name of the organization here)*,

a. is not from such a country ☐

b. has been registered with the Competent Authority *(attach valid registration by the Competent Authority, i.e., the Registration Committee constituted by the Dept. for Promotion of Industry and Internal Trade (DPIIT))*; ☐

and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. *(attach relevant valid registration, if applicable)*

I hereby certify that we fulfill all requirements in this regard and is eligible to be considered.

Thanking you,
Yours faithfully,

(Signature, Date & Seal of
Authorized Signatory of the Bidder)

Note: Bidders to note that in case above certification given by a bidder, whose bid is accepted, is found to be false, then this would be a ground for immediate termination and for taking further action in accordance with law and as per BHEL guidelines.

ANNEXURE-12

IMPORTANT INFORMATION

E -Tender for this work is invited by BHEL PSWR NAGPUR and offer shall be submitted through BHEL e-procurement portal only. All correspondences regarding this tender shall be through E-procurement portal.

Postal Address:
GM /Purchase BHEL PSWR,
SRIMOHINI COMPLEX, Floor No. 5 & 6, 345 KINGSWAY, NAGPUR 440001, INDIA

Following are the concerned BHEL officials to whom bidders can contact in case of any difficulty:

Manager Purchase, Email: tapishkhandelwal@bhel.in , Mob: 9010903666

DGM Purchase, Email: kamleshbhel@bhel.in, Ph: +91-712-3048-645

GM Purchase, Email: rmalhotra@bhel.in , Ph: +91-712- 2858-633

1. **Refer the abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' which is available at www.bhel.com on "supplier registration page" at the following link:** https://www.bhel.com/sites/default/files/suspension_guidelines_abridged.pdf

2. **"Pradhan Mantri Kaushal Vikas Yojna:** The contractor shall, at all stages of work deploy skilled/semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/Industrial Training Institute/ National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/ certified by State/ Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in–Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs.100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding".

3. **All Statutory Requirements as applicable for this project shall be complied with.**

4. **BHEL Fraud Prevention Policy: "The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice."**

5. **The following clause is added under clause 1.10 Security Deposit in Vol-1C:**

Clause No 1.10.8 of Vol-IC General Conditions of Contract: Timely Submission of Security Deposit for Execution of the contract: "Bidder agrees to submit Security Deposit required for execution of the contract within the time period mentioned. In case of delay in submission of Security Deposit, enhanced Security Deposit which would include interest (Base rate of SBI +6%) for the delayed period, shall be submitted by the bidder. Further, if Security Deposit is not submitted till such time the first bill becomes due, the amount

of Security Deposit due shall be recovered as per terms defined in NIT/contract, from the bills along with due interest."

6. Following clause shall form part of the HSE documents issued under Chapter IX of Volume IB 'Special Conditions of Contract'

"In case of any financial deduction made by Customer for lapses of safety other than what is provided elsewhere in the contract, the same shall be charged on back-to-back basis on the defaulting contractor without prejudice to any other right spelt anywhere in the tender /contract".

7. BHEL Fraud Prevention Policy: "The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice."

8. The clause 2.7.9.1 below is added under the heading "Rights of BHEL" of General Conditions of Contract Volume-IC GCC:

2.7.9.1 Provision of Penalty in case of slippage of Intermediate Milestones:

i) Two major Intermediate Milestones are mentioned as M1 & M2 in Chapter VI: Time Schedule of Vol IA Technical Conditions of Contract.

ii) In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to Form 14.

iii) In case delay in achieving M1 Milestone is solely attributable to the contractor, 0.5% per week of Executable Contract Value*, limited to maximum 2% of Executable Contract Value, will be withheld.

iv) In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of Executable Contract Value*, limited to maximum 3% of Executable Contract Value, will be withheld.

v) Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.

vi) Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.

vii) Final deduction towards LD (if applicable as per clause 2.7.9 above), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.

viii) In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted into recovery.

* **Executable Contract Value** - Value of work for which inputs/ fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.

9. Commencement Period for "Performance Guarantee for Workmanship" as per clause no 2.24 of Vol-IC GCC: This period shall commence after the completion of Contractual work as certified by Engineer-in-Charge**.**

10. Acceptance of Bank Guarantee (BG)

Revision in Acceptance of Bank Guarantee (BG) Clause no. 1.10.3 (iii) of Vol I C GCC:

Clause No. 1.10.3 (iii) of Vol IC GCC is revised as below: -

"Bank Guarantee issued by:

a. Any of the BHEL consortium bank listed below:

State Bank of India
ABN Amro Bank N.V.
Bank of Baroda
Canara Bank
Citi Bank N.A.
Corporation Bank
Deutsche Bank
HDFC Bank Ltd.
The Hongkond and Shanghai Banking Corporation Ltd
ICICI Bank Ltd.
IDBI Ltd.
Punjab National Bank
Standard Chartered Bank
State Bank of Travancore
State Bank of Hyderabad
Syndicate Bank

b. Any public sector Bank (other than consortium banks) with a clause in the text of Bank Guarantee that "**It is enforceable at Nagpur, Maharashtra**".

c. Any private sector banks, with a clause in the text of Bank Guarantee that "**It is enforceable by being presented at any branch of the bank**".

Note: "Bank Guarantees issued by Co-operative Banks are not acceptable".

11. Broad Terms & Conditions of Reverse Auction:

In continuation to Clause 19.0 of NIT (Notice Inviting Tender) following are the broad terms and conditions of Reverse Auction:

"BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) (https://www.bhel.com/guidelines-reverse-auction-2021) for this tender. RA shall be conducted among the techno-commercially qualified bidders.

Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."

Note:-
1. No benefits to MSE bidders w.r.t Reverse Auction Guidelines as available on www.bhel.com against works contract.
2. In case of enquiry through e-procurement the sealed electronic price bid (e-bid) is to be treated as sealed envelope price bid.

12. **Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and procedure indicated in the NIT/GCC.**

13. Bidder to strictly follow all the necessary guidelines issued by Customer, District Magistrate, State Government and Central government to control Pandemic/Epidemic outbreak. The related towards quarantine Centre/Medical expenses etc., if any, shall be in the bidder's scope

14. **OVER RUN COMPENSATION Clause no. 2.12 of Vol-I-C-GCC**: Clause no. 2.12 of Vol-I-C-GCC shall be applicable only for Section-A & Section-B of 'Chapter-XXIV: Bill of Quantities and % Weightage of Individual Items' of TCC.
Clause no. 2.12 of Vol-I-C-GCC **shall not be applicable** for Section-C (Execution/Mobilisation of special resources) of 'Chapter-XXIV: Bill of Quantities and % Weightage of Individual Items' of TCC.

15. **PRICE VARIATION COMPENSATION Clause no. 2.17 of Vol-I-C-GCC** :PVC shall be applicable only for Section-A & Section-B of 'Chapter-XXIV: Bill of Quantities and % Weightage of Individual Items' of TCC.
Clause no. 2.17 of Vol-I-C-GCC shall not be applicable for Section-C (Execution/Mobilisation of special resources) of 'Chapter-XXIV: Bill of Quantities and % Weightage of Individual Items' of TCC.

However Clause 2.17.6 of GCC: PRICE VARIATION COMPENSATION is amended as below-

Existing clause 2.17.6 of GCC : PRICE VARIATION COMPENSATION	**Amended clause**
Base date shall be calendar month of the 'last date of submission of Tender'.	Base date shall be the calendar month of the schedule completion date (i.e. Actual start date + Scheduled Contractual completion period as per Letter of Intent/award and/or work order)

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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24	Bill of Quantities and % Weightage of Individual Items	Chapter-XXIV
25	Technical Annexure	Chapter-XXV

1. Project Information

Sl. No.	Description	Details
1	**Project Title**	2X660 MW Talcher Thermal Power Station
2	**Customer**	National Thermal Power Corporation Limited (NTPC Limited)
3	**Location**	The proposed site is at a distance of about 4 km from Talcher town and about 25 km from district headquarters Angul in Odisha state, India.
4	**Nearest Railway Station**	Talcher is on Talcher-Cuttack section of North Eastern Railway (renamed East Coast Railway) at about 2 Km. However, a small railway station named 'Talcher Thermal' is located near project boundary.
5	**Nearest Airport**	Bhubaneshwar (56 approx.. 150Km by road)
6	**Access By Road/Major Cities**	The area is accessible by NH-23 (renamed NH-149) at about 1 km.
7	**Temperature**	Mean of daily minimum temperature = 15.1°C Mean of daily maximum temperature = 39.8°C
8	**Seismic Zone**	The project site lies in zone III as defined in IS: 1893.
9	**Wind Speed**	Design wind speed is 50 m/sec as per IS: 875 Part III

Above information furnished are for general guidance of Contractor. However, Contractor has advised to visit the site and appraise himself about the conditions of site and infrastructure available in the area for fulfilling their commitments under the contract.

2.0 **SCOPE OF WORK:**

The scope of work shall comprise but not limited to the following:
(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

2.1 The scope of work for package as follows:

Erection and assistance for commissioning & Trial Operation including application of Insulation, Refractory, supply & touch-up painting as and where required including Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site etc. of

1. Erection and assistance for commissioning & Trial Operation including handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site of; Boiler and its auxiliaries, Boiler integral piping, Structure for bunker (BHEL Mfg units Supplied items), Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, SCR ready items, Lining and Insulation, Supply and application of touchup painting, (As and wherever required) package of Unit #1 at 2X660 MW NTPC Talcher Odisha
   And
2. Erection of Bunker & allied works, including supply & installation of items as per BOQ of Unit #1 at 2X660 MW NTPC Talcher Odisha

2.2 The work to be carried out at quoted / accepted rates by the Contractor under the scope of these specifications covers the complete work of handling, loading and transporting of materials from project stores sheds / storage yards to site of erection or preassembly yard and unloading at pre-assembly area/erection site, checking, cleaning chipping and levelling of foundations, providing packers and shims/pre-assembling of equipments at the preassembly yard, inspection, minor rectification, preservation, erection, levelling, and other adjustments, cutting, edge / surface preparation, welding, grinding, radiography, LPI/MPI / UT testing wherever needed, heat treatment, carrying out air tightness test by soap solution / kerosene, Vacuum test, hydraulic test, steam / air blowing, light up, chemical cleaning, passivation, steam blowing and safety valve floating including inter connection of all the termination points, erection and dismantling of all temporary piping, valves, pumps, tanks etc., required for the above operations, all pre-commissioning tests and trial runs of Boiler & its Auxiliaries, Boiler integral piping, Firefighting system inside boiler (Hydrant & Spray piping with associated accessories), Structure for bunker (BHEL Mfg. units Supplied items), Non Pressure Parts, Duct dampers and its support structure, Rotating Equipments, Air Pre Heaters, ID/FD/PA fans, mills, SCR ready items, Lining and Insulation, Supply and application of touch-up Painting (as and where required) for Unit #1 at 2X660 MW NTPC Talcher Odisha.

2.3 The quantities indicated in the tender specification are approximate and are liable for variation and alteration at the discretion of BHEL. The quoted unit rate shall be applicable for any additional product group also, if included at a later date integral to the main scope of work / package envisaged. The work executed shall be measured and priced as per the unit rate arrived at for each work area as mentioned in the relevant clauses.

2.4 The PGMA wise breakup of Boiler and Auxiliaries, PP, NPP, rotating machinery, insulation etc. are indicated in the relevant chapters of this tender specification, but the contractor is required to erect actual tonnage which may be necessary to complete the work in all respects as detailed in the tender specifications, for which payments shall be released on finally settled rates. The weights and dimensions of material shown are approximate and are liable to vary. No increase in quoted / accepted rates / prices shall be allowed due to change in weights and dimensions of the equipment / materials.

2.5 The weights given in the Chapter-IX "ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE OF WORK (BOQ)" are approximate and these are subject to change as per site conditions.

2.6 Supervisors / Engineers, consumables etc., required for the scope of work shall be provided by the contractor. All the expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor's quoted rates should be inclusive of all such contingencies.

2.7 It shall be specially noted that, the contractor may have to work round the clock (24x7) or may have to deploy additional manpower/resources to achieve the completion schedules / plans / targets during the entire course of erection and commissioning works, which may involve considerable payment including overtime. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including labours, engineers / supervisors, T&Ps etc.

2.8 The terminal points can be inferred from the relevant drawings and any further clarifications can be obtained/decided by BHEL and that is final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals. Carrying out work as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at

the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate.

2.9 The contractor shall submit a copy of license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection.

2.10 The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.

2.11 Considering the area constrain in the subject project, Contractor has to work in close co-ordination with other erection/Civil agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a particular given time. Activities and erection program have to be planned in such a way that the milestone events like boiler light up, steam blowing, SV Floating etc., are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

2.12 No member of the already erected structure/ platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.

2.13 The storage yard is located within the plant boundary and outside plant boundary (approx. 10 KM) of the plant premises in multiple locations. All other materials have to be transported from storage yard to construction area by the contractor at his own cost, using own **Pick & Carry Crane (Farrana),** crane and trailer. **BHEL shall reimburse transportation charges at a fixed rate of Rs. 5 per KM per MT for distance beyond 5Km between material gate and Material storage yard.**

2.14 During the course of erection and commissioning, certain rework / modification / rectification / repairs / fabrication etc will be necessary on account of feedback/revision from various relevant sources, and also on account of design discrepancies/ alterations, manufacturing defects, site operations/ maintenance requirements. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repairs etc promptly and expeditiously. Daily log sheets indicating the details of work carried out, man-hours etc shall be maintained by the contractor and got signed by BHEL engineer every day. Claim of

Contractor if any, for such works will be governed by relevant clauses of 'General Conditions of Contract.

2.15 The scope of work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management **including high standard safety management (as per relevant clause of tender document) and green belt management (Project Management, HSE & Quality etc.).** The contractor should ensure successful and timely completion of the work. The contractor must have adequate quantity of tools, construction aids, equipments etc., in his possession. He must also have on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel. The manpower deployment identified by contractor shall match with above scope of works**.(Refer HSE Manual)**

2.16 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The erection manuals for boiler pressure parts, structures etc., which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any failure to comply with the above might lead to rework and the cost for the same shall be borne by the contractor only. BHEL engineer, depending upon the availability of materials, fronts etc., will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs or for any reason whatsoever.

2.17 Brief feature of Steam Generator & Auxiliaries

Steam Generator is of 660 MW capacity including all related auxiliary equipments as specified below. The steam generator will be of once through, two pass, single reheat, radiant furnace, dry bottom, balanced draft, outdoor type, pulverized coal fired having super critical parameters with all necessary auxiliaries, integral piping, etc. Scope includes Erection, alignment and welding, bolting, fastening, grouting as applicable of:

1. Boiler structure, Bunker structure, Bunker, Trestles, Galleries (PG-34,35,36,38,39) **(Structure will be bolted type)**
2. Water cooled furnace complete with separators, water wall, headers, steam generating tubes, furnace bottom hoppers, drains, observation ports, etc. (PG 04,05,06,07,08,09,10,11,12,15)
3. Super heaters including safety valves with silencers, motorised main steam stop valves with integral bypass valve, start-up vents, air vents, nitrogen connections, etc. Re-heaters including safety valves with silencers, drains, air vents, etc.(PG-24)
4. In line, bare tube economizer, including vents, drains etc.(PG-19)
5. De-superheating spray system: Sprays for Super heaters and Re-heaters. (PG-16,17)

6. Steam soot blowing system including long fully retractable rotary blowers for super heater, re-heater and economizer; Sweep action soot blowers for regenerative air preheater along with necessary accessories. Soot blower System will be complete with drains, entire piping, fittings, control valves, safety valves etc (PG-20,21)
7. Complete draft plant for the balanced draft system upto ESP inlet (PG -48,56)
    a) 2 nos. Forced draft fans with drives, associated auxiliaries and accessories.
    b) 2 nos. Induced draft fans with drives, associated auxiliaries and accessories.
    c) 2 nos of Primary air fan with drives, associated auxiliaries and accessories.
    d) Regenerative tri-sector air pre-heater 2 nos (PG-52)
    e) 4 nos. steam coil air pre-heater (SCAPH) with drain collection system.
    f) Air and Gas duct work with necessary metallic expansion joints, dampers and support steel work up upto ESP inlet. (PG-48)
    g) Duct stiffening devices, mating flanges, access doors and brackets, supporting structure as applicable.
8. Raw coal feeders system (PG-61)
9. 2 nos. Seal Air Fans (PG-55,56)
10. 07 Nos of coal pulverizers (bowl mills), complete with all necessary accessories (including classifiers, MDV, seal air fans, etc). (PG-61) **(Front milling system)**
11. 2 nos Scanner air fans. (PG-43)
12. Fuel oil system will cater to Light Diesel oil (LDO) firing requirements of each Steam Generator. Fuel oil burners will be complete with diffusers, tips extension pipes, atomizers, burner shut off valves, flexible hoses and all other ancillaries. (PG-45)
13. Valves, dampers etc with actuators. (PG-57)
14. Hoists and cranes. (PG-99)
15. Thermal insulation & refractory. (PG-31,32,33,37)
16. Application of touch-up **Painting alongwith supply of paint**
17. Ducts and dampers BOF to ESP inlet, (PG-48)
18. Refractory and Thermal insulation. (PG-31,32,33,37)
19. Lift support Structure(PG-35)
20. Roof Sheeting(PG-36)
21. Buckstay (PG-08)
22. Seal Boxes & Skin Casing (PG-09)
23. Enclosure (Penthouse, Rear Arch, S-panel) (PG-31)
24. Piping including P91, P92, HP & LP Piping (PG-80, 81) **(inside SG area)**
25. Ignitor System
26. PF Pipe/Coal Pipe & Supports
27. PP supports fixed & Variable load hanger
28. MTM pad to PP components
29. **Assistance for Acromate insert fixing**
30. **Acromate welding (if required)**

31. CC Pump including DMCW piping from dearetor to CC pump.
32. Firefighting piping (hydrant and Spray) including QBD installation inside SG area (supplied by BHEL PE&SD).
33. Mill Reject System.
34. **Fabrication and erection of mill reject silo structure including storage silo**
35. Arrangement for Biomass
36. Pipe & Cable rack around Boiler and ESP area.
37. **BHEL-Trichy/ BHEL-HYd/ BHEL-PEM/BHEL-Bhopal valves (As applicable)**
38. **Insulation supplied by BHEL-PEM**

2.18 Piping:

Erection, Testing and Commissioning of SG area Piping and Insulation works including handling at site stores / storage yard, transporting to site, inspection, pre-assembly, erection, alignment, welding NDT, fixing of hangers & supports, chemical cleaning / pickling, oil flushing, water flushing, hydro testing steam blowing, surface finish, supply & application of Primer & finish paints and application of refractory & insulation works as per requirement / as given in the drawings including labeling & flow direction on the piping / over insulation & hangers and supports, pre-commissioning, commissioning, trial operation & handing over to customer and its associated items /systems, hangers and supports, valves of following piping systems:

SG Area Piping: Piping from Boiler/Bunker Column upto Boiler/ESP/ID fan area shall be in the scope of Contractor.

a. Flash tank and Flash tank drain tank including its exhaust pipe.
   The approximate weight details:
   i. Approx. Weight of Flash tank : 30 MTs
   ii. Approx. Weight of Flash tank vent : 20 MTs
   iii. Approx. Weight of Flash tank drain tank : 50 MTs
b. Temporary piping for steam blowing, chemical cleaning, detergent flushing & hydro static testing including piping from Portable DM plant to SG area (as per Site scheme).
a. Steam drains from above-mentioned piping /equipment to flash Tank(s)/flash tank manifolds,
b. Miscellaneous piping like drains and vents pipe upto nearest drain.
c. Valve, fittings, Steam traps, orifice plate, air release valve, safety valves, flow nozzles, flow meters, control valves, skids etc
d. Demagnetizing of Pipe, as required without any additional cost.
e. Hanger & Supports
f. Mineral wool mattress alongwith cladding sheet and iron component etc
g. Direct gauges for steam lines.
h. Erection materials for instruments
i. LP piping drains - SG scope
j. Drain from unlisted eqpt/vessel-SG scope

k. SG aux cooling water unit system
l. Boiler water wash to and from unit
m. Service water piping
n. Drinking water piping
o. Fire water-other areas
p. Service air-comp suction and discharge to receiver
q. Service air for individual units
r. Instrument air for individual unit
s. Fuel oil supply and return piping – SG Area
t. Lube oil piping system
u. Trichy valves – HP/LP piping
v. Demineralised water system– SG Area
w. High/ Low pressure dosing piping – SG Area
x. Direct gauges for non-steam lines
y. Local control eqpt for non-steam lines
z. Instrumentation for startup system
aa. Any other piping system required to make the HP/ LP piping system complete.

2.19 MILL BUNKER STRUCTURE, COAL BUNKER, SILOS & HOPPERS INCLUDING MILL MAINTENANCE PLATFORM, PIPE & CABLE RACKS ETC.

(Coal bunker – silo, ring beam & hopper etc.) Erection, alignment, welding, bolting, grouting and touch-up painting as applicable for fabricated structures (supplied from BHEL units) of Mill bunker structures, Coal bunkers etc., Installation of items as per Chapter-IX BOQ for Bunker structural works etc.

Where ever the supply together is covered in the scope of bidder, necessary approvals from BHEL / CUSTOMER shall be taken by the bidder for the design, inspection procedure & vendor. List of items for which such approvals is required shall be frozen by bidder during execution of the contract.

2.20 Biomass: Biomass feeding arrangement is envisaged in this boiler hence erection of the equipment for Biomass firing arrangement shall be in contractor scope. **In addition to this, if any modification is required for fixing of biomass system, required resources will be deployed by agency to complete the job in consultation with BHEL engineer.**

2.21 <u>Touch-up Painting (Applicable in entire scope of work):</u> All Boilers structures/ components shall be supplied from BHEL units/ workshops with finish coats of paint. Therefore, final painting is not applicable in the scope of contractor for Unit supplied items. However, touch up painting (wherever required), **incidental to the work, shall be in the scope of the contactor, including supply of the required paints and primers and associated consumables.**

In case any shop painted structure/component is required to be repainted due to the reasons attributable to the contractor such as Mis-handling, damage during erection process, other reasons incidental to the work etc., such re-painting/finish painting of the components/structures shall be in the scope of the contractor including the supply of paints and primers along with all required consumables.

2.22 In case of non-completion of work with in contractual period and non-finalization of delay analysis for further extension, BHEL at its discretion may provide provisional time extension by withholding 10% of running bill amount during extension period till regularisation of time extension to secure the applicability of LD (if any).

2.23 Contractor has to deploy **3 nos. of Safety personals** at site, within 15 days, as and when intimated by BHEL. This deployment shall be over and above the requirement as per Health and safety Environment plan. The deployed manpower shall report to BHEL and may be deployed at any location within the plant. BHEL shall make payment (separate item rate under section C) on pro rata monthly basis on actual deployment at the rate of Rs. 25,000/- per person per month (considering 26 working days in a month). In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will levy penalty of Rs. 100 per person per service day, for delay. PVC shall not be applicable for the payment against deployment of 3 nos. of Safety personals at site.

2.24 Bidders are requested to specifically note the following:

*Bidders are requested to have **pre-bid visit/ inspection of site** to make them fully acquainted with the site situation & nature of job. No claim shall be entertained at later date on account of non-familiarization of site conditions. Bidders may fix up their site visit in consultation with below mentioned contact person:*

Sh P K Biswas BHEL Site Office: 2x660 MW Talcher TPS Email: pkbiswas@bhel.in Ph. No: +91-8617711054, 8331015585	Sh Ankit Goyal PSWR Nagpur Email: ankitgoyal@bhel.in Ph. No: +91-7888044133

3.0 Facilities in the scope of Contractor/BHEL:

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
3.1	**Establishment:**			
3.1.1	**For Construction Purpose:**			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Firefighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**For living purpose of the bidder:**			
a	**Open space for labour colony (as per availability)**		**Yes**	**Contractor has to make his own arrangements for labour accommodation. Transportation of labours shall be in Contractor scope.**
b	Labour Colony with internal roads, sanitation, complying with statutory requirements.		Yes	Construction Plan shall be approved by BHEL.
3.2	**Electricity:**			

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
3.2.1	**Electricity for construction purposes 3 Phase 415/440 V**			
a	Single point source	Yes		Free of cost at one point near the site at a distance of approx. 500 meter. Further distribution and Metering is in scope of bidder.
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for office, stores, canteen etc. of the bidder.(Chargeable)**			
a	Single point source	Yes		Chargeable basis. Single point as above for construction purpose, no separate point shall be given. Metering is in scope of bidder.
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc.**			
a	Single point source		Yes	No separate point shall be given.
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3	**Water Supply:**			

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
3.3.1	**For construction purposes: (free)**			
a	Making the water available at single point	Yes		Free of cost at one point near the plant boundary. Further distribution and Metering is in scope of bidder.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc. (Chargeable)**			
a	Making the water available at single point		Yes	Chargeable basis. Single point as above for construction purpose, no separate point shall be given. Metering is in scope of bidder.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	Contractor has to make his own arrangements for distribution.
3.3.3	**Water supply for Living Purpose**			
a	Making the water available at single point		Yes	No separate point shall be given.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	Contractor has to make his own arrangements for distribution.
3.4	**Lighting**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc. during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5	**Communication facilities for site operations of the bidder**			
a	Telephone, fax, internet, intranet, e-mail etc.		Yes	
3.6	**Compressed air wherever required for the work**		Yes	
a	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc.		Yes	
b	Installation of above system and operation & maintenance of the same		Yes	
c	Supply of the all the consumables for the above system during the contract period		Yes	
3.7	**Demobilization of all the above facilities**		Yes	
3.8	**Transportation**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc.)		Yes	
3.9	Engineering works & Materials for construction:			
a	Providing the erection drawings for all the equipments covered under this scope	Yes		
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site-example – routing of small bore pipes		Yes	In consultation with BHEL. Changes are to be marked in drawing & handover to BHEL on completion of work.
d	Shipping lists etc for reference and planning the activities	Yes		In consultation with BHEL
e	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on SL No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on SL No. g		Yes	In consultation with BHEL
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested that this review by the senior official of the bidder, should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
L	Arranging the materials required for preassembly		Yes	
M	COIVD-19 PREVENTIVE MEASURE		Yes	

3.10 General Scope:

1 Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and fro the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.

2 Furnishing samples of all materials required by the engineers for testing/inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.

3 Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.

4 Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that is required for all works including temporary works.

5 Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.

6 The contractor shall provide the owner/BHEL such an assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.

7 Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.

8 Arranging for joint checking (with BHEL / BHEL's Customer / Consultant) of all site construction activities Preparation of joint protocols for each & every activity and maintaining quality records for audit/inspection as per approved FQP by BHEL.

9 Contractor shall set up suitable storage facilities. Any wastage due to lapse of storing shall be debited to contractor.

10 The drawings enclosed with this tender are intended to give the tenderer a general idea of the type and extent of work involved. The drawings are as such only indicative and not to be considered as the exact construction drawings.

Further this is to be noted that the drawings and the documents furnished along with this specification are the sole property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

11 <u>BHEL at its discretion may include other area works, limited to 15% of awarded contract value, although not be specially mentioned in above scope of works. All such incidental works not specified but reasonably implied and necessary for completion of the project as a whole, contractor shall execute the works as desired and as directed by BHEL engineer which is binding on the contractor. The item rates & contract conditions shall remain unchanged for such works.</u>

12 The scope of work will also include such other related works although they may not be specifically mentioned above and all such incidental items not specified but reasonably imply and necessary for completion of the job as a whole all as desired and as directed by the engineer.

13 The detail scope of work covered above is not a comprehensive list of items of work involved. The detail scope of work may vary considerably depending on the actual requirements.

14 **Labour and Staff Colony:** The following are in the Bidder's scope of work for labour & staff colony:

- Development of Bidders temporary staff colony and labour colony having adequate no. of rest rooms along with toilets & fencing etc. (**enclosing drawing for ready reference Annexure-4: Labour Colony drawing**).
- Contractor has to arrange the land for labour colony.
- All Civil and Structural work associated with drinking and service water for Bidder's labour and other personnel at the work site/colony/offices including pump houses, pipes, overhead tank, tube wells etc.
- Providing and maintaining facilities for safety, welfare, drinking water and sanitation, hygiene, biennial health check-up etc. for construction workers at their workplaces as well as at labour & staff colonies.
- The facilities for occupational safety, healthy environment, first aid, drinking water, resting place & toilets, canteen, crèche, etc. shall be provided at the workplace for construction workers by the contractor.
- Development and maintenance of above facilities for construction workers hired by the Contractor shall solely rest with the Contractor.
- Contractor shall be responsible for maintenance of Labour colony. Contractor shall dismantle the labour colony after the completion of contract.

3.11 Preamble for the schedule of quantities/BOQ:

- Details of the items in this Schedule shall be read in conjunction with the Corresponding Consultants/ NTPC specifications, drawings and other documents and shall have precedence over any contrary statement mentioned anywhere in this document.
- The work shall be carried out as per construction drawings, specifications, the description of the items in this schedule and/or Engineer's instructions, Drawings enclosed with these documents are only indicative giving some idea of the type of work involved.
- Items of work provided in this schedule but not covered in the specifications shall be executed strictly as per instructions of the Engineer.
- Unless specifically mentioned otherwise in the contract, the bidder shall quote his price for the finished items and shall provide for the complete cost towards fuel, tools, tackle, equipment, temporary works, labour, materials, levies, taxes , transport, repairs, rectification, maintenance till handing over, supervision, shops, establishments, services, temporary approach roads, revenue expenses, contingencies, overheads, profits and all incidental items not specifically mentioned but reasonably implied and necessary to complete the works according to the contract.
- The quantities of the various items mentioned in the schedule are approximate and may vary up to any extent or be deleted altogether. The overall variation in contract value on execution shall be dealt as per GCC. Contractor has to obtain prior approval of BHEL/ NTPC before procurement of bought out items/ materials.
- Engineer decision shall be final and binding on the contractors regarding clarification of items in this schedule with respect to the other section of the contract.

- In case of any discrepancy between item description, relevant drawing and/or specification, clarification shall be sought at tender stage itself. Otherwise it shall be assumed that the bidder has quoted for the more stringent requirement.

3.12 Construction Power (Provided by BHEL free of cost for Construction purpose only):

1. Construction power (three phase, 415 V/ 440 V) will be provided free of cost at one point near the site at a distance of approx. 500M. Further distribution shall be arranged by the contractor at his own cost and services. Contractor shall be responsible for fulfilment of all requirements including statutory requirements in this regard. Contractor shall deploy and install required energy meter, cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act. Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc towards the clearance of such installations, prior to use. Sufficient power factor compensation equipments like capacitor shall be provided by contractor for reactive loads like welding machines etc. In case of any fine/penalty on account of low power factor, same shall be shared by contractor proportionately according to power consumption.
2. Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes & vehicles, civil work, fabrication/construction/assembly/ erection etc and safety of personnel. It may become necessary to relocate some of the installations to facilitate work by other agencies or by him.
3. It shall be the responsibility of the Contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.
4. While reasonable efforts will be made to ensure continuous electric power supply, interruptions cannot be ruled out and no claim from the Contractor shall be entertained on this account such as idle labor, extension of time etc. The Contractor shall adjust his working shift accordingly and deploy additional manpower, if necessary, so as to achieve the target.
5. **Contractor to note that till construction power is made available by BHEL (approx. within 3 months from start of work); contractor shall make his own arrangement like DG set etc. The contractor shall also take the approval/ permission of statutory authorities for his DG set installation.** The Contractor has to make his own arrangement for the same as required to carry out the job under the scope of work within the quoted rate. Nothing extra shall be paid on this account of DG set up and running for construction and office maintenance etc.
6. Contractor shall be well equipped with back-up power supply arrangement like DG set etc. to tackle situations arising due to failure of supplied power, so as to ensure

continuity in Operation of Batching Plant etc. that are underway at the time of power failure or important activities planned in immediate future.

7. BHEL is not responsible for any loss or damage to the Contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.

8. **Contractor is advised to maintain the calibrated energy measuring instruments and use their system as efficiently as possible to maintain the HT side input energy meter reading and LT side outgoing energy meter reading to sub-contractors as equal.**

9. The bidder will have to Procure & install General mobile illumination system during construction right from start of his work. This system will include temporary pole lighting, portable lighting towers with DG back-up, within the quoted price. The illumination should be such that minimum illumination requirement as specified by Indian standards for general illumination is maintained.

10. Contractor to arrange energy meter for office.

General:

If any other voltage level (other than normally available) is required, the same shall be arranged by the contractor from power supply as above. Contractor will have to provide at his own cost necessary calibrated energy meters (tamper proof, suitably housed in a weather proof box with lock & key arrangement) at point of power supply along with calibration certificate from authorized/ accredited agency for working out the power consumption. In case of recalibration required for any reason the necessary charges including replacement by calibrated meters is to be borne by the contractor. Supply of electricity shall be governed by Indian Electricity Act and Installation Rules and other Rules and Regulation as applicable. The contractor shall ensure usage of electricity in an efficient manner and the same may be audited by BHEL time to time. In case of any major deviation from normally accepted norms is observed, BHEL will reserve the right to impose penalty as deemed fit for such cases.

Contractor to arrange calibrated energy meter (tamper proof, suitably housed in a weather proof box with lock & key arrangement) **for office** and this construction power at office is chargeable as per applicable tariff rates.

3.13 Construction water (Free of cost):

Construction water will be provided free of cost at one point near the plant boundary. Bidder has to make arrangement of further distribution of water at his own cost. No extra payment shall be made under this account. The agency should also construct a sump of suitable size for storage of construction water as per their site requirement for use in construction purposes.

However, drawal of construction/potable water from bore-well shall be permitted if found suitable. Any statutory clearance required shall be obtained by the contractor.

3.14 Field Quality Assurance:

The contractor shall be responsible for day-to-day quality checks of activities during the progress of work. All quality records and log sheets shall be maintained as per the requirement of BHEL/BHEL'S customer and as per field quality plan approved by BHEL/ BHEL'S customer.

3.15 DRINKING WATER

Bidder shall provide drinking water at the work spot at their cost.

3.16 Supervisors and Computer for exclusive use of BHEL:

(a) The successful bidder(s) will have to provide **two supervisors (MIN. Qualification: Diploma in Mechanical/Production/ Industrial Engineering)** acceptable to BHEL Site with sufficient computer knowledge (knowledge of MS office) to whom works will be assigned in consultation and acceptance of BHEL for original contract period.

(b) The bidder will have to provide Two (02) Nos. of Laptops (X-86 Architecture Based, 64-Bit Supported, Microprocessor with minimum minimum 8 cores, Onboard Graphics feature compatible with supplied OS, Minimum 8 GB RAM 2666 MHZ SDRAM upgradeable to 16 GB, 512 GB SSD M.2 Hard Drive or higher, 13" - 14" (both included) high definition anti-glare LED back lit Screen, OEM USB Optical Travel Mouse, Integrated High definition audio with integrated speakers and volume control (Hardware/Software). Single audio jack (single pin) for connecting ear phones and mic, Built-In HD Webcam with Built-In Microphone, integrated 100/1000 Mbps port, Integrated Wi-Fi 6, supporting industry standard IEEE 802.11ax + Bluetooth 5.0 or higher, Minimum 2 xUSB 3.1 Ports, 1 x Type C, Stereo headphone/ microphone combo jack,1 x HDMI Port. 1 x RJ – 45, Minimum 3-cell battery capable of providing 6 hours or more backup in standard business environment, ACPI Compliant, OEM AC Adaptor suitable for 230V supply, Should come pre-installed with Windows 11 Professional Edition or latest version with 64bit latest service pack, OEM carry bag to be suppliedwith OS Certification from Microsoft and required software like MS Office 2010 Professional, AutoCAD 2011, ADOBE PDF CREATOR (version 8.0) with one laser jet printer compatible for A4 and A3 size printing (ink/ cartridge for which to be supplied as and when required, (the consumption may be assumed as 1 cartridge per month) with power backup at places, as per instruction of BHEL.

(c) These laptops/ printers along with two supervisors shall remain contractor's property/ownership for all legal/technical purposes. However, contractor will be allowed to take out the same after completion of the site works. However, the computer/printer along with technical supervisor shall remain at BHEL offices.

(d) This facility has to be provided from 3rd month from LOI date/ **as instructed by BHEL** till completion of site works or as decided by BHEL.

(e) If contractor fails to provide computer/ printer as per requirement, for a continuous period of fifteen days or more, BHEL shall have the right to purchase it at risk and cost of bidder.

(f) BHEL shall make payment (separate item rate under section C) on pro rata monthly basis on actual deployment of manpower along with aforementioned facilities, at the rate of Rs. 25,000/- per person per month (considering 26 working days in a month). In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will levy penalty of Rs. 100 per person per service day, for delay.

3.14 CONSUMABLES:

3.14.1 Such of those consumables as indicated as consumables provided by BHEL alone will be provided to the contractor by BHEL free of charge for erection activities. Other required consumables like electrodes, all gases, and other materials for this scope of work are to be arranged by the contractor at their cost.

3.14.2 All the required electrodes (in his scope) as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement regarding, suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.

3.14.3 Only TIG welding wires for CS, AS & SS welding will be supplied by BHEL free of cost for Boiler for applicable Pressure Parts as provided by manufacturing units. All other electrodes including stainless steel electrodes required for shall be arranged by the contractor at his cost. However, BHEL will provide imported electrodes as provided by manufacturing units. The bidder shall use the Customer approved quality welding electrodes only. The utilization of the TIG welding wires issued by BHEL shall be duly accounted for exercising maximum care and ensuring economical usage for minimum wastage. If during erection, it is found that the consumption of filler wire is more than the actual requirement due to improper usage, the cost for the additional quantity so consumed shall be recovered from the contractor.

3.14.4 The contractor shall provide within finally accepted price / rates, all consumables like welding electrodes (including alloy steel and stainless steel), all gases (inert, welding, and cutting), soldering material, dye penetrants, radiography films. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding and pre-assembly materials (**structural steel, concrete sleeper, concrete blocks etc**) hardware items etc. required for temporary works such as supports, scaffoldings, **pre-assembly bed etc.** are to be arranged by him.

3.14.5 Sealing compounds and GI wires for insulation mattress binding shall be provided by the agency with in finally accepted price/rates.

3.14.6 Gaskets, gland packing, wooden sleepers, for temporary work, required for completion of work except those which are specifically supplied by manufacturing unit are also to be arranged by him.

3.14.7 All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost.

3.16 LIGHTING FACILITY:

Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, pre assembly yard and contractor's material storage area etc. at his cost.

3.17 GASES:

3.17.1 All the required gases like Oxygen / Acetylene / argon / Nitrogen required for work shall be supplied by the Contractor at his cost. It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of these gases. Non availability of gases cannot be considered as reason for not attaining the required progress. BHEL reserves the right to reject the use of any gas in case required purity is not maintained.

3.17.2 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

3.17.3 The contractor shall ensure safe keeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.

3.17.4 BHEL reserves the right to reject the use of any gas in case required purity is not maintained.

3.18 ELECTRODES SUPPLY AND STORAGE

3.18.1 The bidder shall use the BHEL / Customer approved quality welding electrodes only.

3.18.2 It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.

3.18.3 Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate.

3.18.4 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at his own cost by the contractor.

3.18.5 All low hydrogen electrodes shall be baked / dried in the electrode drying oven (range 375 deg. C - 425 deg. C) to the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by contractor at his cost.

3.18.6 **In case of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the contractor's first subsequent bills at market value plus departmental charges of BHEL communicated from time to time. Postponement of such recovery is not permitted.**

3.18.7 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.

3.19 OTHER FACILITIES

3.19.1 **Adequate water less urinals (at least 4 nos. in alternate levels)** shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas like boiler structure, with proper disposal arrangement.

3.19.2 Vendors have to comply requirements of HSE & Statutory requirement in line with BHEL HSE plan, NTPC Safety requirement, State/Central statutory requirement.

3.19.3 Preparation of method statement, HIRA, Job Safety analysis, permit to work, Lifting plans, and all supporting documents as required for starting & continuation of work/job is in vendor's scope.

3.19.4 Hydras are not allowed for materials transport, only pick and carry cranes to be deployed by the agency.

3.19.5 Scaffolding pipes, clamps, safety nets, floor grills for working platforms are to be made of good quality with proper certifications as per IS Codes.

3.20 **SITE ORGANISATION**

3.20.1 The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL:

i. Overall planning, monitoring & control.
ii. Quality control and quality assurance.
iii. Materials management.
iv. Safety, fire & security.
v. Industrial relations and fulfilment of labour laws and other statutory obligations.

3.20.2 The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.

3.20.3 The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc. prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

4.1 The following major Tools & Plants (T&P) shall be arranged by the Contractor for execution of work as per Technical Conditions of Contract of this tender within the quoted rate.

S.N.	DESCRIPTION OF MAJOR T&Ps	CAPACITY	QUANTITY	REMARKS
1.	Crawler Crane	150 MT	01 No.	Cranes to be made available as per site requirement up to Boiler Lightup.
2.	Crawler/Tyre mounted crane	75 MT	02 Nos.	Cranes to be made available as per site requirement. 1 no. crane upto Bolier Hydrotest.
3.	Tyre mounted	35/40 MT	01 No	Cranes to be made available as per site requirement.
4.	Passenger Cum Goods Elevator	Temporary lift, 1.5 MT capacity	02 No.	Refer note below.
5.	Backhoe Loader/JCB	Appropriate capacity	01 no.	Approximately four months per yr.
6.	Man lifter	min. 17mtr capacity	01 Nos.	As per requirement

Note:

1. Contractor shall mobilise 01 no. of 150MT Capacity Crawler Crane, 02 nos. of 75MT capacity Crawler/Tyre mounted crane & 01 nos. of 35MT capacity Tyre mounted crane at site. In case the cranes of aforementioned capacity could not be made available at site, for the reason best known to contractor, higher capacity crane shall be mobilised by the contractor.

2. Separate item is made for making payment against actual deployment of Backhoe Loader/JCB and Man lifter at site.

Note: PASSENGER CUM GOODS ELEVATOR

"The contractor has to Supply, install, operate and maintain passenger cum goods lift (temporary lift ,1.5 MT capacity) in boiler to facilitate access to various platform elevations upto top floor. Civil Foundation shall be provided by BHEL as per drawing submitted by the agency. Necessary grouting including supply of grout materials shall be in the scope of the bidder. The dismantling of the erected lift, Transport / removal from site is also covered in this scope of work. The contractor has to arrange operators, technicians for round the clock operation and maintenance is to be carried out by the contractor at his cost. The operation and maintenance shall be carried out till the end of contract period, or the date, on which the lift is dismantled as per the directives of BHEL, whichever is earlier" Foundation drawing for the proposed passenger lifts **shall be submitted by the agency.**

Said elevator in boiler to facilitate access to various platform elevations up-to top floor. The elevator shall conform to the national standard and industrial safety code as applicable. These shall be deployed at the time of start of pressure parts work in consultation with BHEL site engineer.

Laying of sleepers and rails and routine maintenance of the dip trolley system including assembly and dismantling are in Contractor's scope.

4.2 The following other Tools & Plants (T&P) shall be arranged by the Contractor for execution of work as per Technical Conditions of Contract of this tender within the quoted rate. Nos. of T&Ps to be deployed at site shall be decided w.r.t. monthly plan and review format (F-14) based on site requirement. Below given Nos are tentative for planning purposes by the bidder.

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
1.	Tyre mounted mobile crane	18/20 MT	02Nos.	As per requirement
2.	Tyre mounted mobile crane	10/12/14 MT	02 Nos.	As per requirement
3.	Trailer with prime mover	20 MT	02 No	As per requirement
4.	Trailer with prime mover	40 MT	01 Nos.	As per requirement
5.	Low bed trailer Low bed trailer with min 70-100 feet span	60 MT	01 No.	As per requirement
6.	Induction heating machine	As Required	02 No.	For welding of P-91,P-92,P-22, P-23, & pipes as applicable.
7.	Torque calibrator	As Required	As Required	For Ceiling girder erection
8.	Electrical torque wrench	As Required	As Required	For Ceiling girder erection
9.	Impact wrench	As Required	As Required	For Ceiling girder erection
10.	Torque wrench	As Required	As Required	For Ceiling girder erection
11.	Steel tape	As Required	As Required	For Ceiling girder erection
12.	Steel ruler	As Required	As Required	For Ceiling girder erection
13.	Ultrasonic hardness testing machine (Ultrasonic contact impedance (UCI))		As required	GE or Kraut Kramer or Microdur make or reputed branded ultrasonic hardness testing machine. (Hardness test may be Brinell, Vickers and Rockwell tests as per the discretion of BHEL.)
14.	DG SET – 250 KVA	As required	02 set	For continuous/ uninterrupted back up

				power during welding & post weld heat treatment of Girders and HP joints.
15.	Air compressor (electric/diesel operated)	210 CFM, 7 KG/CM2	02 nos.	As per requirement.
16.	Tig welding set	As required	As required	As per requirement.
17.	Submerged ARC WELDING M/C		Adequate nos.	As per requirement.
18.	Oxy Acetelyne Gas cutting Machine		Adequate nos.	
19.	DC arc welding machine		As required.	
20.	3-phase distribution board with complete set up for drawl of construction power	As required	As required	
21.	Power cable for drawl of construction power	As required	As required	
22.	Pre heating / stress relieving set (heating control panel, cables, heating elements, thermometers etc.)	As required	As required	As per requirement.
23.	Radiography arrangement with radioactive isotope source	As required	2 sets	As per Requirement, (quantity may vary as per site requirement.)
24.	Theodolite of required accuracy	To ensure verticality of structural columns.	02 Nos.	Required Since Boiler erection start
25.	Self-drilling cum tapping machine for screws of boiler	As required	6 nos. (As required)	
26.	Arrangement for UT of higher thickness joints with recording facility & required calibration blocks.	Type USN 50 or equivalent/ up graded type	02 SET (As required)	During Pre-assembly & erection
27.	Electro-hydraulic pipe bending machine	Up to 2" nb and 12 mm thick pipes	2 Nos	During Trim piping erection work.
28.	Welding rectifiers (electrical)	300 ampere rating	As required	As per requirement.
29.	Welding generator (diesel operated)	300 ampere rating	As required	

30.	Radiography film viewer	As required	As required	As per site requirement.
31.	Hydraulic pipe bending machine (manual)	For bending of pipes up to 50 mm nb size	4 Nos	During Trim piping erection work.
32.	Pipe chamfering machine /Tube Cutting	4-14"	As required	During pressure parts pre assembly & erection
33.	Pipe chamfering machine /Tube Cutting	14-20"	As required	During pressure parts pre assembly & erection
34.	Pipe cutting & beveling machines		Adequate nos.	During pressure parts pre assembly & erection
35.	Chain pulley blocks of various & Suitable capacities		As Required (as per the instructions of BHEL Engineer)	As per requirement.
36.	Baking oven with thermostat and temperature gauge for welding electrodes	As required	(As per Required)	As per requirement.
37.	Holding oven with thermostat and temperature gauge for welding electrodes	As required	(As per Required)	As per requirement.
38.	Portable oven for welding electrodes	As required	(As per Requirement)	As per requirement.
39.	Electric winch	2/3/5/10/15 ton capacity	As per requirement	As per requirement.
40.	Battery Driven emergency light	To meet construction requirement	As required	
41.	Hydraulic test/ pressurizing pump	Upto 400 kg per cm2	As per site requirement	For Piping and other areas Incl. installation, electrical connection, Erection and dismantling, temporary pipelines, fittings, etc. shall be carried out by the contractor as part of this work.
42.	Filling pumps	As Required	As Required	For hydro/other tests of various systems
43.	Furnace maintenance platform (sky climber)	Adequate capacity	2 nos./	to cover one length and one width of furnace including corners

44.	Hand winch	0.5 ton/1.0 MT capacity	As required	
45.	Scaffolding materials with clamps.	Suitable for working at various heights	As required	**For Safety related activity - Min. 2000 Nos.** For Erection, Alignment, welding & Insulation, painting works – as per requirement.
46.	Profile making m/c	For aluminium sheet cladding work	as required	
47.	Nibbling m/c	For refractory and other required activities	as required	
48.	Shearing m/c		as required	
49.	Water pump to lift water to top of boiler		2 set	As per requirement.
50.	Portable grinding m/c	As required	as required	As per requirement.
51.	Portable drilling m/c	As required	as required	
52.	Hoisting and pulley devices/pulleys	Assorted capacities	As required	As per requirement.
53.	Fire retardant tarpaulins	As required	As required	As per requirement.
54.	Fire extinguisher	As required	as required	
55.	Hydraulic Jacks	10/20/50/100 MT	as required	
56.	Dewatering pumps(Electrical & Diesel engine operated)		as required	
57.	Various sizes of clamps/ fixtures for assembling		as required	
58.	Portable hardness tester		as required	

59.	Hardness testing equipment (Equotip or Microdur make) 33 Stress relieving equipment with temperature		As per requirement	
60.	Magnetic particle testing equipment-DRY & WET Type		as required	
61.	Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable		as required	As per requirement.
62.	Pre-heating, post-heating and post-weld stress relief heat treatment chartless recorder / IIOT sensors duly password protected with a connectivity to remote server /Cloud		As required	
63.	elcometer for paint thickness checking		as required	
64.	Hand Operated Megger 500 / 1000 V		as required	
65.	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy		as required	
66.	Digital and Analogue Multimetres		as required	
67.	U Tube Manometer 0-2000 mm Water Column		as required	
68.	Inclined Manometer 0-50 mm Water Column		as required	
69.	Bolt Tension Calibrator		as required	
70.	Special Slings for Erection of Ceiling Girders & other heavy components		as required	As per requirement
71.	Concrete Blocks		As required	For making bed of steel structure for checking dimensional accuracy, configuration and minor rectification.

72.	Wooden/Concrete sleeper 1.5-2.0 Mtr length	Since beginning	As required	For material storage at site.
73.	PORTABLE MAGNETIC STRUCTURESCOPE		01 No	
74.	Calibrated Power driven HSFG bolt tightening machines with set value facility.		10 Nos	As per Site requirements
75.	PMI (Positive Material Identification)		01 Nos.	As per site requirement Additional PMI machine shall be deployed as per requirement.
	Equipment for carrying out preheating, post-heating, radiography, and other NDT test like LPI/MPI etc along with consumables.	As required	As required	
76.	Stress relieving equipment with automatic recording devices such as heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress-relieving operations.	As required	As required	
77.	Portable Drilling machine		02 Nos	Having capacity to make a drill the Upto 32 mm Dia
	~~**T& P for chemical cleaning**~~			
~~78.~~	~~**Circulating Pump**~~	~~200T/Hr,200 M Head Centrifugal, single/multi stage back pull out design, impeller and casing made of cast steel with base frame, motor, starter, cables. essential spares etc~~	~~3 Nos~~	~~3 NOS STARTER AND ALONG WITH REQURED CABLE AND LUGS~~

	List of suggestive safety Equipments /PPEs to be included in List of minimum T&P:	
79.	Safety Net (Conforming IS 11057:1984) Safety Net (Net Size: 10m x 5m, Mesh Size: 25 mm, Mesh Rope: 2mm double cord, Border/Tie Cord: 12mm diameter polypropylene rope (tested as per IS: 5175).Two meters length shall be provided at all four corners.	Min-100 Nos/unit
80.	Fall Arrester 'Rope grab fall arrester' & anchorage line. Anchorage Line: 14mm- 16 mm diameter, three strand twisted Polyamide rope. Rope Grab fall arrester: Openable & Guided type Fall Arrestor (on flexible line) conforming EN 353-2 & works on 14-16 mm diameter polyamide rope. Material: Nickel Chrome plated Steel Connector: Karbiner conforming to EN 362 (Minimum Strength 22 KN), material: Steel	Min. 200 nos. of Rope Grab Fall arrester' and Karbiner each. Min 90 nos. anchorage line, 30 metre long each, 30 nos. anchorage line, 40 metre long each
81.	**Horizontal life line** Stainless Steel Wire rope of 8mm diameter. Minimum six nos. of steel U-bolt clips are required for clamping each wire rope to a rigid support (03 nos. of U-bolt clips at each end).	Min 40 nos. of wire rope, each 40 metre long Min 90 nos. of wire rope, each 25 metre long.
82.	**Ladders on column** The minimum design live load on metallic ladder shall be a single concentrated load of 100 kilo grams. All rungs shall have a minimum diameter of 1- 2 meters, and minimum clear length of rungs shall be 40.6 centimeters. The distance between rungs shall not exceed 30.5 centimeters. Each ladder shall have maximum height of 9.0 metre. The ladder shall have proper fastenings for attaching it to a column using positive means such as bolt, weld or other type of fasteners.	Cumulative length of ladders is 1200 metres

MEASURING AND MONITORING DEVICES (MMD):

As per requirement to be finalized at site, shall meet the requirements as per field quality plan and other Erection related activities.

4.3 FACILITY TO BE PROVIDED BY THE CONTRACTOR FOR P91/P92 WELDING

4.3.1 Required no. of operators/ Technicians/ Electrician for installation, commissioning & operating continuously.

4.3.2 Gas Burners arrangement with required gas for maintaining temperature in the event of power failure.

4.3.3 Ultrasonic Flaw detector with recording device & complete accessories (Digital Type – Krautkramer Model USN 50 or equivalent) capable of storing calibration data. All recordable indications will be stored in memory of digital flaw detector and in PC (to be provided by the contractor) for review at later period.

4.3.4 EQUOTIP or MICRODUR make or equivalent portable hardness tester.

4.3.5 MPI/LPI Kits with required consumables.

4.3.6 Consumables

4.3.6.1 Glass fibre cloth – 1mm x 1000mm – Temp rating – 1260 ^{O}C.

4.3.6.2 Glass fibre cord – Dia 3mm (twisted) Temp rating – 1260 oC.

4.3.6.3 Ceramic fibre Blanket – RT Grade, density 96Kg/M3 – Temp rating – 1260 oC.

4.3.6.4 Ceramic fibre rope – Fibre Glass braided, Dia 12mm – Temp rating – 1260 oC.

4.3.6.5 K Type Thermocouple – 0.5mm Dia Single Strand individual fiber glass insulated

4.3.6.6 Heavy duty TC connectors for – K Type Thermocouple – 0.5mm Dia Single Strand individual fibre glass insulated.

4.3.6.7 All other consumables/ equipment required to carry out the work.

4.3.7 Adequate no of DG Set, operator and fuel for P-91 welding is in Bidders scope.

Note to Point no 4.3:

1) The induction heating equipment and other equipment shall be in the scope of agency. For routine maintenance & attending all type of break-down maintenance, contractor shall deploy sufficient manpower, tools and plant within the quoted rate.

2) The contractor shall provide electrical cables & switches required for extending power supply to the induction heating equipment. All the equipment shall be protected by providing covers or sheds at site by the contractor with in the quoted rate.

3) Diesel Generator for P 91/92 welding, along with required cables, switches, fuel and operator, has to be arranged by the contractor within the quoted rates. In the eventuality of contractor not making necessary arrangements to ensure availability of DG set as per requirement at site, BHEL will arrange the same at the contractor's risk and cost.

Contractor to follow and ensure the following related to DG set deployment at site:

- All rules & regulations pertaining in the state of Jharkhand to run DG sets are to be strictly followed.
- Statutory permission is to be obtained from Inspection authority.
- Separate earth pits for Body and neutral are to be made.

- All safety precautions and protections are to be installed before starting of the DG sets.
- Installation inspection is to be done by the authority.
- Payment of electricity duty and generation duty is to be paid by the contractor.

NOTE:

1. **All above T&Ps are to be deployed by contractor as and when required as per instruction of BHEL engineer. If works gets delayed due to non-availability of above T&Ps, BHEL reserves the right to deploy the same and recover the charges thereof from the contractor.**

2. Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work.

3. **Acid/Chemical Pump required for chemical cleaning process including unloading pumps** - Installation including civil/ structure work & operation of Acid/Chemical pumps is in scope of Contractor. Pumps & structural material (if required) shall be supplied by BHEL.
   Note: For chemical cleaning process, compressor will be in the scope of agency.

4. Necessary electrical / water / air connection required for operation of any of the tools & tackles shall be to Contractor‘s account.

5. Contractor has to submit the Calibration certificates of all the precision Equipement to BHEL. BHEL may ask for recalibration of the MMEs /precision equipments for ensuring quality of work. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.

6. Any T&Ps, Cranes, Slings, D-shackles and other lifting tackles, Trailers required for shifting of material from store to site shall be arranged by contractor.

7. T&P and the mobilization shown in the above mentioned list is suggestive requirement considering parallel working in Main plant structural area. Mobilization schedule as mutually agreed at site for major T&Ps, have to be adhered to. Numbers / time of requirement will be reviewed time to time at site and contractor will provide required T&P / equipments to ensure completion of entire work within schedule / target date of completion without any additional financial implication to BHEL. Vendor will give advance intimation & certification regarding capacity etc. prior to dispatch of heavy equipments. Also on completion of the respective activity, demobilization of T&P in total or in part can be done with the due approval of engineer in charge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.

8. In the event of need of change of type of any of major T&Ps, approval shall be taken from BHEL Engineer in-charge prior to mobilization. The decision of Number of T&P required due to replacing the enlisted T&P as per above table, shall be taken after analyzing the production capacity and suitability of both the T&Ps.

9. The contractor shall submit the valid test certificate/calibration certificates for all the T&Ps before put into actual use at site. The certificates shall be renewed time to time as instructed by BHEL Engineer

10. Crane operators deployed by the contractor shall be offered for testing by BHEL before they are allowed to operate the cranes.

11. The above list as mentioned in S.No. 4.2 is only indicative and these T&Ps may not be required for entire contract period but contractor shall ensure the availability of the T&Ps as per work requirement and T&P Deployment schedule. T&P Deployment schedule shall be finalized at site in consultation with BHEL Engineer based on the work fronts/work requirement. BHEL decision shall be final and binding regarding the T&P deployment schedule. Contractor shall mobilize / maintain the T&P's as per the deployment schedule notified time to time by BHEL Engineer.

12. APR (As per Requirement)- Contractor has to deploy T&P, MMD, IMTE as per requirement of site and as decided by BHEL Engineer.

13. Apart from above mentioned T&P, any additional item required in addition to above mentioned T&P for proper execution of scope of work, contractor has to arrange such T&P within quoted rate on the instruction of BHEL in writing in a reasonable period within two weeks from the written instruction from BHEL.

14. T&P's mentioned above shall be specifically deploy as per the respective packages. However, as per work requirement and availability of T&Ps the inter use in Material Handling and Mechanical works may be permitted as per the instruction of the BHEL Engineer.

15. If the work related to T & Ps mentioned above is completed then, BHEL can release that T & P during contract period / extended period if any. However, written permission shall be taken by contractor from BHEL Construction Manager and gate pass formalities shall be followed by the contractor for releasing the T&P.

16. In the eventuality of contractor not deploying / abnormal down time of T&P/cranes in his scope during the period specified above, and BHEL arranges for the same [BHEL's own cranes], prevailing BHEL Corporate Crane hire charges (which may vary from time to time) shall be recovered from the contractor's running bills. Corresponding pages of Corporate Crane hire charges are enclosed as part of VOL-I-E-2754 as File titled "**Annexure 1- BHEL T&P Hire Charges"**. (Please note that these charges are as valid up to Aug, 2023 and may get revised further). In case BHEL arrange the T&P/Crane through hiring, actual hiring charges with 5% over head shall be recovered from the contractor's running bills.

17. The loading, unloading and transportation of contractors T&Ps shall be in the scope of contractor. All necessary items such as Trailers, Cranes, Winches, welding generators, slings, jacks, sleepers, rails etc., are to be arranged by the contractor at his own cost.

18. All operators (for crane, winch etc.) deployed by contractor shall have valid licence from applicable authority (which ever applicable).

19. The contractor has to furnish a list of Tools and plants including cranes/ tractors/trailers/trucks etc. which he has proposed to deploy for this work.

20. The contractor shall arrange operator, diesel, petrol and other consumables required for the tools and plants, equipments etc. Preventive and routine maintenance of T & P are also to be arranged by the contractor at his cost without any delay. Required number of experienced mechanics and helpers for routine maintenance of the above cranes shall be provided by the contractor within his quoted rate.

21. **Heavy equipment will be tracked with real-time position location for fleet management. Deployment vs planned reports shall be generated. Equipment Condition monitoring data like Service Meter Reading, Operation maps, Loading, fuel levels, operating information, idle time etc. shall be captured. This data shall be captured through Integrated Online Project Monitoring system. All T&P equipment deployed by contractor will be covered/ monitored through this system. Minimum 5 signals per equipment should be made available to provide the input to Integrated Online Project Monitoring system. Necessary software/ hardware for aforesaid system shall be provided by BHEL.**

22. **All manpower hired/deployed by Contractor for this project shall be monitored through Integrated Online Project Monitoring system by BLE beacons & LoRa backhaul. Every personnel entering in to NTPC site premises for carry out any work shall be tracked. [Separate tagging for visitors]. Geo-fencing /BLE beacon based zoning of the erection area shall be done to track workforce deployment and safety purposes. Work force monitoring Dash board (planned vs actual deployment) shall be made available. BLE beacons & LoRa backhaul shall be provided by BHEL on chargeable basis to contractor. BHEL will provide Tags free of cost for maximum 300 workers, additional tags as required shall be provided by BHEL on chargeable basis @ Rs. 1000/- per tag. In case of damage or missing of issued worker tag, Rs. 1000/- per tag will be charged for issuing new worker tag.**

23. **Medical/First aid center/medicine purchased for emergency/Doctor purpose along with ambulance services with fuel and operator (round the clock) shall be arranged by BHEL for handling medical emergencies on behalf of vendors. Cost, without any overheads, against these facilities shall be distributed/shared among the vendors working in Talcher Project site proportionately based on contract value. In case of any unforeseen eventuality with contractor's staff/labour held at Medical/First aid center, BHEL shall not be responsible.**

NOTE:

The above list (other than mentioned in S.No. 4.1 of Chapter IV) is only indicative and neither exhaustive nor limiting. Quantities indicated above are only the minimum required. Contractor shall deploy all necessary T&P to meet the schedules & as prescribed by BHEL engineer and required for completion of work. In the event of non-mobilization of any T&P by the successful bidder and as a result if progress of work gets suffered, BHEL reserves the right to deduct suitable amount from the dues of the bidder, without assigning reasons thereof.

5.1 LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS:

SL NO	DESCRIPTION & CAPACITY OF T&P	QUANTITY	REMARKS
1	Cranes	As decided by BHEL	All cranes (except Contractor scope) required for mentioned work will be arranged by BHEL as per requirement.
2	Air Leak Test equipment with all auxiliaries.	01 Set	For leakage test of Boiler and ducts.
3	Boiler Hydraulic Pressure Testing Pump with accessories (Above 400 Kg/cm2)	As required	
4	Acid/Chemical cleaning pump	As required	200 T/Hr, 200 M Head, for handling 31% concentration Hcl or 40% EDTA concentration ph 5.5 to 6.0/ 25% CONCENTRATED AMMONIA

5.2 All the T&Ps mentioned in clause 5.1 above shall be given to contractor on sharable basis and the allotment is made by BHEL on need basis.

5.3 HLHR crane is to be used for erection of boiler ceiling structures and equipment/ components above boiler ceiling structure, heavy structures of bunker that require services of this crane as decided by BHEL. This crane will accordingly be deployed at appropriate time as decided by BHEL for suitable duration and intended purpose.

5.4 Contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores all T&Ps mentioned in Sr no 5.1 for his use.

5.5 Cranes are only for erection purpose and shall not be available for material handling or transportation purpose. Contractor shall make their own arrangements for material transportation to erection site.

5.6 All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections for the BHEL issued T&Ps shall have to be arranged by the contractor at his cost.

5.7 The contractor at his cost shall arrange for grouting of anchor points of T&Ps issued to him. Necessary grout materials are to be arranged by the contractor at his cost.

~~5.8 Filling pump for other than main boiler, for hydro test shall be arranged by the contractor, if required. For testing LP lines, necessary hydraulic test pumps/ hand pumps are to be arranged by the contractor.~~

5.9 The day-to-day and routine maintenance including replacement of spares for the BHEL T&Ps will be carried out by the contractor at his own cost. However, BHEL shall supply spare parts free of charges for normal wear and tear only.

5.10 Any loss/damage of tools by the contractor shall have to be replaced or otherwise cost thereof shall be recovered from the contractor.

5.11 The contractor shall make necessary arrangement like laying of special sleeper beds, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of crane.

5.12 Hydraulic testing pumps for Boiler and HP lines shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, Erection and dismantling and returning to BHEL stores, etc, shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same. The spares will be arranged by BHEL.

5.13 Agency has to deploy the sufficient nos. of induction heating Machines. The consumables such as electrodes and filler wire (except as specified in shipping list), thermocouple, ceramic pads and insulation, induction coil etc. has to be arranged by the contractor.

Note: For Crane:

1. The cranes may be BHEL owned or may be obtained on hiring basis including operating and maintenance crew.
2. Operator and O&M for BHEL owned crane will be provided by BHEL.
3. Contractor shall provide the fuel for BHEL provided cranes (Hired/owned) for his use.
4. Contractor shall make necessary arrangements like laying of special sleeper beds and steel plates (**Plates & sleepers for BHEL owned/hired cranes shall be provided by the BHEL**), assembly and dismantling of heavy attachment, boom, jib etc. for movement and operation of the crane. Contractor shall provide necessary manpower assistance for initial and final assembly & dismantling and for subsequent operations of boom extension and reduction during execution of work. Levelled area in boiler area will be provided by BHEL/customer for the cranes. Consolidation of the ground, if required (Area required for movement of crane), and preparation (including civil work with material) for placing crane for operation shall be done by the contractor, at his cost. Necessary plates / sleepers required for marching operation shall also be provided by the BHEL only for BHEL owned cranes.
5. Cranes provided by BHEL will be on sharing basis with other agencies / contractors of BHEL. The allocation of cranes shall be the discretion of BHEL engineer, which shall be binding on the contractor. Cranes will be deployed at appropriate time as decided by BHEL for suitable duration and intended purpose. Augmentation of BHEL T & P under special circumstances shall be discretion of BHEL.

6. TIME SCHEDULE & MOBILIZATION

6.1 Initial Mobilization and Time Schedule:

After issue of LOI (though Fax/courier/email) the contractor shall report to the Construction Manager/Site In-Charge of BHEL at site within two weeks and make a MOM (Minutes of meeting) for mobilization of manpower, T&Ps, date of start of work and detailed completion program. Such resources shall be progressively augmented to match the schedule of milestones and commissioning and the entire works are completed within the contract period of 33 (Thirty-three) Months from the date of start of work in a manner required by BHEL to match with the project schedule.

6.2 MOBILIZATION FOR ERECTION, ASSISTANCE FOR COMMISSIONING ETC.

The activities for Erection etc. shall be started as per directions of Construction Manager of BHEL. Contractor shall mobilize further resources as per requirement to commence the work of Erection etc. of Boiler, rotating machines including touchup Painting (as and where required), Bunker, Bunker structure etc. & Insulation progressively augment the resources to match schedule of the project.

6.2.1 The contractor shall have to mobilize his resources earlier than the start of contract period for preparatory work like taking over and chipping of foundations, blue-matching, grouting of packer plates etc. and start of pre-assembly. The contractor shall complete all the works in the scope of this contract within the contract period. Pending points identified by the customer/BHEL during the execution of the contract are to be liquidated during the contract period itself.

6.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Erection/placement on its designated foundation / location, of the first major permanent equipment / component / column covered in the scope of these specifications, (whichever is earlier as decided by BHEL) shall be recognized as "Start of contract period". Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period. The date of Start of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy, the decision of BHEL engineer is final.

Based on the availability of civil foundations from BHEL and materials from manufacturing units, contractor may have to advance the start of erection after getting clearance from Construction Manager, or the start of erection may get delayed due to site conditions.

The Contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules. The schedule of important milestones is as follows:

Boiler & Its Auxiliaries & Bunker U#1		
SL No.	**Milestones**	**Tentative Schedule**

1.	Boiler Erection Start	1st Month
2.	Completion of Ceiling Girder erection	8th Month
3.	Boiler Hydro Test- drainable	18th Month
4.	Boiler Light Up (BLU)	25th Month
5.	Chemical cleaning completion	25th month
6.	Mill Clean air flow test	26th Month
7.	Steam Blowing Completion with readiness of Coal system related to boiler	27th Month
8.	Synchronization on coal	28th Month
9.	Safety Valve Floating	29th month
10.	Full Load Operation	31nd Month
11.	Completion of Trial Run	33rd Month
12.	Completion of Facilities	33th Month

SL No.	Milestones	Tentative Schedule
1.	Construction of 2 nos. of Labour Hutment	03rd Months
2.	Construction of balance Labour Hutment	Progressively

Note: Contractor has to construct atleast 3 sets of Labour hutment (as per specification) to meet the actual deployment of manpower.

6.4 CONTRACT PERIOD

The contract period for completion of entire work under scope shall be **33 (Thirty-three) months** from the "START OF CONTRACT PERIOD" as specified earlier for completion of the entire work.

6.5 PROVISION OF PENALTY IN CASE OF SLIPPAGE OF INTERMEDIATE MILESTONES:

In case of slippage of Two Major Intermediate Milestones, mentioned as M1 & M2 hereunder, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to F-14.

Milestones	Activities	To be completed by
M1	Completion of Ceiling Girder erection	8th Month from Date of Start
M2	Boiler hydro Test-Drainable	18th Month from Date of start

Note A: Refer clause-8 of 'ANNEXURE-12: IMPORTANT INFORMATION' of the NIT regarding modalities against provision of penalty in case of slippage of Intermediate Milestones.

Note B:

1. Above time schedule is tentative and in order to meet above schedule in general, and any other intermediate targets set, to meet customer/project schedule, contractor shall arrange & augment all necessary resources from time to time as per the instructions of BHEL.
2. The above schedule is tentative. In case the activities in the schedule are to be advanced, the related Erection activities in the scope of the contractor are to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.
3. The contractor shall submit and a detailed area/structure wise L3 schedule within 7 days in consultation with BHEL based on the tentative schedule provided as above. The detailed L3 schedule shall be approved by BHEL and same shall be implemented. Bidder shall submit L3 schedule in MS Projects to meet the agreed project schedule covering various mile stone activities and their split up details such as mobilization, procurement of materials & erection activities. This schedule shall also clearly indicate the interface facilities / inputs applicable in each package.

NOTE: The tentative commencement of work shall be from Jul'23.

7. Terms of payment

The progressive payment for Erection and commissioning on accepted price of contract value will be released as per the break up given hereinafter:

7.1 Progressive Payment against monthly running bills will be made upto 85 % of the value of the erected Pro-rata as per SL no 7.1.1 to 7.1.20.8 of the following table.

Sl No.	Sub Packages ------->	Structures	Pressure Parts	Non Pressure Parts	Rotating machines		Piping		Insulation
	Rate schedule Identifier --->	1A	1B	1C	2A – APH (PG52)	2A - Fans, Mills & Other systems	5A, 5B, 5C, 5D	5E	3A, 3B, 3C, 3D
	Pro rata payments (85%)								
7.1.1	on pre-assembly wherever applicable (if not applicable, this portion shall be clubbed with placement in position)	20%	20%	25%	--	15%	15%	15%	--
7.1.2	placement in position	15%	10%	10%	--	20%	20%	25%	50%
7.1.3	alignment	20%	15%	10%	--	20%	20%	15%	15%
7.1.4	welding/bolting/fixing	20%	20%	15%	--	20%	20%	30%	15%

7.1.5.1	completion of non-destructive examination - Radiography (if not applicable, then this portion to be paid along with welding/bolting/fixing)	4%	4%				2%		
7.1.5.2	completion of non-destructive examination – ultrasonic testing UT (if not applicable, then this portion to be paid along with welding/bolting/fixing)	1%	1%				0.50%		
7.1.5.3	completion of non-destructive examination - Hardness (if not applicable, then this portion to be paid along with welding/bolting/fixing)	1%	1%				0.50%		
7.1.5.4	completion of Stress relieving/ heat treatment (if not applicable, then this portion to be paid along with welding/bolting/fixing)	4%	4%	--	--	--	2%		--
7.1.9	completion of attachment welding, fin welding, supports	--	5%	--	--	--			--
7.1.10	completion of roof skin casing & al cladding works	--	4%	--	--	--			5%
7.1.11	installation of temporary piping	--	--	--	--	--			--
7.1.12	dismantling of temporary piping, edge preparation and return to BHEL stores, area cleaning	--	--	--	--	--			--
7.1.13	hangers & supports etc wherever necessary as per drg	--	1%	25%	--	--	5%		--
7.1.14	completion of furnace alignment and fire ball checking		--	--	--	--			--
7.1.15	completion of back pass alignment		--	--	--	--			--
7.1.16	completion of vibration snubbers, mechanical spacers, cassette baffles, steam cooled spacers		--	--	--	--			--
7.1.17	equipment trial operation	--	--	--	--	10%			--
7.1.18	hydraulic test/pneumatic test	--	--	--	--	--	3%		--

7.1.19	floating of lines, final adjustment of supports for cold and hot values (if not applicable, this portion to be clubbed along with hydraulic test/pneumatic test)	--	--	--	--	--	2%		--
7.1.20	**Air pre heaters (PG 52)** **from the total amount payable for the PGMA weight at tonnage rates, payment will be regulated as under:**	--	--	--	--	--			--
7.1.20.1	completion of support steel squareness and levelling, expansion arrangement, housing panel erection and alignment, erection, alignment and welding of pedestals	--	--	--	11%	--			--
7.1.20.2	completion of erection, alignment and welding of support bearing, guide bearing, rotor post, bottom and top centre sections, hot and cold end connecting plates	--	--	--	14%	--			--
7.1.20.3	completion of erection and alignment of modules	--	--	--	15%	--			--
7.1.20.4	completion of erection, alignment and welding of pin rack assembly and drive assembly	--	--	--	12%	--			--
7.1.20.5	completion of seals setting	--	--	--	17%	--			
7.1.20.6	erection, alignment and welding of lube oil systems, cleaning device, fire sensing device, deluge and water wash lines, observation port and lighting assemblies and other accessories	--	--	--	13%	--			
7.1.20.7	completion of PGMA	--	--	--	1%	--			
7.1.20.8	air preheater trial run	--	--	--	2%	--			
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**

7.2 Further 15 % payment on pro-rata basis common to all PGs of Boiler ,its Aux shall be released on achievement of the following stage / milestones events (as per Cl no 7.2.1 to 7.2.30 of the following table) for the tonnage erected.

Sl No.	Sub Packages ------->	Structures	Pressure Parts	Non Pressure Parts	Rotating machines		Piping		Insulation
	Rate schedule Identifier --->	1A	1B	1C	2A – APH (PG52)	2A - Fans, Mills & Other systems	5A, 5B, 5C, 5D	5E	3A, 3B, 3C, 3D
II	**STAGE/MILESTONE PAYMENTS (15%)**								
7.2.1	Air & gas tightness test	--	--	5%	--	--			--
7.2.4	completion of air & gas tightness test for furnace	--	2%	--	--	--			--
7.2.5	boiler hydraulic test (drainable)	--	2%	--	--	--			--
7.2.6	boiler Hydraulic test (non Drainable)	--	1%	--	--	--			--
7.2.7	Reheater coils hydraulic test	--	2%	--	--	--			--
7.2.8	clean air flow test	--	--	--	--	1%			--
7.2.9	boiler light up	--	1%	--	2%	1%	1%	1%	1%
7.2.10	ABO/chemical cleaning	--	1%	1%	2%	1%			1%
7.2.11	steam blowing	--	--	2%	1%	1%	2%	2%	1%
7.2.12	safety valve floating	--	2%	--	2%	--			1%
7.2.13	Rolling and synchronization						1%	1%	
7.2.14	readiness for coal feeding	--	--	--	--	--			--
7.2.15	coal firing	--	--	2%	2%	2%			1%
7.2.16	full load	--	--	--	--	1%	1%	1%	1%
7.2.17	trial operation of unit	--	--	--	--	2%	1%	2%	2%
7.2.23	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	3%	--	--	--	--			--
7.2.24	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing	--	--	--	--	--	1%		--

7.2.25	Painting	3%	--	1%	1%	2%	3%	3%	--
7.2.26	Area cleaning, temporary structures cutting/removal and return of scrap	1%	1%	1%	1%	1%	1%	2%	3%
7.2.27	Punch List points/pending points liquidation	4%	1%	1%	2%	1%	1%	1%	1%
7.2.28	Submission of 'As Built Drawings'	--	--	--	--	--	1%		--
7.2.29	Material Reconciliation	3%	1%	1%	1%	1%	1%	1%	2%
7.2.30	Completion of Contractual Obligation	1%	1%	1%	1%	1%	1%	1%	1%
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**
	TOTAL I + II	**100 %**	**100%**	**100%**	**100%**	**100%**	**100 %**	**100 %**	**100%**

7.3 Mill bunker structure including coal bunkers, Conveyor galleries, trestles etc., Pipe and cable racks: This is split into two types as below:

1) BHEL supplied items.
2) Contractor supplied items that goes as permanent part of the system.

7.3.1 BHEL supplied items

7.3.1.1: Progressive Payment against monthly running bills will be made up-to 85 % of the value of the erected tonnage Pro-rata as per following table.

Sr no	Description	Percentage
7.3.1.1.1	On pre-assembly wherever applicable (if not applicable, this portion shall be clubbed with placement in position)	15%
7.3.1.1.2	Placement in position	20%
7.3.1.1.3	Alignment	20%
7.3.1.1.4	Welding / bolting / fixing	15%
7.3.1.1.5	Completion of non-destructive examination - Radiography (if not applicable, then this portion to be paid along with welding/bolting/fixing)	4%
7.3.1.1.6	Completion of non-destructive examination – ultrasonic testing UT (if not applicable, then this portion to be paid along with welding/bolting/fixing)	1%
7.3.1.1.7	Completion of non-destructive examination - Hardness (if not applicable, then this portion to be paid along with welding/bolting/fixing)	1%

7.3.1.1.8	Completion of Stress relieving/ heat treatment (if not applicable, then this portion to be paid along with welding/bolting/fixing)	4%
7.3.1.1.9	Hangers & supports etc., Readiness of floors for concrete pouring as applicable	5%
		85%

7.3.1.2 Further 15 % payment on pro-rata basis shall be released on achievement of the following stage / milestones events (as per SL no 7.3.1.2.1 to 7.3.1.2.8 of the following table) for the tonnage erected.

Sr no	Description	Percentage
7.3.1.2.1	READINESS FOR COAL FEEDING (1% for each Mill) & completion of side cladding	7%
7.3.1.2.2	COAL FIRING	3%
7.3.1.2.3	TRIAL OPERATION OF UNIT	1%
7.3.1.2.5	Area cleaning, temporary structures cutting/removal and return of scrap	1%
7.3.1.2.6	Punch List points/pending points liquidation	1%
7.3.1.2.7	Material Reconciliation	1%
7.3.1.2.8	Completion of Contractual Obligation	1%
		15%
	Total of 7.3.1.1 and 7.3.1.2	**100%**

7.3.2 Contractor supplied items that goes as permanent part of the system: Progressive payment:

7.3.2.1 Interim Payment (95%) Interim bills in the form of monthly running bills prepared by the contractor shall be based on the quantities executed and measured.

7.3.2.2 5% of the item rate shall be released after submission of the quality check formats / documents as per the quality plan for the quantum of work billed and duly certified by engineer.

7.4 Sanction of 'part' item rates in the item-rate contract for payment in Running Bills: In order to facilitate part payment, BHEL Site Engineer at his discretion may further split the contracted rates/percentages to suit site conditions, cash flow requirements according to the progress of work as per Vol. IC - GCC clause 2.23.1 (v), however following points are to be noted:

a) Provided no 'part' payment is recommended till 25% of work in the item rate is executed.
b) Payment of item rate to be made in not more than three instalments, last stage payment to be not lower than 20% of the item rate.

7.5 Progressive Payment/ Final Payment: The payments for works under the scope of this contract shall be as per clause no 2.6; clause 2.22; clause 2.23 of General Conditions of Contract and Chapter X of Special Conditions of Contract. However, Clause No. 10.5 on RA Bill Payments, in Volume-IB, Chapter-X of SCC, is revised as under:

The payment for running bills will normally be released within 30 days of submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc. and other dues in the meanwhile. No interest shall be payable for the payment (if any) made beyond 30 days.

Few points of consideration are as below:

7.5.1 The measurements sheets of work done in a month shall be submitted in triplicate duly agreed/signed by BHEL Engineer. The contractor shall extend all necessary assistance for verification of measurements of works without any extra cost.
7.5.2 Material reconciliation shall be complied on monthly basis.
7.5.3 The RA bill payments are interim payments and bills shall be submitted in prescribed formats.
7.5.4 Recoveries on account of electricity, water, statutory deductions etc. shall be made as per terms of contract.
7.5.5 BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS.
7.5.6 Final bill shall be submitted after completion of works and upon material reconciliation along with all prescribed formats.

8.0 TAXES, DUTIES, LEVIES (Rev 14 dated 09/10/2020)

1. All taxes excluding GST, GST Cess **& BOCW** Cess **but including, Royalties, fees, license, deposits, commission, any State or Central Levy and other charges whatsoever, if any, shall be borne by you and shall not be payable extra.**

2. Any increase of the taxes excluding GST, GST Cess & BOCW **Cess**, at any stage during execution including extension of the contract shall have to be borne by the contractor. Quoted/ accepted rates/ price shall be inclusive of all such requirements. Please note that since GST on output will be paid by BHEL separately as enumerated below, your quoted rates/ price should be after considering the Input Credit under GST law at your end.

3. **GST :**
   The successful bidder shall furnish proof of GST registration .GST along with Cess (as applicable) legally leviable & payable by the successful bidder as per GST Law, shall be paid by BHEL. Hence Bidder shall not include GST along with Cess (as applicable) in their quoted price.

4. GST charged in the Tax Invoice/Debit note by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return

5. E-invoicing under GST has been implemented with effect from 1st October 2020 for all the taxable persons having turnover more than the threshold limit in any preceding financial year from 2017-18 onwards. Therefore, for all the taxable persons falling under the purview of E-invoice, it is mandatory to mention a valid unique Invoice Reference No. (IRN) and QR code as generated from E-Invoicing portal of the Government for the purpose of issuing a valid Tax Invoice. Only an E-invoice issued in the manner prescribed under rule 48(4) of CGST Rules shall be treated as valid invoice for reimbursement of GST amount.
   If the successful Bidder is not falling under the purview of E-Invoicing then he has to submit a declaration in that respect along with relevant financial statements.

6. Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred there under) wherein the 'Bill To' details will as below:
   BHEL GSTN – As per **Annexure -1**
   NAME -- Bharat Heavy Electricals Limited
   ADDRESS – Site address

7. Bidder to immediately intimate on the day of removal of Goods (in case of any supply of goods) to BHEL along with all relevant details and a scanned copy of Tax Invoice to below email ids to enable BHEL to meet its GST related compliances :-
   Email id ---- to be intimated later on.
   In case of delay in submission of the abovementioned documents on the date of dispatch, BHEL may incur penalty /interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from the successful bidder, if such delay is not attributable to BHEL.
8. In case of raising any Supplementary Tax Invoice (Debit / Credit Note) Bidder shall issue the same containing all the details as referred to in Section 34 read with Rule 53.

9. Bidder shall note that in case GST credit is delayed/ denied to BHEL due to delayed / non receipt of goods and /or tax invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other reasons not attributable to BHEL, GST amount shall be recoverable from the vendor along with interest levied / leviable on BHEL, as the case may be.

10. Bidder shall upload the Invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit availed by BHEL is denied or reversed subsequently as per GST Law , GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the bidder along with interest levied / leviable on BHEL.

11. Way Bill: Successful Bidder to arrange for way bill / e-waybill for any transfer of goods for the execution of the contract.

    The Bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit/ Way Bill, if required, shall be arranged by the contractor and BHEL will not supply any Road Permit/ Way Bill for this purpose.

12. **New taxes and duties**:-Any New taxes & duties, if imposed subsequent to due date of offer submission as per NIT & TCN, by statutory authority during contract period including extension, if the same is not attributable to you, shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties.
    Benefits and/or abolition of all existing taxes must be passed on to BHEL against new Taxes, if any, proposed to be introduced at a later date.
    In case any new tax/levy/duty etc. becomes applicable after the date of bidder's offer but before opening of the price bid, the bidder must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of the price bids. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

13. For transportation work, bidder shall declare in his quotation whether he is registered under GST, if yes, whether he intends to claim GST on forward charge basis. In absence of this declaration, BHEL will proceed further with the assumption that bidder intends not to claim GST on forward charge basis. However, in case of GST registered transporter, the amount to the extent of goods and service tax will be retained till BHEL avails the credit of GST. Further, transporter shall issue tax invoice which inter alia includes gross weight of the consignment, name of the consigner and the consignee, registration number of vehicle in which the goods are transported, details of goods transported, details of place of origin and destination, GSTIN of the person liable for paying tax whether as consigner, consignee or goods transport agency, and also containing other information as mentioned under rule 46.

14. **TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills unless exemption certificate from the appropriate authority/ authorities is furnished.**

15. **TDS under GST shall be deducted at prevailing rates on applicable value from the running bills.**

16. **TCS under Income Tax 1961 has been implemented with effect from 1st October 2020 for every seller having turnover more than threshold limit during financial year immediately preceding financial year in which the sale of goods is carried out, who receives any amount as consideration for sale of any goods of the value or aggregate of such value exceeding threshold limit other than export of goods or who is already covered under other provision of section 206C, collect from the buyer, TCS as per applicable rates of the sale consideration exceeding threshold limit subject to following conditions**
    i. Buyer shall be as per clause (a) of section 206C- (1H)
    ii. Seller shall be as per clause (b) of section 206C- (1H)
    iii. No TCS is to be collected, if the seller is liable to collect TCS under other provision of section 206C or the buyer is liable to deduct TDS under any provision of the Act and has deducted such amount.

    If Successful Bidder is falling under the purview of TCS then he has to submit a declaration in that respect along with relevant financial statements before the start of work or if bidder is falling under preview of TCS during the work in progress then bidder is compulsorily required to submit relevant financial statement in the beginning of the respective FY.

    For TCS claim, vendor has to submit relevant documents required as per Income Tax Act.

17. Refer Annexure – 2 for BOCW Act & Cess Act.

ANNEXURE-1

State wise GSTIN no.s of BHEL

Sl. No	Projects under state	GSTIN
1	Andhra Pradesh	37AAACB4146P7Z8
2	Bihar	10AAACB4146P1ZU
3	Chhattisgarh	22AAACB4146P1ZP
4	Gujarat	24AAACB4146P1ZL
5	Jharkhand	20AAACB4146P5ZP
6	Madhya Pradesh	23AAACB4146P1ZN
7	Maharashtra	27AAACB4146P1ZF
8	Orissa	21AAACB4146P1ZR
9	Telangana	36AAACB4146P1ZG

ANNEXURE-2

BOCW Act & Cess Act

Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:

1. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

2. It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3. It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4. It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may , by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5. It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.
6. It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
7. It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.
8. It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics :

   (i)Number of Building Workers employed during preceding one month.

   (ii) Number of Building workers registered as Beneficiary during preceding one month.

   (iii)Disbursement of Wages made to the Building Workers for preceding wage month.

   (iv) Remittance of Contribution of Beneficiaries made during the preceding month
9. BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.

10. It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction.

11. Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty (if any, imposed by Cess Authorities) from the payables on account of non-compliance.

12. The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

BILL OF QUANTITY/WEIGHT SHCEDULE

Summary of Weight of BOQ for Boiler, Mill bunker structure, Coal bunkers, ID- Ducts, Structure, Gates & dampers, Rot. M/c, Insulation: -

Note to weight schedule:

1. The weights mentioned above are approximate and liable to vary as per design consideration. There will be change in PG, weight, description etc. However, payments will be made for the tonnage actually erected at the quoted rate. Quantity Variation will be dealt as per clause 2.14 of General Conditions of Contract (Volume I BCD).
2. **Besides PG / PGMA indicated in the weight schedule, there is likely hood of addition product groups integral to Boiler etc. and its aux. The quoted rate shall be applicable for such product groups also. There may be variation or addition of PGMAs, description, weights etc., and any additional scope of work supplied under the above package shall be erected by the contractor and payment will be made as per the quoted / accepted rate in the respective category at the discretion of BHEL. Decision of BHEL Engineer shall be final and binding to the contractor in this regard.**
3. Rate Schedule Identified for PGMAs are based on envisaged material specification. Payment shall be made on the basis of material specification of actual material received and erected at site. BHEL's decision in this regard shall be final.
4. The erection & dismantling of temporary piping, pumps, tanks, dummy plates & blanks, valves, pressure gauges and other miscellaneous equipment required for the test. for pre-commissioning and commissioning activities like hydraulic test, chemical cleaning, steam blowing etc. are covered in this contract and shall be carried out as a part of work. Payment will be made at the rate applicable. Weight for the same will be based on jointly measured quantity and corresponding standard weights. No payment will be made for the equipments brought by the Contractor such as pumps etc and foundations made by the Contractor for temporary systems. Weight for the same will be based on jointly measured quantity and corresponding standard weights. Except contractor scope materials/Pump.

   Payment terms for temporary piping:

   a. 50% on completion of installation of temporary piping.

   b. 25% on dismantling

   c. 15% on return of BHEL Stores

   d. 10% on Material reconciliation.

Note: Required pipes, valves, blanks, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded.

5. Imported electrodes / TIG welding wires released under XX992 will be given by BHEL. All other electrodes / TIG welding wires are to be supplied by contractor under his scope.
6. Fixing components for insulation: The scope of works covers welding of all attachment on the pressure parts for fixing insulation & refractory.
7. The Erection of HT MOTORS are covered in this scope of contract. However, dry out, testing and commissioning is not in the scope of this contract.
8. The erection and dismantling of air blowers and connecting pipes and ducts, providing blanks / dummies at the required locations and conducting gas tightness test is in the scope of the contractor and shall be carried out within the quoted rate.
9. Payment for additional CONTROL VALVES / STEAM TRAPS/ FLOW NOZZLES / ORIFICES & OTHER VALVES AND FITTINGS (except temporary system valves) will be made as per the quoted / accepted tonnage rate of respective piping category in which these material is installed. i.e. P91, P92, HP Piping, LP Piping & SS piping.
10. **Extra work rates for welding:**

    The quantum of welding joints indicated in **Welding schedule shall be tentative and** liable for variation in PG, description, size, materials, NDT requirements etc. The joints will be grouped into category of carbon steel (inclusive of SA106GrC or equivalent) and Alloy steel (inclusive of T91/T92/P91/P92) and convert them in to equivated joints (Dia 63.5x6.3mm) as per the formula below:

    No. of equivated Joints = Dia X Thickness / (63.5 x 6.3)

    = Dia X Thickness / 400.05

    If the total no of equivalent joints in each category exceeds 25% of the total equivalent joints in that category contractor will be paid extra as per the rate indicated below:

    a) One extra Equivalent joints of Carbon Steel (CS) = Rs 254/-
    b) One extra Equivalent Joints of Alloy Steel (AS) = Rs 561/-

Non Destructive Testing (NDT) - Phased Array Ultrasonic Testing (PAUT) and Computrised RT for the materials/items erected by the bidder, if applicable, shall be carried out by a septate agency. The bidder shall make all the arrangements, as and when required, such as safe approach and scaffolding platform, to enable the PAUT and Computerised RT Testing agency/ies to execute their work. No separate payment shall be made in case of preparation of safe approach and scaffolding platform for PAUT and Computerised RT Testing (NDT) agency/ies. In case, bidder fails to provide safe approach and scaffolding platform to the agency within 2 days from the date of completion of joint/intimation, BHEL shall make the arrangement at risk and cost of bidder without any further notice under clause 2.7.2 of GCC.

9.1 Detailed (PGMA wise) weight of BOQ for Boiler, Mill bunker structure, Coal bunkers, ID- Ducts, Structure, Gates & dampers, Rot. M/c, Insulation:-

PGMA	PGMA DESCRIPTION	WEIGHT in kg	CATEGORY	RATE SCHEDULE ID	Remarks
08-001	FURN UPR BKSTYS-F&R	60,000.00	Structure	1A	
08-003	FURN UPR BKSTYS-SIDE	1,30,000.00	Structure	1A	
08-006	FURN INT BKSTYS	3,60,000.00	Structure	1A	
08-007	FURN LWR BKSTYS	45,000.00	Structure	1A	
08-111	FURN REAR ARCH BKSTYS	35,000.00	Structure	1A	
08-380	FURN BOT SUPRTS	3,40,000.00	Structure	1A	
08-400	FURN GUIDES	14,000.00	Structure	1A	
08-501	FURN B P BKSTYS-F&R	1,50,000.00	Structure	1A	
08-503	FURN B P BKSTYS-SIDE	2,00,000.00	Structure	1A	
08-901	FURN KEY BKSTYS-UPR	12,000.00	Structure	1A	
08-910	EX.MOVT MEAS COMP	1,200.00	Structure	1A	
08-911	Bulk Bps Items-Upper	200.00	Structure	1A	
08-912	Bulk Bps Items-Inter	1,500.00	Structure	1A	
08-913	Bulk Bps Items-Lower	1,100.00	Structure	1A	
	TOTAL PG 08	13,50,000.00			
34-101	Bunker Columns 1st Tier	3,00,000.00	Structure	1A	
34-102	Bunker Columns 2nd Tier	3,00,000.00	Structure	1A	
34-103	Bunker Columns 3rd Tier	3,00,000.00	Structure	1A	
34-104	Bunker Columns 4th Tier	3,00,000.00	Structure	1A	
34-105	COLM-Q ROW LOWE TIER	3,00,000.00	Structure	1A	
34-200	BUNKER SUPPORT BEAMS	4,50,000.00	Structure	1A	

34-300	BUNKER BAY HORIZONTAL BRACINGS	75,000.00	Structure	1A	
34-390	Misc.Structures	75,000.00	Structure	1A	
34-441	Bunker Horizontal Beams Tier 1	1,00,000.00	Structure	1A	
34-442	Bunker Horizontal Beams Tier 2	1,00,000.00	Structure	1A	
34-443	Bunker Horizontal Beams Tier 3	1,00,000.00	Structure	1A	
34-444	Bunker Horizontal Beams Tier 4	1,00,000.00	Structure	1A	
34-445	Bunker Horizontal Beams Tier 5	1,00,000.00	Structure	1A	
34-511	Bunker Vertical Bracings Tier 1	75,000.00	Structure	1A	
34-512	Bunker Vertical Bracings Tier 2	75,000.00	Structure	1A	
34-513	Bunker Vertical Bracings Tier 3	75,000.00	Structure	1A	
34-514	Bunker Vertical Bracings Tier 4	75,000.00	Structure	1A	
34-515	Bunker Vertical Bracings Tier 5	75,000.00	Structure	1A	
34-721	HSFG FASTENERS FOR 34PG - TIER 1	7,000.00	Structure	1A	
34-722	HSFG FASTENERS FOR 34PG - TIER 2	7,000.00	Structure	1A	
34-723	HSFG FASTENERS FOR 34PG - TIER 3	7,000.00	Structure	1A	
34-724	HSFG FASTENERS FOR 34PG - TIER 4	7,000.00	Structure	1A	
34-725	HSFG FASTENERS FOR 34PG - TIER 5	7,000.00	Structure	1A	
34-730	HSFG FASTENERS - BUNKER SUPPORT BEAMS	7,000.00	Structure	1A	
34-731	FASTENERS	7,000.00	Structure	1A	
34-732	FASTENERS	3,000.00	Structure	1A	
34-733	FASTENERS	2,000.00	Structure	1A	
34-810	FLOOR GRILLS	10,000.00	Structure	1A	
34-820	STAIRS	5,000.00	Structure	1A	

34-850	HAND RAILS	5,000.00	Structure	1A	
	TOTAL PG 34	30,49,000.00			
35-010	FOUNDATION MATERIALS	30,000.00	Structure	1A	Only Packers and erection material are billable, Foundation bolts or templates are not billable, these would be in Civil package.
35-131	Middle Columns RHS 1st Tier	1,50,000.00	Structure	1A	
35-132	Middle Columns RHS 2nd Tier	75,000.00	Structure	1A	
35-133	Middle Columns RHS 3rd Tier	75,000.00	Structure	1A	
35-134	Middle Columns RHS 4th Tier	75,000.00	Structure	1A	
35-135	Middle Columns RHS 5th Tier	75,000.00	Structure	1A	
35-136	Middle Columns RHS 6th Tier	75,000.00	Structure	1A	
35-137	Middle Columns RHS 7th Tier	75,000.00	Structure	1A	
35-138	MIDDLE COLUMNS 8TH TIER	75,000.00	Structure	1A	
35-141	Auxiliary Columns LHS 1st Tier	1,50,000.00	Structure	1A	
35-142	Auxiliary Columns LHS 2nd Tier	1,00,000.00	Structure	1A	
35-143	Auxiliary Columns LHS 3rd Tier	1,00,000.00	Structure	1A	

35-144	Auxiliary Columns LHS 4th Tier	75,000.00	Structure	1A	
35-145	Auxiliary Columns LHS 5th Tier	75,000.00	Structure	1A	
35-146	Auxiliary Columns LHS 6th Tier	75,000.00	Structure	1A	
35-147	Auxiliary Columns LHS 7th Tier	75,000.00	Structure	1A	
35-148	AUXILIARY COLUMNS LHS 8TH TIER	75,000.00	Structure	1A	
35-151	AUXCOL LHSLWR 1&2PAS	1,50,000.00	Structure	1A	
35-152	AUXCOL RHSMID 1&2PAS	1,00,000.00	Structure	1A	
35-153	AUXCOL RHSUPR 1&2PAS	1,00,000.00	Structure	1A	
35-154	Auxiliary Columns RHS 4th Tier	75,000.00	Structure	1A	
35-155	Auxiliary Columns LHS 7th Tier	75,000.00	Structure	1A	
35-156	Auxiliary Columns RHS 6th Tier	75,000.00	Structure	1A	
35-157	Auxiliary Columns RHS 7th Tier	75,000.00	Structure	1A	
35-181	Main Columns 1st Tier	1,50,000.00	Structure	1A	
35-182	Main Columns 2nd Tier	1,00,000.00	Structure	1A	
35-183	Main Columns 3rd Tier	1,00,000.00	Structure	1A	
35-184	Main Columns 4th Tier	75,000.00	Structure	1A	
35-185	Main Columns 5th Tier	75,000.00	Structure	1A	
35-186	Main Columns 6th Tier	75,000.00	Structure	1A	
35-187	Main Columns 7th Tier	75,000.00	Structure	1A	
35-188	MAIN COLUMNS 8TH TIER	75,000.00	Structure	1A	
35-190	GIRDER PIN CONNECTIO	25,000.00	Structure	1A	
35-211	CEILING STRUCTUREMAI	4,00,000.00	Structure	1A	
35-212	CEILING STRUCTUREMAI	3,50,000.00	Structure	1A	

35-213	CEIL STRUCT -CROSS W	1,50,000.00	Structure	1A	
35-214	CEIL STRUCT -CROSS W	1,50,000.00	Structure	1A	
35-221	CEILING STRUCTURE RO	50,000.00	Structure	1A	
35-222	CEILING STRUCTURE RO	50,000.00	Structure	1A	
35-231	CEILING STRUCTURE HO	50,000.00	Structure	1A	
35-232	CEILING STRUCTURE HO	50,000.00	Structure	1A	
35-311	HORIZONTAL BRACING I	50,000.00	Structure	1A	
35-312	HORIZ BRACING II PAS	50,000.00	Structure	1A	
35-321	HORIZ BRACING I PASS	50,000.00	Structure	1A	
35-322	HORIZ BRACING II PAS	50,000.00	Structure	1A	
35-331	HORIZ BRACING I PASS	50,000.00	Structure	1A	
35-332	HORIZ BRACING II PAS	50,000.00	Structure	1A	
35-341	HORIZ BRACING I PASS	50,000.00	Structure	1A	
35-342	HORIZ BRACING II PAS	50,000.00	Structure	1A	
35-351	HORIZ BRACING I PASS	25,000.00	Structure	1A	
35-352	HORIZ BRACING II PAS	25,000.00	Structure	1A	
35-361	HORIZ BRACING I PASS	25,000.00	Structure	1A	
35-362	HORIZ BRACING II PAS	25,000.00	Structure	1A	
35-371	Horizontal Bracing@79100 (MBL-7)1st Pass	25,000.00	Structure	1A	
35-372	Horizontal Bracing @79100(MBL-7)2nd Pass	25,000.00	Structure	1A	
35-374	Horizontal Bracing@87500(MBL-8) 1st Pass	25,000.00	Structure	1A	
35-375	Horizontal Bracing@87500(MBL-8) 2nd Pass	25,000.00	Structure	1A	
35-381	Landing & Connecting Platforms Tier-1	50,000.00	Structure	1A	

35-382	Landing & Connecting Platforms Tier-2	50,000.00	Structure	1A	
35-383	Landing & Connecting Platforms Tier-3	50,000.00	Structure	1A	
35-384	Landing & Connecting Platforms Tier-4	50,000.00	Structure	1A	
35-385	Landing & Connecting Platforms Tier-5	25,000.00	Structure	1A	
35-386	Landing & Connecting Platforms Tier-6	25,000.00	Structure	1A	
35-387	Landing & Connecting Platforms Tier-7	25,000.00	Structure	1A	
35-388	Landing & Connecting Platforms Tier-8	25,000.00	Structure	1A	
35-390	MISC STRUCTURES	50,000.00	Structure	1A	
35-441	Horil Beams First Pass-Tier-1	50,000.00	Structure	1A	
35-442	Horil Beams First Pass-Tier-2	50,000.00	Structure	1A	
35-443	Horil Beams First Pass-Tier-3	50,000.00	Structure	1A	
35-444	Horil Beams First Pass-Tier-4	50,000.00	Structure	1A	
35-445	Horil Beams First Pass-Tier-5	50,000.00	Structure	1A	
35-446	Horil Beams First Pass-Tier-6	50,000.00	Structure	1A	
35-447	Horil Beams First Pass-Tier-7	50,000.00	Structure	1A	
35-448	Horil Beams First Pass-Tier-8	50,000.00	Structure	1A	
35-451	Hor Beam-Second Pass- Tier-1	50,000.00	Structure	1A	
35-452	Hor Beam-Second Pass- Tier-2	50,000.00	Structure	1A	
35-453	Hor Beam-Second Pass- Tier-3	50,000.00	Structure	1A	
35-454	Hor Beam-Second Pass- Tier-4	50,000.00	Structure	1A	
35-455	Hor Beam-Second Pass- Tier-5	50,000.00	Structure	1A	
35-456	Hor Beam-Second Pass- Tier-6	50,000.00	Structure	1A	
35-457	Hor Beam-Second Pass- Tier-7	50,000.00	Structure	1A	

35-458	Hor Beam-Second Pass- Tier-8	50,000.00	Structure	1A	
35-511	Front Bracing-Tier-1	50,000.00	Structure	1A	
35-512	Front Bracing-Tier-2	50,000.00	Structure	1A	
35-513	Front Bracing-Tier-3	50,000.00	Structure	1A	
35-514	Front Bracing-Tier-4	50,000.00	Structure	1A	
35-515	Front Bracing-Tier-5	25,000.00	Structure	1A	
35-516	Front Bracing-Tier-6	25,000.00	Structure	1A	
35-517	Front Bracing-Tier-7	25,000.00	Structure	1A	
35-518	Front Bracing-Tier-8	25,000.00	Structure	1A	
35-521	Side Bracing-Tier-1	50,000.00	Structure	1A	
35-522	Side Bracing-Tier-2	50,000.00	Structure	1A	
35-523	Side Bracing-Tier-3	50,000.00	Structure	1A	
35-524	Side Bracing-Tier-4	50,000.00	Structure	1A	
35-525	Side Bracing-Tier-5	50,000.00	Structure	1A	
35-526	Side Bracing-Tier-6	50,000.00	Structure	1A	
35-527	Side Bracing-Tier-7	50,000.00	Structure	1A	
35-528	Side Bracing-Tier-8	50,000.00	Structure	1A	
35-531	Rear Bracing-Tier-1	20,000.00	Structure	1A	
35-532	Rear Bracing-Tier-2	20,000.00	Structure	1A	
35-533	Rear Bracing-Tier-3	20,000.00	Structure	1A	
35-534	Rear Bracing-Tier-4	10,000.00	Structure	1A	
35-535	Rear Bracing-Tier-5	10,000.00	Structure	1A	
35-536	Rear Bracing-Tier-6	10,000.00	Structure	1A	

35-537	Rear Bracing-Tier-7	10,000.00	Structure	1A	
35-538	Rear Bracing-Tier-8	10,000.00	Structure	1A	
35-721	HSFG FASTENERS FOR 35PG - TIER 1	8,000.00	Structure	1A	
35-722	HSFG FASTENERS FOR 35PG - TIER 2	5,000.00	Structure	1A	
35-723	HSFG FASTENERS FOR 35PG - TIER 3	5,000.00	Structure	1A	
35-724	HSFG FASTENERS FOR 35PG - TIER 4	5,000.00	Structure	1A	
35-725	HSFG FASTENERS FOR 35PG - TIER 5	5,000.00	Structure	1A	
35-726	HSFG FASTENERS FOR 35PG - TIER 6	5,000.00	Structure	1A	
35-727	HSFG FASTENERS FOR 35PG - TIER 7	5,000.00	Structure	1A	
35-728	HSFG FASTENERS FOR 35PG - TIER 8	5,000.00	Structure	1A	
35-730	HSFG FASTENERS - CEILING	5,000.00	Structure	1A	
35-811	FLOOR GRILLS AND GUARD PLATE	50,000.00	Structure	1A	
35-812	Edge Strip And Guard Plate	10,000.00	Structure	1A	
35-821	STAIRS - LOWER	10,000.00	Structure	1A	
35-822	STAIRS - MIDDLE	10,000.00	Structure	1A	
35-823	STAIRS - UPPER	10,000.00	Structure	1A	
35-851	HAND RAILS AND POSTS	30,000.00	Structure	1A	
35-993	CONSUMABLESANDERECTI	30,000.00	Structure	1A	Billable only in case of short supply of Perticular material, modification,

					addition al fabricati on with proper record of issues and purpose of use.
35-995	CHUTE PIPE AND LADDE	29,000.00	Structure	1A	
	TOTAL PG 35	68,67,000.00			
36-111	COLUMNS NEAR APH Tier 1	2,00,000.00	Structure	1A	
36-112	COLUMNS NEAR APH Tier 2	2,00,000.00	Structure	1A	
36-113	COLUMNS NEAR APH Tier 3	1,00,000.00	Structure	1A	
36-114	COLUMNS NEAR AIR PRE HEATERS/SCR Tier4	1,00,000.00	Structure	1A	
36-115	COLUMNS NEAR AIR PRE HEATERS/SCR Tier5	1,00,000.00	Structure	1A	
36-151	BEAMS AND BRACINGS NEAR APH Tier 1	2,50,000.00	Structure	1A	
36-152	BEAMS AND BRACINGS NEAR APH Tier 2	2,00,000.00	Structure	1A	
36-153	BEAMS AND BRACINGS NEAR APH Tier 3	1,50,000.00	Structure	1A	
36-154	BEAMS AND BRACINGS NEAR AIR PREHEATER/SC	1,50,000.00	Structure	1A	
36-155	BEAMS AND BRACINGS NEAR AIR PREHEATER/SC	1,50,000.00	Structure	1A	
36-311	MAIN FLOOR I MBL 1ST	75,000.00	Structure	1A	
36-312	MAIN FLOOR I MBL 2ND	75,000.00	Structure	1A	
36-313	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-314	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-315	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-	NON-MBL FLOOR BETWEE	75,000.	Structure	1A	

316		00			
36-321	MAIN FLOOR II MBL IST	75,000.00	Structure	1A	
36-322	MAIN FLOOR II MBL 2ND	75,000.00	Structure	1A	
36-323	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-324	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-325	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-326	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-331	MAIN FLOOR III MBL 1	75,000.00	Structure	1A	
36-332	MAIN FLOOR III MBL 2	75,000.00	Structure	1A	
36-333	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-334	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-335	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-336	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-341	MAIN FLOOR IV MBL 1ST	75,000.00	Structure	1A	
36-342	MAIN FLOOR IV MBL 2ND	75,000.00	Structure	1A	
36-343	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-344	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-345	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-351	MAIN FLOOR V MBL IST	75,000.00	Structure	1A	
36-352	MAIN FLOOR V MBL II ND	75,000.00	Structure	1A	
36-353	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-354	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-355	NON-MBL FLOOR BETWEE	75,000.00	Structure	1A	
36-	MAIN FLOOR VI MBL 1ST	75,000.	Structure	1A	

361		00			
36-362	MAIN FLOOR VI MBL 2ND	75,000.00	Structure	1A	
36-363	NON_MBL FLOOR ABOVE	75,000.00	Structure	1A	
36-364	NON MBL FLOOR ABOVE MBL VI	75,000.00	Structure	1A	
36-365	NON MBL FLOOR ABOVE MBL VI	75,000.00	Structure	1A	
36-371	Floor Beams @ 79100 (MBL-7) 1st Pass	75,000.00	Structure	1A	
36-372	Floor Beams @ 79100 (MBL-7) 2nd Pass	75,000.00	Structure	1A	
36-373	Floor Beams @ 83400 (Tier-8)	75,000.00	Structure	1A	
36-374	Floor Beams @ 87500 (MBL-8) 1st Pass	75,000.00	Structure	1A	
36-375	Floor Beams @ 87500 (MBL-8) 2nd Pass	75,000.00	Structure	1A	
36-376	Floor Beams @ 90500 (Tier-8)2nd Pass	75,000.00	Structure	1A	
36-391	MISCELLANEOUS PLATFO	75,000.00	Structure	1A	
36-392	MISCELLANEOUS PLATFO	75,000.00	Structure	1A	
36-393	APH, SCAPH, HANDLING	75,000.00	Structure	1A	
36-394	MISCELLANEOUS PLATFO	75,000.00	Structure	1A	
36-395	MISCELLANEOUS PLATFO	75,000.00	Structure	1A	
36-396	Slide Bearing Plates	75,000.00	Structure	1A	
36-610	BOILER ROOF STRUCTUR	3,00,000.00	Structure	1A	
36-611	BOILER ROOF SHEETING	44,000.00	Structure	1A	
36-613	RAIN WATER PIPES and	50,000.00	Structure	1A	
36-620	BOILER SIDE CLADDING	1,00,000.00	Structure	1A	
36-621	BOILER SIDE CLADDING	25,000.00	Structure	1A	
36-721	HSFG FASTENERS FOR 36PG - TIER 1	10,000.00	Structure	1A	
36-	HSFG FASTENERS FOR 36PG - TIER 2	10,000.	Structure	1A	

722		00			
36-723	HSFG FASTENERS FOR 36PG - TIER 3	10,000.00	Structure	1A	
36-724	HSFG FASTENERS FOR 36PG - TIER 4	10,000.00	Structure	1A	
36-725	HSFG FASTENERS FOR 36PG - TIER 5	10,000.00	Structure	1A	
36-726	HSFG FASTENERS FOR 36PG - TIER 6	10,000.00	Structure	1A	
36-727	HSFG FASTENERS FOR 36PG - TIER 7	10,000.00	Structure	1A	
36-728	HSFG FASTENERS FOR 36PG - TIER 8	10,000.00	Structure	1A	
36-731	FASTENERS	10,000.00	Structure	1A	
36-732	FASTENERS	10,000.00	Structure	1A	
36-733	FASTENERS	10,000.00	Structure	1A	
36-740	POSTS AND HANGERS	50,000.00	Structure	1A	
36-811	FLOORGRILLSANDGUARDP	75,000.00	Structure	1A	
36-812	FLOORGRILLSANDGUARDP	75,000.00	Structure	1A	
36-813	FLOORGRILLSANDGUARDP	75,000.00	Structure	1A	
36-814	FLOORGRILLSANDGUARDP	75,000.00	Structure	1A	
36-821	STAIRS AND LADDERS	10,000.00	Structure	1A	
36-822	STAIRS AND LADDERS	10,000.00	Structure	1A	
36-823	STAIRS AND LADDERS	6,000.00	Structure	1A	
36-851	HANDRAILS AND POSTS	50,000.00	Structure	1A	
36-852	HANDRAILS AND POSTS	50,000.00	Structure	1A	
36-853	HANDRAILS AND POSTS	25,000.00	Structure	1A	
	TOTAL PG 36	61,05,000.00			
38-210	INTER CONN PLATFORMS	25,000.00	Structure	1A	
38-	MILL HANDLING MONORA	2,50,00	Structure	1A	

299		0.00			
38-310	CONN PLATFORMS TO MI	66,000.00	Structure	1A	
38-410	MILL MAINTANANCE PLA	2,00,000.00	Structure	1A	
38-510	LIFT BEAMS AND BRACI	75,000.00	Structure	1A	
38-610	ELEVATOR CLADDING ST	50,000.00	Structure	1A	
38-611	ELEVATOR CLADDING SH	25,000.00	Structure	1A	
38-710	LIFT MACHINE ROOM DE	50,000.00	Structure	1A	
38-810	FLOORGRILLS AND GUAR	75,000.00	Structure	1A	
38-820	STAIRS AND LADDERS	8,000.00	Structure	1A	
38-850	HAND RAILS AND HAND	10,000.00	Structure	1A	
38-993	CONSUMABLES AND EREC	10,000.00	Structure	1A	Billable only in case of short supply of Particular material, modification, additional fabrication with proper record of issues and purpose of use.
	TOTAL PG 38	8,44,000.00			
39-012	FOUNDATION MATERIALS	12500	Structure	1A	

39-101	COLUMNS FRAMES BEFOR	2,00,000.00	Structure	1A	
39-102	COLUMNS FRAMES BEFOR	2,00,000.00	Structure	1A	
39-299	Platforms - Before ESP	2,50,000.00	Structure	1A	
39-301	STRUC AND PLATFORM F	12500	Structure	1A	
39-302	STRUC FOR MOTOR HOOD	25,000.00	Structure	1A	
39-304	FAN HANDLING STRUCTU	50,000.00	Structure	1A	
39-305	FAN HANDLING STRUCTU	50,000.00	Structure	1A	
39-306	FAN HANDLING STRUCTU	50,000.00	Structure	1A	
39-700	HSFG FASTENERS FOR P	5500	Structure	1A	
39-810	FLOOR GRILL	5000	Structure	1A	
39-820	STAIRS	5000	Structure	1A	
39-850	HAND RAIL AND HAND R	5000	Structure	1A	
39-993	CONSUMABLES AND EREC	7,500.00	Structure	1A	Billable only in case of short supply of Particular material, modification, additional fabrication with proper record of issues and purpose

					of use.
	TOTAL PG 39	15,02,000.00			
04-147	Supprts for Collectr & Separatr Vessel	19,000.00	Pressure Part	1B	
04-321	VERTICAL SEPARATOR	31,000.00	Pressure Part	1B	
04-323	STORAGE TANK	49,000.00	Pressure Part	1B	
04-347	Seperator/Collecting Vessel Supp DD	200.00	Pressure Part	1B	
04-547	Seperator/Collecting Vessel Supp Shop	5,800.00	Pressure Part	1B	
05-137	EVAPORATOR INLET HDR - FRNT	14,000.00	Pressure Part	1B	
05-147	FUR LWR REAR INLET HDR	14,000.00	Pressure Part	1B	
05-155	FUR LWR SIDE INLET HDRS	13,000.00	Pressure Part	1B	
05-227	FUR UPPER REAR OUTLET HDR	10,600.00	Pressure Part	1B	
05-231	FUR UPPER FRNT OUTLET HDR	10,300.00	Pressure Part	1B	
05-251	FUR UPPER SIDE OUTLET HDRS	20,600.00	Pressure Part	1B	
05-327	FUR INTERMEDIATE REAR HDR	10,500.00	Pressure Part	1B	
05-330	FUR INTERMEDIATE FRNT HDR	10,500.00	Pressure Part	1B	
05-350	FUR INTERMEDIATE SIDE HDRS	20,500.00	Pressure Part	1B	
06-400	FUR BURNER PANELS	45,000.00	Pressure Part	1B	
06-401	Burner Panel- OS	200.00	Pressure Part	1B	
06-431	Front Upper Ww Panel Attachment	100.00	Pressure Part	1B	

06-434	Front Intermediate WW Panel -OS	32,000.00	Pressure Part	1B	
06-437	Front WW Lower Panel-OS	30,000.00	Pressure Part	1B	
06-441	Rear Upper WW Panel -OS	200.00	Pressure Part	1B	
06-444	Rear Intermediate WW Panel -OS	32,000.00	Pressure Part	1B	
06-447	Rear Lower WW Panel -OS	30,000.00	Pressure Part	1B	
06-451	Side Upper Ww Panel Attachment	200.00	Pressure Part	1B	
06-453	Side Intermediate WW Panel -OS	50,000.00	Pressure Part	1B	
06-455	Side Lower WW Panel -OS	14,000.00	Pressure Part	1B	
06-500	FUR SOFA PANELS	20,000.00	Pressure Part	1B	
06-501	Sofa Panels -OS	300.00	Pressure Part	1B	
06-731	FUR VERTICAL WALL PANELS - FRNT	36,000.00	Pressure Part	1B	
06-732	FRONT WW PNL + ATT	39,000.00	Pressure Part	1B	
06-734	FUR UPPER FRNT SPIRAL PANEL	70,000.00	Pressure Part	1B	
06-735	FUR FRNT SPIRAL TO VERTICAL TRANS. PANEL	9,500.00	Pressure Part	1B	
06-737	FUR LWR FRNT SPRL PNL WITH I/T TERM TUBE	50,000.00	Pressure Part	1B	
06-741	FUR REAR ARCH PANELS	34,000.00	Pressure Part	1B	
06-744	FUR UPPER REAR SPIRAL PANEL	70,000.00	Pressure Part	1B	
06-745	FUR REAR SPIRAL TO vert TRANSITION PANEL	9,500.00	Pressure Part	1B	
06-747	FUR LWR RR SPRL PNL WITH I/T TERM TUBES	68,000.00	Pressure Part	1B	
06-751	FUR VERTICAL WALL PANELS - SIDE	72,000.00	Pressure Part	1B	
06-752	FUR LWR VERTICAL WALL PANELS - SIDE	84,000.00	Pressure Part	1B	
06-753	FUR UPPER SIDE SPIRAL PANELS	1,36,000.00	Pressure Part	1B	
06-755	FUR LWR SIDE SPIRAL PANELS	48,000.00	Pressure Part	1B	

06-759	FUR SIDE SPIRAL TO VERT TRANSITION PANEL	18,000.00	Pressure Part	1B	
07-102	LINKS FROM SEPARATOR TO STORAGE TANK	34,000.00	Pressure Part	1B	
07-110	DOWNCOMER TO CONNECTING SPHERE	9,000.00	Pressure Part	1B	
07-125	Connecting Sphere	3,500.00	Pressure Part	1B	
07-217	SCREEN RELIFE TUBES	750.00	Pressure Part	1B	
07-223	FUR SCREEN AND HANGER ASSEMBLY	66,000.00	Pressure Part	1B	
07-231	FUR SPIRAL WALL OUTLET TERM TUBES	2,000.00	Pressure Part	1B	
07-232	FUR VERTICAL WALL INLET TERM TUBES	9,000.00	Pressure Part	1B	
07-309	Furnace Wall Supports Front-DD	1,000.00	Pressure Part	1B	
07-315	FUR SIDE RISERS	40,000.00	Pressure Part	1B	
07-316	FUR REAR RISERS	25,000.00	Pressure Part	1B	
07-318	FUR FRNT RISERS	10,500.00	Pressure Part	1B	
07-331	Riser Tube Support DD Item	500.00	Pressure Part	1B	
07-360	Furnace Spiral Wall Support DD Item	100.00	Pressure Part	1B	
07-361	Furnace Wall Support Rear DD Item	900.00	Pressure Part	1B	
07-362	Furnace Wall Support Side L&R DD Item	500.00	Pressure Part	1B	
07-393	Consumables & Erection Materials-DD	100.00	Pressure Part	1B	
07-402	WW FRT HDR SUSPN	700.00	Pressure Part	1B	
07-403	WW SIDE HDR SUSPN	700.00	Pressure Part	1B	
07-405	WW SCR.HDR SUSPN.	10,000.00	Pressure Part	1B	
07-409	Furnace wall Supports front	24,000.00	Pressure Part	1B	
07-423	Furnace Screen Tubes Attachment	200.00	Pressure Part	1B	
07-431	RISER TUBE SUPPORT	7,000.00	Pressure Part	1B	

07-460	Furnace Spiral Wall supports Misc items	21,000.00	Pressure Part	1B	
07-461	Furnace wall Supports rear	30,500.00	Pressure Part	1B	
07-462	Furnace wall Supports Sides L & R	30,500.00	Pressure Part	1B	
07-502	Ww Front Header Suspn Shop Item	900.00	Pressure Part	1B	
07-503	Ww Side Header Suspension Shop Item	1,250.00	Pressure Part	1B	
07-505	Ww Screen Header Suspn Shop Item	1,100.00	Pressure Part	1B	
07-509	MISC PR.PART COMPNTS	700.00	Pressure Part	1B	
07-531	Riser Tube Support Shop Item	1,500.00	Pressure Part	1B	
07-560	Furnace Spiral Wall Support Shop Item	700.00	Pressure Part	1B	
07-991	Welding Electrodes-Part-1	200.00	Pressure Part	1B	
07-992	Welding Electrodes	300.00	Pressure Part	1B	
07-993	EREC MATLS, CONSUMES	900.00	Pressure Part	1B	Billable only in case of short supply of Perticular material, modification, additional fabrication with proper record of issues and purpose of use.
09-	MATL FOR INST TAPPG	910.00	Pressure	1B	

003			Part		
09-004	SEAL BOX FURN OPENG	15,000.00	Pressure Part	1B	
09-005	SEAL BOX INST OPENG	3,640.00	Pressure Part	1B	
09-304	Seal Boxes For Furnace Openings-DD	450.00	Pressure Part	1B	
10-135	FUR ARCH SUPPPORT INLET HDR	17,000.00	Pressure Part	1B	
10-174	FINISH SH INLET HDR	15,000.00	Pressure Part	1B	
10-176	SH PLATEN FRONT INLET HEADER(S-26)	20,000.00	Pressure Part	1B	
10-178	SH PLATEN INLET HDR	13,000.00	Pressure Part	1B	
10-182	BP LWR REAR HDR	16,000.00	Pressure Part	1B	
10-183	BP UPPER SIDE INLET HDR	25,000.00	Pressure Part	1B	
10-184	BP EXTENDED SIDE INLET HDR	13,000.00	Pressure Part	1B	
10-185	BP LWR FRNT HDR	15,000.00	Pressure Part	1B	
10-191	SH FUR ROOF INLET HDR	12,000.00	Pressure Part	1B	
10-235	FUR ARCH SUPPPORT OUTLET HDR	17,000.00	Pressure Part	1B	
10-274	FINISH SH OUTLET HDR	41,000.00	Pressure Part	1B	
10-276	SH PLATEN FRONT OUTLET HEADER(S-28)	18,000.00	Pressure Part	1B	
10-278	SH PLATEN OUTLET HDR	14,000.00	Pressure Part	1B	
10-283	BP LWR SIDE HDRS	28,000.00	Pressure Part	1B	
10-284	BP EXT FLOOR OUTLET HDR WITH TERM TUBES	12,000.00	Pressure Part	1B	
10-285	BP FRNT OUTLET HDR	23,000.00	Pressure Part	1B	
10-291	SH FUR ROOF OUTLET HDR	21,000.00	Pressure Part	1B	
11-074	FINISH SH FRNT ASSY WITH I/T TERM & COT	2,02,400.00	Pressure Part	1B	
11-078	SH PLATEN ASSY WITH TERM TUBES - LEFT	2,50,000.00	Pressure Part	1B	
11-	FINISH SH REAR ASSY WITH O/T TERM & COT	2,80,00	Pressure	1B	

374		0.00	Part		
11-378	SH PLATEN ASSY WITH TERM TUBES - RIGHT	2,50,000.00	Pressure Part	1B	
11-406	SH Frnt Upper Pnl Attachment	300.00	Pressure Part	1B	
11-467	SH Sc Side Pnl Upper Left Attachment	150.00	Pressure Part	1B	
11-469	SH Sw Panels Lower Front (L&R)-OS	150.00	Pressure Part	1B	
11-474	SH Vertical Spaced Coil Attachment	300.00	Pressure Part	1B	
11-487	BP LTRH Hanger Tube Attchment	2,400.00	Pressure Part	1B	
11-491	SH Radient Roof Tubes (Left)-OS	150.00	Pressure Part	1B	
11-494	SH Extended Bottom Panels-OS	150.00	Pressure Part	1B	
11-606	BP FRNT WALL PANELS	42,000.00	Pressure Part	1B	
11-608	BP FRNT WALL PANEL - LWR	32,000.00	Pressure Part	1B	
11-684	BP EXTENDED SIDE FIN WELDED PANEL	32,000.00	Pressure Part	1B	
11-694	BP EXTENDED SIDE FLOOR FIN WELDED PANEL	19,000.00	Pressure Part	1B	
11-716	BP UPPER REAR PANEL	27,000.00	Pressure Part	1B	
11-718	BP LWR REAR PANEL	27,000.00	Pressure Part	1B	
11-767	BP UPPER SIDE PANEL-LEFT	31,000.00	Pressure Part	1B	
11-768	SH SIDE WALL PANELS INTER (FRONT)	31,000.00	Pressure Part	1B	
11-769	BP LWR SIDE PANEL - LEFT	44,000.00	Pressure Part	1B	
11-787	BP REAR ROOF PANELS	20,000.00	Pressure Part	1B	
11-791	SH FUR ROOF FIN WELDED PANEL	35,000.00	Pressure Part	1B	
11-916	SH REAR WALL PANELS UPPER (RIGHT)	28,000.00	Pressure Part	1B	
11-918	SHSC RR WL PNL LR RT	28,000.00	Pressure Part	1B	
11-967	BP UPPER SIDE PANEL-RIGHT	31,000.00	Pressure Part	1B	
11-	SH SIDE WALL PANELS INTER (REAR)	31,000.	Pressure	1B	

968		00	Part		
11-969	BP LWR SIDE PANEL - RIGHT	44,000.00	Pressure Part	1B	
11-987	SHSC RR ROOF PNL RT	20,000.00	Pressure Part	1B	
11-991	SH FUR ROOF TUBES	57,000.00	Pressure Part	1B	
12-178	LINK TO SH DESUPERHEATER	37,000.00	Pressure Part	1B	
12-179	LINK TO FINISH SH INLET HDR	40,000.00	Pressure Part	1B	
12-181	FUR ARCH SUPPORT LINKS	12,000.00	Pressure Part	1B	
12-184	BP EXTENDED SIDE CONNECTION LINK	31,000.00	Pressure Part	1B	
12-187	SH BYPASS PIPES	16,000.00	Pressure Part	1B	
12-306	SH Spprt For Lines And Links DD Item	1,500.00	Pressure Part	1B	
12-314	Suspn of SH R.Roof Headers DD Item	100.00	Pressure Part	1B	
12-317	Suspn of R.Roof Headers DD Item	100.00	Pressure Part	1B	
12-324	Suspension of SH Rear Wall DD Items	100.00	Pressure Part	1B	
12-327	Suspension of SH Rear Wall DD Items	400.00	Pressure Part	1B	
12-328	Suspension of SH Rear Wall DD Items	300.00	Pressure Part	1B	
12-344	Suspn of Vert. Spaced Assy DD Item	50.00	Pressure Part	1B	
12-348	Suspn of Vert. Spaced Assy DD Item	250.00	Pressure Part	1B	
12-354	Suspn of Vert. Spaced Assy DD Item	50.00	Pressure Part	1B	
12-368	RH Vert Platen Frnt Coil Left DD Item	900.00	Pressure Part	1B	
12-393	SH Misc Components DD Item	200.00	Pressure Part	1B	
12-405	SH Hanger Tube Attachment	2,000.00	Pressure Part	1B	
12-506	SH Spprt For Lines And Links Shop Item	1,200.00	Pressure Part	1B	
12-514	Suspn of SH R.Roof Hdrs Shop Item	3,000.00	Pressure Part	1B	
12-	Suspn of R.Roof Headers Shop Item	3,000.0	Pressure	1B	

517		0	Part		
12-524	Suspension of SH Rear Wall Shop Item	2,500.00	Pressure Part	1B	
12-528	Suspension of SH Rear Wall Shop Item	150.00	Pressure Part	1B	
12-544	Suspn of Vert. Spaced Assy Shop Item	3,100.00	Pressure Part	1B	
12-554	Suspn of Vert. Spaced Assy Shop Item	3,100.00	Pressure Part	1B	
12-800	SH DESUP-STAGE II	6,770.00	Pressure Part	1B	
12-803	SH STEAM COOLED SPACER TUBES	1,500.00	Pressure Part	1B	
12-805	BP FRNT WALL SCREEN TUBES	33,000.00	Pressure Part	1B	
12-850	SH CONNECTING PIPE	28,000.00	Pressure Part	1B	
12-852	LINKS TO SH PLATEN INLET HDR	32,000.00	Pressure Part	1B	
12-900	SH DESUPERHEATER	6,000.00	Pressure Part	1B	
12-903	SH MISCL COMPONENTS	2,000.00	Pressure Part	1B	
12-906	SH LINK SUPPORTS	3,100.00	Pressure Part	1B	
12-907	RAD&RR ROOF SUPPORTS	6,700.00	Pressure Part	1B	
12-914	EXPN-SH RAD ROOF HDR	1,560.00	Pressure Part	1B	
12-917	SUSPN OF RADINT ROOF	10,390.00	Pressure Part	1B	
12-924	SUSPN-SH BAKPASS HDR	14,600.00	Pressure Part	1B	
12-927	SUSPN OF REAR ROOF	18,700.00	Pressure Part	1B	
12-928	SUSPN - SH REAR WALL	23,800.00	Pressure Part	1B	
12-944	SUSPN-SH PLATEN HDRS	3,200.00	Pressure Part	1B	
12-948	SUSP-VERT SPACD ASSY	44,000.00	Pressure Part	1B	
12-954	SUSP-VERT SPACD HDRS	11,400.00	Pressure Part	1B	
12-968	SUSPN OF PLATEN ASSY	33,600.00	Pressure Part	1B	
12-	Welding Electrodes-Part-1	530.00	Pressure	1B	

991			Part		
12-992	Welding Electrodes	2,100.00	Pressure Part	1B	
12-993	EREC MATLS, CONSUMES	7,000.00	Pressure Part	1B	Billable only in case of short supply of Particular material, modification, additional fabrication with proper record of issues and purpose of use.
12-994	PORT IN FOR THK MSMT	50.00	Pressure Part	1B	
15-136	LTRH INLET HDR	11,000.00	Pressure Part	1B	
15-178	FINISH RH INLET HDR	12,000.00	Pressure Part	1B	
15-236	LTRH OUTLET HDR	17,000.00	Pressure Part	1B	
15-278	FINISH RH OUTLET HDR	32,000.00	Pressure Part	1B	
16-201	LTRH UPPER ASSEMBLY	2,00,00 0.00	Pressure Part	1B	
16-202	LTRH INTERMEDIATE ASSEMBLY	2,25,00 0.00	Pressure Part	1B	
16-203	LTRH LWR ASSEMBLY WITH INLET TERM TUBES	4,00,00 0.00	Pressure Part	1B	
16-270	LTRH PENDANT ASSY WITH O/T TERM TUBES	1,50,00 0.00	Pressure Part	1B	
16-278	FINISH RH ASSEMBLY WITH TERMINAL TUBES	1,17,00 0.00	Pressure Part	1B	

16-379	RH VERPLN FR COIL RT	8,000.00	Pressure Part	1B	
17-174	LINK TO RH DESUPERHEATER	45,000.00	Pressure Part	1B	
17-304	RH Spprts For Lines And Links DD Item	200.00	Pressure Part	1B	
17-306	RH Suprt For Lines And Links DD Item	200.00	Pressure Part	1B	
17-319	RH Frnt Suspension DD Item	200.00	Pressure Part	1B	
17-407	RH Sc Spacer Tube Attchment	200.00	Pressure Part	1B	
17-476	RH V.S. CENTRE CROSS OVER TUBE ATTCHMT	4,000.00	Pressure Part	1B	
17-504	RH Suprts For Lines And Links Shop Item	2,000.00	Pressure Part	1B	
17-506	RH Suprt For Lines And Links Shop Item	300.00	Pressure Part	1B	
17-807	RH STM COOL SPACERS	300.00	Pressure Part	1B	
17-900	RH DESUPERHEATER	4,500.00	Pressure Part	1B	
17-903	RH MISCL COMPONENTS	41,000.00	Pressure Part	1B	
17-904	RH HDR SUPRT AB ROOF	15,500.00	Pressure Part	1B	
17-906	RH SUPRT LINES & LIN	9,000.00	Pressure Part	1B	
17-919	RH FRONT SUSPENSION	20,000.00	Pressure Part	1B	
17-991	Welding Electrodes-Part-1	800.00	Pressure Part	1B	
17-992	Welding Electrodes	800.00	Pressure Part	1B	
18-001	FUR ROOF SKIN CASING	19,400.00	Pressure Part	1B	
18-002	1 PASS ROOF SKINCASG	150.00	Pressure Part	1B	
18-010	PR PARTS ATTACH-CASG	300.00	Pressure Part	1B	
18-701	Furnace Roof Skin Casing BOI Item	150.00	Pressure Part	1B	
19-092	ECO OUTLET TERM TUBES	30,000.00	Pressure Part	1B	
19-306	Eco Supports For Line & Links DD Item	200.00	Pressure Part	1B	

19-307	Eco Feed Pipe Suspn DD Item	200.00	Pressure Part	1B	
19-402	Eco Hanger Tube Attachment	1,000.00	Pressure Part	1B	
19-506	Eco Supports For Line & Links Shop Item	25,000.00	Pressure Part	1B	
19-507	Eco Feed Pipe Suspn Shop Item	16,000.00	Pressure Part	1B	
19-701	ECO INLET HDR	25,000.00	Pressure Part	1B	
19-702	ECO OUTLET HDR	22,000.00	Pressure Part	1B	
19-704	ECO II INLET HEADER	10,000.00	Pressure Part	1B	
19-753	ECO JUNCTION HDR	9,000.00	Pressure Part	1B	
19-763	ECO JUNCTION HDR	9,000.00	Pressure Part	1B	
19-783	ECO JUNCTION HDR	9,000.00	Pressure Part	1B	
19-793	ECO JUNCTION HDR	9,000.00	Pressure Part	1B	
19-802	ECO LWR HANGER TUBES	2,38,000.00	Pressure Part	1B	
19-804	ECO UPPER HANGER TERMINAL TUBES	32,000.00	Pressure Part	1B	
19-814	ECO UPPER ASSY - LEFT	1,60,000.00	Pressure Part	1B	
19-824	ECO LWR ASSY -LEFT	3,00,000.00	Pressure Part	1B	
19-850	ECO INLET LINKS	95,000.00	Pressure Part	1B	
19-851	LINKS FROM ECO OUT. HDR TO ECO MIX LINE	95,000.00	Pressure Part	1B	
19-852	ECO MIXING LINE	40,000.00	Pressure Part	1B	
19-853	LINKS FROM ECO MIX LINE TO FURN I/T HDRS	50,000.00	Pressure Part	1B	
19-884	ECO INTER ASSY - LEFT	3,00,000.00	Pressure Part	1B	
19-903	ECO.MISCL COMP	1,50,000.00	Pressure Part	1B	
19-904	ECO HDR SUPT AB ROOF	64,600.00	Pressure Part	1B	
19-905	ECO HDR SUPT BL ROOF	700.00	Pressure Part	1B	

19-906	ECO LINE&LINK SUPORT	30,000.00	Pressure Part	1B	
19-907	ECO,FEEDPIPE SUPPORT	15,000.00	Pressure Part	1B	
19-914	ECO UPPER ASSY - RIGHT	1,60,000.00	Pressure Part	1B	
19-924	ECO LWR ASSY-RIGHT	3,00,000.00	Pressure Part	1B	
19-984	ECO INTER ASSY - RIGHT	3,00,000.00	Pressure Part	1B	
19-991	Welding Electrodes-Part-1	150.00	Pressure Part	1B	
19-992	Welding Electrodes	150.00	Pressure Part	1B	
20-051	LONG RETRACT SB M11E	84,410.00	Pressure Part	1B	
20-054	WALL BOX NPR LRSB MI	1,423.00	Pressure Part	1B	
20-201	WALL DESLAGGER RW5E	30,116.00	Pressure Part	1B	
20-204	WALL BOX NPR-RW5E	4,155.00	Pressure Part	1B	
20-511	DA HEAD VALVE ASSY	113.00	Pressure Part	1B	
20-794	WALL BOX NPR FOR TP	63.00	Pressure Part	1B	
20-962	TR PROBE DUP PT&AC	2,026.00	Pressure Part	1B	
20-998	SPL TOOLS FOR SB	43.00	Pressure Part	1B	Non Billable
21-600	S.B. PPG & FITTINGS	33,000.00	Pressure Part	1B	
21-601	S.B PIPING SUPPORTS	1,800.00	Pressure Part	1B	
21-602	Sb Piping - DD Items	2,500.00	Pressure Part	1B	
21-603	Sb Piping - BOI Items	20.00	Pressure Part	1B	
21-604	SB Piping Supports - OS items	8,700.00	Pressure Part	1B	
21-605	SB Piping Supports - DD Items	16.00	Pressure Part	1B	
21-606	SB Piping Supports - BOI Items	2.00	Pressure Part	1B	
21-700	BULKED BPS COMP	600.00	Pressure Part	1B	

21-800	SB VALVES (BHEL)	4,700.00	Pressure Part	1B	
21-825	SB VALVES (SUBDELY)	1,300.00	Pressure Part	1B	
21-850	SB SAFETY VALVE BHEL	50.00	Pressure Part	1B	
21-992	WELDING ELECTRODES	150.00	Pressure Part	1B	
24-350	BLR FILLING PIPING	3,500.00	Pressure Part	1B	
24-351	H&S BLR FILLING PPG	70.00	Pressure Part	1B	
24-352	Boiler Fill Piping - DD Items	200.00	Pressure Part	1B	
24-353	H&S For Boiler Fill Piping - OS Items	1,000.00	Pressure Part	1B	
24-354	BOI Items for Blr Trim Piping	2.00	Pressure Part	1B	
24-700	BULKED BPS COMP	500.00	Pressure Part	1B	
24-800	BOILER TRIM PIPING	59,000.00	Pressure Part	1B	
24-801	SUPPORTS-TRIM PIPING	350.00	Pressure Part	1B	
24-803	Boiler Trim Piping - DD Items	500.00	Pressure Part	1B	
24-804	Supports - Blr Trim Piping - OS Items	40,000.00	Pressure Part	1B	
24-805	LINK TO BOILER RECIRCU SYSTEM	27,000.00	Pressure Part	1B	
24-806	MIXING VESSEL	6,500.00	Pressure Part	1B	
24-807	RECIRCU PUMP SUCTION LINE	23,200.00	Pressure Part	1B	
24-808	RECIRCU PUMP DISCHARGE LINE	9,800.00	Pressure Part	1B	
24-809	BOILR RECIR LINK FROM BF LINE	11,000.00	Pressure Part	1B	
24-810	H and S FOR STARTUP SYSTEM	23,000.00	Pressure Part	1B	
24-811	Fur Link to Flash tank HWL1&2	72,000.00	Pressure Part	1B	
24-815	SPRAY WATER SYSTEM	40,000.00	Pressure Part	1B	
24-817	H&S For Start-Up System - OS Items	14,000.00	Pressure Part	1B	

24-818	H&S For Start-Up System - DD Items	150.00	Pressure Part	1B	
24-820	EXHAUS PIPE SAFETY VLV	70,000.00	Pressure Part	1B	
24-822	De-Superheater Pipes - OS Items	7,200.00	Pressure Part	1B	
24-823	De-Superheater Pipes - DD Items	900.00	Pressure Part	1B	
24-824	Exhaust Pipe For Sv - OS Items	13,000.00	Pressure Part	1B	
24-825	SILENCER SUPPORTS	100.00	Pressure Part	1B	
24-826	Silencer Supp - OS Items	45,000.00	Pressure Part	1B	
24-827	Exhaust Pipe For Sv - DD Items	1,200.00	Pressure Part	1B	
24-828	Exhaust Pipe For Sv - BOI Items	50.00	Pressure Part	1B	
24-835	STARTUP VENT DIFFUSER SILEN SUP	1,400.00	Pressure Part	1B	
24-836	Start-Up Vent, Diffuser, Sil Supp-OS	7,000.00	Pressure Part	1B	
24-837	Start-Up Vent, Diffuser, Sil Supp-DD	20.00	Pressure Part	1B	
24-840	SAMPLE COOLER AND SUPPORTS	870.00	Pressure Part	1B	
24-841	Sample Cooler & Supports - OS Items	170.00	Pressure Part	1B	
24-842	Sample Cooler and Suprts-DD items	20.00	Pressure Part	1B	
24-855	RECIRCULATING PUMB COMP	19,700.00	Pressure Part	1B	
24-860	VALVES (BHEL)	80,000.00	Pressure Part	1B	
24-865	CTL VALVES FOR SPRAY PIPING SD	11,500.00	Pressure Part	1B	
24-867	CTL VAL FOR STARTUP RECIRCU SYS	12,400.00	Pressure Part	1B	
24-880	SAFETY VALVES	9,000.00	Pressure Part	1B	
24-881	SAFETY VALVES AND ERV(BHEL) SD	2,000.00	Pressure Part	1B	
24-883	Safety Valves (Bhel) - Non HT	5,000.00	Pressure Part	1B	
24-885	SILENCERS(BHEL)	87,000.00	Pressure Part	1B	

24-950	SPECIAL TOOLS	160.00	Pressure Part	1B	Non Billable
24-955	LAP TOOL SV&ERV	70.00	Pressure Part	1B	Non Billable
24-960	LAP TOOL-CON VAL(BHEL)	35.00	Pressure Part	1B	Non Billable
24-992	WELDING ELECTRODES-TRIM PPG	2,000.00	Pressure Part	1B	
24-993	CONSUME & EREC MATLS	500.00	Pressure Part	1B	Billable only in case of short supply of Perticular material, modification, additional fabrication with proper record of issues and purpose of use.
24-994	NAME PLATES	300.00	Pressure Part	1B	
42-001	PNEUMATIC FITTINGS	100.00	Pressure Part	1B	
42-002	STEAM BLOW MATERIALS	2,500.00	Pressure Part	1B	
42-005	INSTRUMENT FITTINGS	300.00	Pressure Part	1B	
42-010	LFO PUMP SET	16,500.00	Pressure Part	1B	
42-046	DO PUMP-MOTOR ASSY	600.00	Pressure Part	1B	
42-065	DRAIN OIL TANK	5,000.00	Pressure Part	1B	
42-	BURNER STN SKID ASLY	5,000.0	Pressure	1B	

070		0	Part		
42-120	PIPING,PH FUEL OIL	1,500.00	Pressure Part	1B	
42-152	PIPING,OP.FLR LFO	3,000.00	Pressure Part	1B	
42-154	PIPING,OP.FLR DO	600.00	Pressure Part	1B	
42-157	PIPING,OP.FLR AIR	250.00	Pressure Part	1B	
42-200	SUB.DEL FO SYSTEM	7,500.00	Pressure Part	1B	
42-300	BHEL VALVE F.O. SYS	1,000.00	Pressure Part	1B	
42-700	BULKED BPS COMPONENT	900.00	Pressure Part	1B	
42-710	Fuel Oil System - DD Items	1,600.00	Pressure Part	1B	
42-858	Fuel Oil System - Shop items	14,500.00	Pressure Part	1B	
42-992	IMPORTED ELECTRODES	35.00	Pressure Part	1B	
45-200	Windbox - Sub Delivery	3,700.00	Pressure Part	1B	
45-710	Wind Box & SOFA Assembly - DD items	100.00	Pressure Part	1B	
45-801	WINDBOX AND SOFA TUBE ATTACH	26,000.00	Pressure Part	1B	
45-802	WINDBOX ASSEMBLY - 32" WIDTH	1,70,000.00	Pressure Part	1B	
45-804	WINDBOX - SOFA ASSEMBLY	25,000.00	Pressure Part	1B	
45-805	WINDBOX SUPPT AIR CYL MOUNTG	25,000.00	Pressure Part	1B	
45-858	Wind Box & SOFA Assy - Shop items	35,000.00	Pressure Part	1B	
97-282	FLOWMETERS	3,500.00	Pressure Part	1B	
97-297	MTM CLAMPS & PADS	1,000.00	Pressure Part	1B	
97-298	MTM Thermocouples & Junction Boxes	8,000.00	Pressure Part	1B	
97-599	PNEU.ACTUR A&FG SYS	3,200.00	Pressure Part	1B	
	TOTAL Pressure Part	89,91,939.00			
28-	DOORS	13,750.	Non	1C	

220		00	Pressure part		
28-700	BPS FASTENERS	5,500.00	Non Pressure part	1C	
30-103	SEAL PLATE ASSY	4,100.00	Non Pressure part	1C	
30-105	FUR BOTTOM ENCL FRAM	47,000.00	Non Pressure part	1C	
30-211	FUR REAR ARCH ENCL	5,100.00	Non Pressure part	1C	
30-215	MAIN BOILER ENCL	32,000.00	Non Pressure part	1C	
30-219	VERT ROOF ENCL	1,12,000.00	Non Pressure part	1C	
30-223	GAS DIST BAFFLES	400.00	Non Pressure part	1C	
30-224	Antivibration Baffles	35,500.00	Non Pressure part	1C	
30-233	IST PASS DECK SPRT	33,500.00	Non Pressure part	1C	
30-234	2ND PASS DECK SPRT	33,500.00	Non Pressure part	1C	
30-235	ENCL SUPPORT STEEL	59,000.00	Non Pressure part	1C	
41-350	ACOIL GUN ASSY	500.00	Non Pressure part	1C	
41-390	OIL GUN VICE&RACK	1,000.00	Non Pressure part	1C	
41-500	HEA IGNITOR	700.00	Non Pressure part	1C	
41-710	Oil Gun Assembly - DD items	5.00	Non Pressure	1C	

			part		
43-004	ASSY SCNR&GUN AIR SY	5,000.00	Non Pressure part	1C	
43-005	ASSY MILL AIR SYSTEM	25,000.00	Non Pressure part	1C	
43-104	M/C SCNR&GUN AIR SYS	14,000.00	Non Pressure part	1C	
43-105	M/C MILL AIR SYSTEM	70,000.00	Non Pressure part	1C	
43-200	SUBDEL,IGNR,SCNR AIR	8,000.00	Non Pressure part	1C	
43-710	Seal Air & Scanner Air System - DD items	500.00	Non Pressure part	1C	
47-200	Fuel Piping - Sub-delivery	34,000.00	Non Pressure part	1C	
47-261	Fuel Pipe Supports	22,000.00	Non Pressure part	1C	
47-263	Fuel Pipe Couplng , Collar,Gate Misc Ite	20,000.00	Non Pressure part	1C	
47-269	St Pipes & Shop Bends For Rest Of Mills	3,20,000.00	Non Pressure part	1C	
47-710	Pulverised Fuel Piping - DD items	4,000.00	Non Pressure part	1C	
47-858	Fuel Piping - Shop items	30,000.00	Non Pressure part	1C	
48-012	DUCT - -FDFAN TO A.H	1,38,000.00	Non Pressure part	1C	
48-014	EXP.JT - -FDFAN TO A.H	7,300.00	Non Pressure part	1C	
48-015	SUPPORT-FDFAN TO A.H	23,000.00	Non Pressure part	1C	

48-018	MISC. DUCT&SPRT MATL	46,000.00	Non Pressure part	1C	
48-019	AIRDUCT SUP FDN MATL	4,000.00	Non Pressure part	1C	
48-112	DUCT - -PAFAN-PRI-AH	1,07,000.00	Non Pressure part	1C	
48-114	EXP.JT - -PAFAN-PRI-AH	7,400.00	Non Pressure part	1C	
48-115	SUPPORT-PAFAN-PRI-AH	13,800.00	Non Pressure part	1C	
48-141	SEAL AIR HAG&ID GATE	6,400.00	Non Pressure part	1C	
48-142	DUCT - -COLDAIRBUS	91,000.00	Non Pressure part	1C	
48-144	EXP.JT - -COLDAIRBUS	5,800.00	Non Pressure part	1C	
48-145	SUPPORT-COLDAIRBUS	11,000.00	Non Pressure part	1C	
48-200	INS TAPPINGS ON DUCT	2,700.00	Non Pressure part	1C	
48-202	DUCT - AH-WIND BOX	1,70,000.00	Non Pressure part	1C	
48-204	EXPJT - AH-WIND BOX	43,000.00	Non Pressure part	1C	
48-205	SUPORT AH-WIND BOX	30,400.00	Non Pressure part	1C	
48-206	CLH/VLH -Hot Air	15,200.00	Non Pressure part	1C	
48-207	FLOWMTR-SEC AIRFLOW	20,200.00	Non Pressure part	1C	
48-	DUCT-SEC.AIR TO WB	2,02,40	Non	1C	

208		0.00	Pressure part		
48-212	DUCT - WIND BOX CONN	82,800.00	Non Pressure part	1C	
48-214	EXPJT - WIND BOX CONN	6,400.00	Non Pressure part	1C	
48-222	SQ DUCT AH-HOT AIR BUS	1,06,000.00	Non Pressure part	1C	
48-224	EXPN PCS AH-HOT AIR BUS	13,800.00	Non Pressure part	1C	
48-225	SUPPORT AH-HOT AIR BUS	11,900.00	Non Pressure part	1C	
48-232	DUCT - HOT AIR BUS	87,000.00	Non Pressure part	1C	
48-234	EXPJT - HOT AIR BUS	11,000.00	Non Pressure part	1C	
48-235	SUPORT HOT AIR BUS	11,800.00	Non Pressure part	1C	
48-262	Rect Duct Aihtr Toprinozzle And Seca	1,00,000.00	Non Pressure part	1C	
48-264	Expn Piece Aihtr Toprinozzle and Seca	20,000.00	Non Pressure part	1C	
48-265	Supports Aihtr Toprinozzle And Seca	7,000.00	Non Pressure part	1C	
48-267	FLOW METER- SOFA	3,700.00	Non Pressure part	1C	
48-372	DUCT - ECO HOPPER TO AH	32,000.00	Non Pressure part	1C	
48-382	DUCT - ECO-HOPPER	1,33,400.00	Non Pressure part	1C	
48-384	EXPNJT - ECO-HOPPER	36,800.00	Non Pressure	1C	

			part		
48-385	SUPPORT - ECO-HOPPER	40,500.00	Non Pressure part	1C	
48-388	DUCT - ,ECO-PRI AH	3,45,000.00	Non Pressure part	1C	
48-395	CLH/VLH-FLUE GAS	11,000.00	Non Pressure part	1C	
48-432	DUCT - AH-BLROUTFL	1,10,400.00	Non Pressure part	1C	
48-434	EXPJT - AH-BLROUTFL	7,400.00	Non Pressure part	1C	
48-435	SUPORT AH-BLROUTFL	8,000.00	Non Pressure part	1C	
48-462	DUCT - BLROUTFL-EP	4,80,000.00	Non Pressure part	1C	
48-464	EXPJT - BLROUTFL-EP	32,200.00	Non Pressure part	1C	
48-465	SUPORT BLR OUTFL-EP	73,600.00	Non Pressure part	1C	
48-662	CIRCULAR DUCT HOT BUS MILLS	1,28,800.00	Non Pressure part	1C	
48-664	EXPN PCS HOT BUS MILLS	24,000.00	Non Pressure part	1C	
48-665	SUPPORTS HOT BUS MILLS	1,900.00	Non Pressure part	1C	
48-667	FLOW METER	20,000.00	Non Pressure part	1C	
48-700	BULKED BPS COMPONENT	7,000.00	Non Pressure part	1C	
48-911	Slide Brg Pl & Pac Bellow-Blr	2,000.00	Non Pressure part	1C	

48-912	Slide Brg Pl-Id Sys	2,000.00	Non Pressure part	1C	
48-915	Man Hole Doors (450X450)	9,000.00	Non Pressure part	1C	
48-993	ERECTON-MATERIALS	15,000.00	Non Pressure part	1C	Billable only in case of short supply of Perticular material, modification, additional fabrication with proper record of issues and purpose of use.
57010	GATE-FD FAN OUTLET	25,100.00	Non Pressure part	1C	
57033	DAMPER-SA SCAPH INLET	12,700.00	Non Pressure part	1C	
57063	DAMPER-SA SCAPH OUTLET	16,400.00	Non Pressure part	1C	
57083	DAMPER-SA SCAPH BYPASS	16,500.00	Non Pressure part	1C	
57110	GATE-PA FAN OUTLET	19,300.00	Non Pressure part	1C	
57113	DAMPER-PA FAN OUTLET	10,000.00	Non Pressure part	1C	

57141	SEAL AIR PIPING	7,500.00	Non Pressure part	1C	
57141	SEAL AIR PIPING	27,000.00	Non Pressure part	1C	
57143	DAMPER-COLD AIR TO MILL	4,750.00	Non Pressure part	1C	
57160	GATE-COLD AIR TO MILLS	14,000.00	Non Pressure part	1C	
57173	DAMPER-PA APH INLET	9,000.00	Non Pressure part	1C	
57203	DAMPER-SA APH OUTLET	25,300.00	Non Pressure part	1C	
57209	MOUNTING BRACKET	400.00	Non Pressure part	1C	
57209	MOUNTING BRACKET	3,820.00	Non Pressure part	1C	
57223	DAMPER-PA APH OUTLET	11,410.00	Non Pressure part	1C	
57270	GATE-HOT AIR TO MILLS	23,200.00	Non Pressure part	1C	
57273	DAMPER-HOT AIR TO MILL	9,100.00	Non Pressure part	1C	
57430	FLUE GAS AH OUT GATE	62,460.00	Non Pressure part	1C	
57460	GATE-ESP INLET	63,400.00	Non Pressure part	1C	
57466	PLATFORMS AND LADDERS	39,650.00	Non Pressure part	1C	
57491	BLOWER WITH MOTOR	3,400.00	Non Pressure part	1C	
57491	BLOWER WITH MOTOR	12,400.	Non	1C	

		00	Pressure part		
57497	KGV & CHECK VALVE	2,050.00	Non Pressure part	1C	
57497	KGV & CHECK VALVE	5,200.00	Non Pressure part	1C	
57577	ELECT ACTUATOR FOR GATE,DAMPER	5,000.00	Non Pressure part	1C	
57577	ELECT ACTUATOR FOR GATE,DAMPER	200.00	Non Pressure part	1C	
57578	ELECTRICAL ITEMS FOR GATE,DAMP	4,360.00	Non Pressure part	1C	
57578	ELECTRICAL ITEMS FOR GATE,DAMP	70.00	Non Pressure part	1C	
57620	GATE-SCR BYPASS	74,750.00	Non Pressure part	1C	
57666	PLATFORMS AND LADDERS-SCR GD	5,750.00	Non Pressure part	1C	
57992	SPL MATL ELECTRODES	120.00	Non Pressure part	1C	
57992	SPL MATL ELECTRODES	170.00	Non Pressure part	1C	
57CX0	GATE-WITH CLADDING	68,000.00	Non Pressure part	1C	
95-489	COAL FLOW MONITER	250.00	Non Pressure part	1C	
96-588	ELECT.ACTUATOR-A&FG	500.00	Non Pressure part	1C	
99-099	MISC CHAIN PULLY BLO	150.00	Non Pressure part	1C	
99-501	QUICK ERECT SCAFFOLD	1,10,000.00	Non Pressure	1C	

			part		
Temp Piping	STEAM BLOWING PIPING-TEMPORARY	36,000.00	HP Piping	6B	
Temp Piping	ACID CLEANING PIPING-TEMPORARY	1,30,000.00	Non Pressure part	1C	
	Ceramic Lined items	2,75,000.00	Non Pressure part	1C	
	Seal air Hdr & Platform	10,000.00	Non Pressure part	1C	
	Mill Reject System	2,00,000.00	Non Pressure part	1C	
	TOTAL NON Pressure Part	66,39,085.00			
52000	SPECIAL TOOLS/CONTRA	1,150.00	Rotating Machine	2A	Non Billable
52010	LARG AH-ROTOR ASSY	12,21,600.00	Rotating Machine	2A	
52011	LARG AH-ROTOR POST	47,500.00	Rotating Machine	2A	
52012	LARG AH-ROTORPINRACK	7,200.00	Rotating Machine	2A	
52013	LARG AH-ROTORSEALS	16,420.00	Rotating Machine	2A	
52030	LARG AH-ROTORHOUSING	75,380.00	Rotating Machine	2A	
52041	HOT END CONN PLATE	1,23,100.00	Rotating Machine	2A	
52042	COLD END CONN PLATE	2,51,000.00	Rotating Machine	2A	
52054	LARG AH-AXIAL SEAL	1,430.00	Rotating Machine	2A	
52055	LARG AH-BY PASS SEAL	1,640.00	Rotating Machine	2A	
52100	LARGE AH ROTOR DRIVE	14,350.00	Rotating Machine	2A	
52101	LARG AH-AUX ROTDRIVE	10,500.00	Rotating Machine	2A	
52211	LARG AH-AIRSEAL PIPE	800.00	Rotating Machine	2A	
52220	LARG AH-GENS DETAILS	2,850.00	Rotating Machine	2A	
52261	LARG AH-GUIDE BEARNG	7,950.0	Rotating	2A	

		0	Machine		
52262	LARG AH-SUPRT BEARNG	19,000.00	Rotating Machine	2A	
52271	OIL PIPING GUIDE BRG	560.00	Rotating Machine	2A	
52272	OIL PIPING SUPRT BRG	520.00	Rotating Machine	2A	
52274	LUB OIL CIRCULATION UNIT	1,120.00	Rotating Machine	2A	
52275	LARGE AIR HEATER-LUBRICANTS	1,750.00	Rotating Machine	2A	
52301	WASH MANIFLD GAS INL	2,370.00	Rotating Machine	2A	
52302	WASH MANIFLD GAS OUT	2,610.00	Rotating Machine	2A	
52338	LARGE AH-MULTIMEDI CLNG DEV-CE	2,050.00	Rotating Machine	2A	
52339	LARGE AH-RETRACT CLNG DEV (HE)	1,500.00	Rotating Machine	2A	
52600	LARGE AH E,C&I COMPONENETS	1,500.00	Rotating Machine	2A	
55000	FAN TOOL & FIXTURE	1,000.00	Rotating Machine	2A	Non Billable
55011	FAN FIX MATERIAL	900.00	Rotating Machine	2A	
55015	FD FAN COUPLING GUARD	60.00	Rotating Machine	2A	
55017	FD FAN C&I ITEMS	40.00	Rotating Machine	2A	
55021	ID FAN FIX MATERIAL	2,050.00	Rotating Machine	2A	
55024	ID FAN C & S AIR FAN	2,700.00	Rotating Machine	2A	
55025	ID FAN CPLNG GUARD	100.00	Rotating Machine	2A	
55027	ID FAN C&I ITEMS	50.00	Rotating Machine	2A	
55031	PA FAN FIX MATERIAL	1,050.00	Rotating Machine	2A	
55035	PA FAN CPLNG GUARD	70.00	Rotating Machine	2A	
55037	PA FAN C&I ITEMS	50.00	Rotating Machine	2A	
55091	FIRST FILL LUBRICANT	5,880.00	Rotating Machine	2A	
55216	1 STG FD ROTOR	5,700.0	Rotating	2A	

		0	Machine		
55327	2 STG ID ROTOR	33,000.00	Rotating Machine	2A	
55335	2 STG PA ROTOR	8,200.00	Rotating Machine	2A	
55410	FD SET & INDN SHAFT	170.00	Rotating Machine	2A	
55420	ID SET & INDN SHAFT	300.00	Rotating Machine	2A	
55430	PA SET & INDN SHAFT	170.00	Rotating Machine	2A	
55510	FD FAN EXPN JOINTS	1,600.00	Rotating Machine	2A	
55516	1 STG FD HOUSING	12,000.00	Rotating Machine	2A	
55520	ID FAN EXPN JOINTS	2,800.00	Rotating Machine	2A	
55530	PA FAN EXPN JOINTS	1,200.00	Rotating Machine	2A	
55627	2 STG ID HOUSING	45,800.00	Rotating Machine	2A	
55635	2 STG PA HOUSING	10,200.00	Rotating Machine	2A	
55716	FD FAN SUCTION BOX	8,200.00	Rotating Machine	2A	
55727	ID FAN SUCTION BOX	22,600.00	Rotating Machine	2A	
55735	PA FAN SUCTION BOX	4,800.00	Rotating Machine	2A	
55810	FD FAN COUPLING	800.00	Rotating Machine	2A	
55816	FD FAN DIFFUSER	8,500.00	Rotating Machine	2A	
55820	ID FAN COUPLING	3,000.00	Rotating Machine	2A	
55827	ID FAN DIFFUSER	17,000.00	Rotating Machine	2A	
55830	PA FAN COUPLING	1,200.00	Rotating Machine	2A	
55835	PA FAN DIFFUSER	4,600.00	Rotating Machine	2A	
55910	FD FAN LUBE OIL SYS	2,800.00	Rotating Machine	2A	
55911	FD FAN SILENCER	68,000.00	Rotating Machine	2A	
55920	ID FAN LUBE OIL SYS	5,850.0	Rotating	2A	

		0	Machine		
55930	PA FAN LUBE OIL SYS	3,400.00	Rotating Machine	2A	
55931	PA FAN SILENCER	56,500.00	Rotating Machine	2A	
56075	SA FAN CPLNG GUARD	40.00	Rotating Machine	2A	
56077	SA FAN C&I ITEMS	10.00	Rotating Machine	2A	
56079	SA FAN MTR CANOPY	250.00	Rotating Machine	2A	
56161	PENT HOUSE FAN	1,300.00	Rotating Machine	2A	
56173	SA FAN ROTOR	1,700.00	Rotating Machine	2A	
56373	RADIAL SEAL AIR FAN BEARINGS	210.00	Rotating Machine	2A	
56473	RADIAL SEAL AIR FAN STATOR	7,000.00	Rotating Machine	2A	
56670	RADIAL SEAL AIR FAN MOTOR	2,500.00	Rotating Machine	2A	
56870	SEAL AIR FAN COUPLING(RADIAL)	30.00	Rotating Machine	2A	
61-010	JOURNAL ASSEMBLY	40,320.00	Rotating Machine	2A	
61-010	JOURNAL HEAD ASSY	24,080.00	Rotating Machine	2A	
61-110	PLANETARY GEAR BOX	1,05,000.00	Rotating Machine	2A	
61-110	BOWL & BOWL HUB ASSY	1,37,200.00	Rotating Machine	2A	
61-210	MILL SIDE ASSEMBLY	1,38,810.00	Rotating Machine	2A	
61-310	SEPARATOR BODY ASSEMBLY WITH TRUNNION SHAFTS & JOURNAL OPENING COVER	2,07,550.00	Rotating Machine	2A	
61-310	SEPARATOR TOP ASSEMBLY	33,180.00	Rotating Machine	2A	
61-310	DYNAMIC CLASSIFIER COMPLETE	82,600.00	Rotating Machine	2A	
61-410	MDV ASSEMBLY (KNIFE GATVE VALVES)	3,465.00	Rotating Machine	2A	
65-200	Coal Feeder- Sub-Delivey	2,500.00	Rotating Machine	2A	
65-710	Coal Feeder - DD items	150.00	Rotating Machine	2A	
65-	36GRAVIMETRIC FEEDER	50,000.	Rotating	2A	

736		00	Machine		
67-200	Coal Feeding System- Sub dely.	1,320.00	Rotating Machine	2A	
67-204	RAW COAL GATES	3,267.00	Rotating Machine	2A	
67-272	BUNKER OUTLET GATE -36" MOTOR	7,233.00	Rotating Machine	2A	
67-276	FEEDER INLET GATE- 36" CHAIN	6,611.00	Rotating Machine	2A	
67-283	FEEDER OUTLET ISOLATION GATE	9,333.00	Rotating Machine	2A	
67-710	Coal Feeding System - DD items	389.00	Rotating Machine	2A	
67-801	DOWN SPOUT	7,778.00	Rotating Machine	2A	
67-802	BUNKER EMPTYINGCHUTE	24,889.00	Rotating Machine	2A	
67-803	FEED PIPE TO MILL	18,667.00	Rotating Machine	2A	
95-088	FSSS FLAME SCANNER	450.00	Rotating Machine	2A	
95-091	FSSS INT.CON.EQPTS	2,50,00 0.00	Rotating Machine	2A	
95-485	GRAVI.FDR.REMOTE.CAB	3,000.00	Rotating Machine	2A	
95-487	GRA.FDR.ELEC.PACKAGE	25.00	Rotating Machine	2A	
95-488	FEEDER MOUNTED C&IEQ	1,500.00	Rotating Machine	2A	
95-988	FF CONT COMMG SPARE	50.00	Rotating Machine	2A	Non Billable
99-100	FAN HANDLING EQUIPT	21,700.00	Rotating Machine	2A	
99-300	PUMP HANDLING EQUIPT	4,000.00	Rotating Machine	2A	
99-400	SCAPH,RAPH HANDLG EQ	5,000.00	Rotating Machine	2A	
99-502	Pre.Parts Handling Equipmens	9,650.00	Rotating Machine	2A	
99-514	FURN CRADL-4WALC	3,000.00	Rotating Machine	2A	
99-600	FO SYSTEM HANDLG EQU	1,000.00	Rotating Machine	2A	
	ID Fan Motor	50,000.00	Rotating Machine	2A	
	PA Fan Motor	32,000.	Rotating	2A	

		00	Machine		
	FD Fan Motor	33,000.00	Rotating Machine	2A	
	Mill Motors	67,950.00	Rotating Machine	2A	
	MILL HANDLING EQUIPMENTS	50,000.00	Rotating Machine	2A	
	Base plates and foundation bolts	15,000.00	Rotating Machine	2A	
	Mill Lube oil system & Knife Gate Assy	38,500.00	Rotating Machine	2A	
50510	STEAM COIL A P H	13,300.00	Rotating Machine	2A	
	TOTAL ROTATING M/c	36,74,697.00			
33-021	BLR PP MINRL WOOL	7,06,000.00	Insulation	3A	
33-221	DUCT MINERAL WOOL	2,19,000.00	Insulation	3A	
55919	FD FAN INSUL WOOL	15,000.00	Insulation	3A	
55939	PA FAN INSUL WOOL	11,000.00	Insulation	3A	
SG Integral	Insulation	1,00,000.00	Insulation	3A	
33-210	MAIN BLR CAST REF GR	1,70,000.00	Insulation	3B	
33-230	MAIN BLR POUR INSUL	80,000.00	Insulation	3B	
31-010	COMPS WELDED TO PR	1,000.00	Insulation	3C	
31-104	FUR REAR ARCH SKIN	2,400.00	Insulation	3C	
32-010	FICOM BLR PP INSUL	5,000.00	Insulation	3C	
32-210	FIX COMP-DUCT INSULN	61,000.00	Insulation	3C	
33-924	MISC EQPTS PCK MATLS	500.00	Insulation	3C	
33-970	MISC EQPTS EXP METAL	18,000.00	Insulation	3C	
33-971	MISC EQPTS WW CLOTH	1,300.00	Insulation	3C	
33-975	MISC EQPTS SEAL COMP	800.00	Insulation	3C	

37-010	BLR OUTER CSG COMPS	43,000.00	Insulation	3C	
37-810	BLR OUTER CASING	37,000.00	Insulation	3C	
32-700	BULKED DD COMPONENT	78,000.00	Insulation	3D	
32-810	EQUIPMENT OUTER CASING	2,03,000.00	Insulation	3D	
	TOTAL Insulation	17,52,000.00			
80-452	HP PIPING DRAINS - SG SCOPE	32,000.00	P91	6A	
	Trichy valves - P91	20,000.00	P91	6A	
80-342	AUX STEAM TO SCAPH	6,500.00	CS-HP Piping	6B	
80-343	AUX STEAM TO AH SOOT BLOWERS	2,000.00	CS-HP Piping	6B	
80-351	AUX STEAM TO UNLISTED USERS - SG SCOPE	19,000.00	CS-HP Piping	6B	
80-395	AUX STEAM TO FUEL OIL ATOMISING	500.00	CS-HP Piping	6B	
80-433	SPRAY WATER FROM BFP INTERSTAGE	6,150.00	CS-HP Piping	6B	
80-434	UNLISTED SPRAY WATER - SG SCOPE	5,500.00	CS-HP Piping	6B	
80-451	BOILER INTEGRAL PIPING DRAINS	8,500.00	CS-HP Piping	6B	
	PEM-Control valves, Traps, dosing system, Flow nozzles, orifices & other items	5,000.00	HP Piping	6B	
	Trichy valves - HP Piping	20,000.00	HP Piping	6B	
	Bhopal valves	0	HP Piping	6B	
80-418	ERECTION MATERIALS FOR INSTRUMENTS	200	CS-LP Piping	6C	
80-453	LP PIPING DRAINS - SG SCOPE	32,000.00	CS-LP Piping	6C	
80-454	SCAPH DRAINS	1,000.00	CS-LP Piping	6C	
80-455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	13,000.00	CS-LP Piping	6C	
80-460	SG AUX COOLING WATER UNIT SYSTEM	40,000.00	CS-LP Piping	6C	
80-471	BOILER WATER WASH TO AND FROM UNIT	7,500.00	CS-LP Piping	6C	

80-477	SERVICE WATER PIPING	7,500.00	CS-LP Piping	6C	
80-480	FIRE WATER-OTHER AREAS	12,500.00	CS-LP Piping	6C	
80-612	SERVICE AIR FOR INDIVIDUAL UNITS	8,500.00	CS/SS-LP Piping	6C	
80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	10,000.00	CS/SS-LP Piping	6C	
80-650	FUEL OIL SUPPLY AND RETURN PIPING	5,000.00	CS-LP Piping	6C	
	Trichy valves - LP Piping	25,000.00	CS-LP Piping	6C	
80-473	DEMINERALISED WATER SYSTEM	2,000.00	SS Piping	6D	
80-901	SUB DELIVERY VALVES FOR LIGHT UP	4,250.00	Piping H&S,Misc	6E	
80-920	H AND S FOR HYDRO TEST	3,350.00	Piping H&S,Misc	6E	
80-921	H AND S FOR LIGHT UP STEAM LINE	20,000.00	Piping H&S,Misc	6E	
80-933	H AND S FOR LP PIPING	10,000.00	Piping H&S,Misc	6E	
80-992	WELDING ELECTRODES-1	5,000.00	Piping H&S,Misc	6E	
80-993	MISC ERECTION MATLS	100	Piping H&S,Misc	6E	
81-060	SPECIAL TANKS AND VESSELS	2,250.00	Piping H&S,Misc	6E	
81-411	DIRECT GAUGES FOR STEAM LINES	0	Piping H&S,Misc	6E	
81-412	DIRECT GAUGES FOR NON-STEAM LINES	0	Piping H&S,Misc	6E	
81-414	LOCAL CONTROL EQPT FOR NON-STEAM LINES	0	Piping H&S,Misc	6E	
81-415	TEST THERMOWELLS	250	Piping H&S,Misc	6E	
81-416	PERFORMANCE GUARANTEE TEST MATERIALS	750.00	Piping H&S,Misc	6E	
81-417	INSTRUMENTATION FOR STARTUP SYSTEM	0	Piping H&S,Misc	6E	
	Varanasi- Load hangers, CLH&VLH	60,000.00	Piping H&S,Misc	6E	
	TOTAL PIPING	3,95,300.00			
57988	COMMISSIONING SPARES	100.00	Spare		

52988	LARG AH COMMISSIONING SPARE	500.00	Spare	
20-988	SB COMMG SPARES	6.00	Spare	
21-987	COMMG SPARES SB SV	2.00	Spare	
21-988	COMMG SPARES-SD	2.00	Spare	
24-987	BHEL-SV/ERV COMG SPARES	10.00	Spare	
24-988	COMMG SPARES/SD	20.00	Spare	
24-989	BHEL VALVE COMG SPAR	50.00	Spare	
41-988	O&G BURN COMMG SPARE	5.00	Spare	
42-988	O&G SYS COMMG SPARE	50.00	Spare	
56997	RADFAN-MANDTRY SPARE	420.00	Spare	
56998	MANDATORY SPARE ELECT C AND I	10.00	Spare	
57897	MANDATORY SPAR ELECTRICAL ITEM	30,000.00	Spare	
57988	COMMISSIONING SPARES	60.00	Spare	
57997	MANDATORY SPAR MECHANICAL ITEM	5,000.00	Spare	
95-088	FSSS FLAME SCANNER	25.00	Spare	
96-186	SB MOTOR CONT CENTRE	25,000.00	Electrical	
96-188	TEMP.PROBE START BOX	50.00	Electrical	
96-193	MISC STARTER BOX	100.00	Electrical	
97-097	Instrumentation Field Transmitters	1,000.00	C&I	
97-098	INST.PANEL&MOUN.INST	100.00	C&I	
97-284	FIELD GAUGES	400.00	C&I	
97-285	FIELD SWITCHES	400.00	C&I	
97-287	INST-STM,WTR,SB SYS	200.00	C&I	
97-407	Instrumentation Field Transmitters	100.00	C&I	
97-	ACOUSTIC PYROMETER S	8,000.0	C&I	

584		0		
97-585	ACO STM LEAK DET SYS	1,500.00	Spare	
97-585	ACO STM LEAK DET SYS	50.00	Spare	
97-590	ERECTION MATERIALS	18,000.00	C&I	
97-591	BURNER TILT SHEAR PIN FAILURE SYS.	50.00	C&I	
97-592	PNEU TUB&FIT,AIRSET	1,000.00	C&I	
97-593	ELEVATOR & ACCESSORI	60,000.00	C&I	
97-596	CC TV SYSTEM	1,500.00	C&I	

2X660 MW NTPC TALCHER PROJECT
SUMMARY OF TOTAL TONNAGE CATEGORY WISE UNIT#1

Rate Schedule	Descriptions	Designed weight In MT	Remarks
1A	Structure	19,093.00	
1B	Pressure parts	8,991.94	
1C	Non Pressure Parts	5,170.42	
2A	Rotary machines	3,674.70	
3A	Insulations Wool Matress	1,051.00	
3B	Insulation -pourable and castable	250.00	
3C	Insulation-iron parts	170.00	
3D	Insulation -Al cladding sheets	281.00	
6A	SG area Piping P-91/92	52.00	
6B	HP Piping Including P-11,P-12,P-22	109.15	
6C	LP Piping	162.20	
6E	Hangers/Pumps & Tanks	105.95	
6D	SS Piping	2.00	
	Total weight	**39,113.35**	

9.2 BOQ for Misc. Bunker structural works:-
(Note: This is in addition to the BHEL supplies as fabricated items for Structural framing of Bunker house etc.)

Weight Schedule/ BOQ- Erection works of Bunker - (Unit#1)			
Item No.	**Section 2 - Bunker & Allied works Item Description**	**UOM (A)**	**Qty.**
1514	Providing and installing **under deck insulation** with resin bonded **rock wool 50 mm** nominal thickness conforming to IS 8183 having a density of 48kg/cum using **minimum 0.05 mm thick aluminium foil** on exposed surface followed by 0.6 mm dia and 25 mm mesh GI wire netting, fixed at various elevations with rawl plugs including clips but excluding cost of insulation.	**SQM**	100
1516	Providing and fixing non-metal opaque **PVC sheet similar to ONDEX roofing** or equivalent including all fixing accessories.	**SQM**	67
A1519	Fixing **Factory made (Continuous Line) prefabricated sandwiched Permanent colour coated metal cladding** comprising top sheet as troughed(minimum depth of trough shall be 30 mm) permanently colour coated sheet & bottom sheet as **plain** permanently colour coated for covering of exposed metal/concrete / brick surfaces with **insulation shall be of Polyurethane type of minimum 50mm thick (excluding trough). The polyurethane shall be Chlorofluorocarbon (CFC) free and self-extinguishing and shall conform to IS 12436: 1988. It shall have Modular Density 40 +/- 2 Kg/m3 and Thermal Conductivity @ 10 Deg.C 0.017 - 0.020 W/M 0k, Water absorption (% by vol) 3.1, Critical Oxygen Index 23 and Compressive Strength 1.2 Kg/sq.cm,** sandwiched between the two sheets, each sheet shall be high strength tensile steel sheet **0.5mm bare metal thickness (minimum)** of YS350 as per IS 15961 /grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z 275 / aluminium-zinc alloy coating to class AZ150 on both sides, both sheet shall be permanently coated with silicon modified polyster (SMP with silicon content of 30% to 50%) paint of minimum 20 micron DFT on exposed surface on 5 microns (min.) epoxy primer/phosphate primer coat and 10 micron (min.) SMP on 5 micron (min.) epoxy primer/phosphate primer on other face, SMP paint system shall be of **industrial finish of product type 4** of AS/NZS 2728,troughed sheet shall be of approved profile, sectional properties, (suitable for the specified loading / deflection and purlins / runner spacing), colour and shade, at all levels, including all labour, materials, equipment, handling, transportation, special coated fastener conforming to **corrosion resistant Class 3 of AS3566 and tested for 1000 hours salt spray test**, fixing insulated sandwiched metal sheet with the structural members below for supporting the sheeting system, scaffolding, equipment, end and side laps, cutting of openings, preparation of working drawings, testing, etc., all complete, as per specifications. Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non stainless material and be flexible enough not to interface with fit of the sheets. Coated surface shall be provided with a **protected guard film** (polyethylene) of about 40 microns to avoid any damage to the coating during handling. Overlap shall be min. 100 mm or as specified by manufacturer.	**SQM**	1094
A2301	Erection of Medium and High Tensile structural steel (**Grade designation E350 Quality B0 (Fully killed), conforming to IS 2062. Plates beyond 40mm thickness**	**MT**	2229

	shall be vacuum degassed & furnace normalised. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised and shall also be 100% ultrasonically tested as per ASTM –A578 level BS2.) with rolled section / built up section / combination of both conforming to IS:2062, pipes conforming to IS:1161/ IS:1239, chequered plate conforming to IS: 3052, mild steel rounds, monorails, stays, safety chains, ladders, MS grating etc. in columns, beams, gantry girders, bunkers, silos, hoppers, roof trusses, portals, laced purlins, space frames, hangers, struts, monorails, galleries, stiffeners, wall beams, sheeting runners, brackets, stub columns, bracings, cleats, trestles, base plates, splice plates, chequered plate flooring, decking and seal plates, steel frame grid over false ceiling, walkway platforms, ladders, stairs, stringers, toe-guard/kick plate, grizzly gratings, treads, landings, hand-rails etc including 2 coats of redoxide zinc-chromate primer (one coat at shop and one coat after erection), connection design & preparation of fabrication drgs, collection of steel from stores, fabrication, straightening, cutting, bending, rolling, grinding, machining, drilling, welding, electrodes and other consumables, alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, edge preparation, preheating (min preheat and interpass temperature of 20o C for welding over 20 mm and upto 40 mm & 66o C for welding over 40 mm and upto 63 mm & 110o C for thickness over 63 mm & use of low hydrogen/ radiogenic electrodes), post heating, testing of welders, inspection of welds, visual inspection, non-destructive and special testing, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete. Including appointment of an **independent** separate agency, approved by BHEL, for review and approval of fabrication drgs, in consultation with BHEL.(Rate shall be exclusive of surface preparation and primer)		
2307	Cutting (in-situ), erection and alignment of factory made **electroforged galvanised grating** units with mild steel having minimum **hot dipped** galvanisation conforming to IS:2062, finish blast cleaned to Sa 2 ½ finish or cleaned by acid pickling as per ISO 8501-1 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. including fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete.		
a	Minimum galvanisation of 610 g/sqm	**MT**	59
2308	Cutting (in-situ), erection and alignment of **factory made galvanised welded grating units** with mild steel conforming to IS:2062 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. including 2 coats of redoxide zinc-chromate primer (one coat at shop and one coat after erection), fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all	**MT**	1

	complete.		
2311	Fixing in position of **permanent mild steel bolts** (class 4.6 as per IS : 1367 and grade `C' as per IS: 1363) and nuts, washers etc. up to and inclusive of 39 mm diameter and upto 300mm long for structural steel work etc all complete.	**MT**	2.229
2312	Fixing in positing of **high strength structural bolts** (of property class 8.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	**MT**	78.00
A2312	Fixing in positing of **high strength structural bolts** (of property class 10.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	**MT**	11
2313	**Dismantling of steel structure**, lowering of material and carriage of the dismantled material up to field fabrication shop / projects storage including temporary dismantling, cutting, re-welding, supporting, and restoring to correct position all temporarily dismantled members, re-alignment of all adjacent connected members to their correct positions (weight of such adjacent members and temporarily dismantled members not payable), scafolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	**MT**	10
2314	**Addition to, alterations in and/or modifiction of "Erection Marks"** including cutting of parts, gauging of welds, cutting, grinding, fabrication, welding, drilling holes, straightening, removal of bends, raising to the required level, painting, transportation, return of unutilised steel pieces to the project store, temporarily dismantling, cutting, re-welding, supporting and restoring to correct position of all the temporarily dismantled members, realignment of adjacent connected members (weight of such temporarily dismantled and adjacent members not payable) etc all complete for the following:		
a	In erected position	**MT**	5
b	In fabrication yard	**MT**	5
2315	**Re-erection of dismantled fabricated structural steel** members including carriage of modified "Erection Marks" from the field fabrication shop to erection site, lifting to required position, aligning in position, tack welding, final welding and touch up painting including temporary dismantling and re-erection of temporarily dismantled members, cutting, rewelding, supporting and restoring to the correct position of all temporarily dismantled members, re-alignment of adjacent connected members(weight of such temporarily dismantled members and adjacent members not payable), scaffolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	**MT**	5
2317	Fabrication and erection of minimum **4 mm thick stainless steel liner conforming to ASTM A 240 S204 (Type 304)** ; Finish Grade 2B (Cold rolled,	**MT**	56

	Annealed & Pickled and Skin passed) on M.S. plate for inside surfaces of hopper & mouth of hopper of bunkers including fixing with stainless steel studs, bolting (including countersunk), welding with electrode classification E308L for welding of stainless steel to stainless steel and E309 for stainless steel to mild steel, fabrication detailed drawing etc.all complete. (The measurement for the item of stainless steel liner in hopper shall be based on the actual finished weight of SS liner over hopper)		
A2319	Providing and fixing preformed flexible open ended bellow strap of neoprene of minimum thickness 2 mm and minimum width 200 mm under un-stretched condition with aluminium stripped edges as sealing below top of bunker and bottom of tripper floor to avoid the coal dust nuisance all complete.	**RM**	198
2321	Fabrication and fixing of **MS pipe hand railing of 32 mm/40 mm dia** including transportation, loading/unloading, painting etc. all complete as per specification.	**MT**	3
2322	Fabrication and fixing of **GI pipe hand railing (900 mm high) of 32 mm/40 mm dia (**Medium Grade) including galvanisation @ 610 gm/sqm over blast cleaned steel surfaces etc all complete. item includes transportation, loading/unloading, suitable paint etc.	**MT**	10
2323	Conducting **radiography test on welds** wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	**RM**	20
2324	Conducting **ultrasonic test on welds** wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	**RM**	20
2325	Conducting **ultrasonic test on steel plates** as per ASTM-A435 or equivalent wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	**SQM**	20
2326	Conducting **magnetic particle test on welds** wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	**RM**	20
2327	Conducting **dye penetration test on welds** wherever specified by the engineer including provision of necessary equipments, measuring devices, gauges etc. all complete (over and above the work already specified in the specifications.)	**RM**	20
2328	Supply, fixing l**ightning arrester and air terminal over roo**f of power house building, pump house and other structures including all materials, labour, electrodes etc complete (all materials to be supplied by the contractor).	**NO.**	1
MRS	Fabrication (site fabrication), transportation and erection of Medium and High Tensile structural steel (Grade designation E350 Quality B0 (Fully killed), conforming to IS 2062. Rolled section / built up section / combination of both conforming to IS:2062, pipes conforming to IS:1161/ IS:1239, chequered plate conforming to IS: 3052, in silo collection of steel from stores, fabrication, straightening, cutting, bending, rolling, grinding, machining, drilling, welding, electrodes and other consumables, alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, edge preparation, preheating (min preheat and interpass temperature of 20o C for welding over 20 mm and upto 40 mm & 66o C for welding over 40 mm and upto 63 mm & 110o C for thickness over 63 mm & use of low hydrogen/ radiogenic electrodes), post heating, testing of welders, inspection of welds, visual inspection, non destructive and special testing, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against	MT	60

	damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete. Blast cleaning of steel structures by shot blasting to near white metal finish conforming to Sa 2 ½ finish of Swedish standard ISO-8501 and shall have profile of 40 to 60 micron and applying two component self/moisture curing Inorganic Zinc ethyl Silicate Primer Coat (Solid by Volume Minimum 62+/- 2% and Zinc content %age on dry film minimum 80%), Zinc dust pigment conforming to ISO 3549 and Zinc dust pigment content determined in accordance with ASTM D 520, Minimum Dry Film Thickness (DFT) of primer coat of 70 Micron, including touch-up painting, using Airless spray technique in shop etc all complete. Providing and applying Intermediate Coat of two component Polyamide Cured pigmented with Micaceous Iron Oxide (MIO content minimum 30%) Epoxy based Paint (Solid by Volume Minimum 80 +/- 2%) of Minimum 100 Micron DFT. This Coat shall be applied after an interval of Minimum overnight (from the application of Primer Coat) by Airless spray technique. Intermediate Coat shall be followed with the application of Finish Coat of two pack isocyanate Cured colour acrlyic based Paint (Solid by Volume Minimum 55 +/-2 %) of Minimum 70 Micron DFT with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied in shop/site after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer. The painting includes protection and cleaning, scaffolding, touchup etc. all complete as per specifications. (Rate shall be inclusive of surface preparation, blasting, primer and painting (includign supply of paint))		

10.1 GENERAL

Site Visit by the Bidder

10.1 The bidder shall, prior to submitting his tender for the work, visit and examine the site of works and its surroundings at his own expense, and obtain and ascertain for himself on his own responsibility all information that may be necessary for preparing his tender and entering into a contract, and take the same into account in the quoted contract price for the work.

10.2 The bidder shall satisfy themselves about the following factors:

i) Site conditions including access to the site, existing and required roads and other means of transport/communication for use by him in connection with the work including diverting and re-routing of services.
ii) Requirement and availability of land and other facilities of his enabling works, establishment of his nursery, office, stores etc.
iii) Ground conditions including those bearing upon transportation, disposal, handling and storage of materials required for the work or obtained there-from.
iv) Source and extent of availability of suitable materials, including water etc., and labour (skilled and unskilled) required for work, and laws and regulations governing their use and employment.
v) Geological, meteorological, topographical and other general features of the site and its surroundings as are pertaining to and needed for the performance of the work.
vi) The limit and extent of surface and subsurface water to be encountered during the performance of the work, and the requirement of drainage and pumping.
vii) The type of equipment and facilities needed, for and in the performance of the work:
viii) The extent of lead and lift required for the work in complete form over the entire duration of the contract, and All other information pertaining to and needed for the work including information as to the risks, contingencies and other circumstances which may influence or affect the work or the cost thereof under this contract.

10.3 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account of contractor only. BHEL engineer, depending upon the availability of materials, fronts etc., will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs in other projects or for any reason whatsoever.

10.4 Contractor has to work in close co-ordination with other erection agencies at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule / plans. Contractor shall arrange & augment the resources accordingly.

10.5 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc. for any temporary supporting or approach platforms or scaffolding works or as bed for pre-assembly works. Contractor shall arrange himself all such materials. The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel (angles, channels, beams, plates etc) for such usage as normal scope of work without any cost implication on BHEL.
In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

10.6 All the works such as cleaning, levelling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.

10.7 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be effected for such excess drawls at the rate prescribed by manufacturing units.

10.8 No member of the already erected structure, platform, pipes, grills, other component and auxiliaries should be cut without specific approval of BHEL engineer. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / Customer without any additional cost.

10.9 No temporary supports shall be welded on the pressure parts of piping. Welding of temporary supports, cleats, etc. on the boiler columns shall be avoided. In case of absolute necessity contractor shall take prior approval from BHEL Engineer. Further, any cutting or alternation of member of the structure of platform or other equipment shall not be done without specific prior approval of BHEL Engineer.

10.10 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies / personnel on ISO 9001 – latest Standards.

10.11 Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer for other agencies, like piping, Turbine, Generator erection, Cabling, instrumentation, insulation etc., to commence their work from / on the equipments coming under this scope. Sometimes, more than one agencies may have to work in same location. Sometimes it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.

10.12 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

10.13 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

10.14 The boiler shall be erected as per relevant provisions of latest Indian Boiler Regulations (IBR) and amendments/addendums thereof, if any. Contractor shall submit a copy of

license to undertake construction / repair of Boilers & Piping issued by Boiler inspectorate before commencement of Pressure Parts / Piping Erection

10.15 Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping (Special tanks, IBD Tanks, CBD tanks any other tanks applicable) under IBR purview. Arrangement for the visit of Boiler inspector for field inspection, hydraulic test etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL. If applicable/required, all boiler, piping layout drawings received from BHEL for pipeline erection to be submitted to Boiler Inspector for approval. After approval of the above drawing, Erection of pressure parts, pipe line to be started

10.16 All necessary certificates and licenses, permits & clearances to carry out this work from the respective IBR authorities/statutory/ local authorities/ Electrical Inspectorate are to be arranged by the Contractor at his cost in time to ensure smooth progress of work and render all assistance, service required in this regard.

10.17 All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully pay-able under the provisions of the Indian Boiler Regulations and any other statutory laws and its amendments from time to time during erection in respect of the plant equipment ultimately to be owned by the customer, shall be to the account of the customer. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor, the additional fees for such inspection and/or registration shall be borne by the Contractor. Inspection fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in (Vol I BCD)) shall be paid by BHEL.

10.18 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.

10.19 Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.

10.20 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.

10.21 On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

10.22 The intent of specification is to provide services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the Contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

10.23 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Contractor and his personnel shall cooperate with personnel of BHEL, BHEL'S Customer, Customer's consultants and other Contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.

10.24 Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.

10.25 The work shall confirm to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to Contractor's fault, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL as per GCC.

10.26 The Contractor shall perform any services, tests etc. which may not be specified but nevertheless, required for the completion of work within quoted rates.

10.27 The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.

10.28 BHEL reserves right to recover from the Contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to Contractor's lapse during any stage of work. Any loss to BHEL due to Contractor's lapse shall have to be made good by the Contractor as per GCC.

10.29 All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables etc, except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by Contractor unless otherwise specified in the relevant clauses. The Contractor's quoted rates should be inclusive of all such contingencies.

10.30 During the course of Erection and commissioning certain rework / modification / rectification / repair / fabrication etc may become necessary on account of feedback / revision of drawing etc. This will also include modifications / re-works suggested by BHEL / Customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc shall be maintained by the Contractor for such reworks. Claim of Contractor if any, for such works will be governed by relevant clauses of 'General Conditions of Contract'.

10.31 All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of structures, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering,

filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc. as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the Contractor as part of the work within the quoted rates.

10.32 The Contractor shall take delivery of the components, equipments, chemicals, and lubricants etc. from the BHEL stores/ storage area after getting the approval of BHEL Engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipments after usage shall be submitted to the BHEL and reconciled periodically

10.33 Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as incidental to work.

No claim for extra payment for such work will be entertained.

10.34 Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc. The details of equipments to be erected under this contract are generally as per the schedule given in relevant appendices. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

10.35 Hangers & suspensions, supports etc for tubes, piping, & ducts etc will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required with in the quoted cost.

10.36 Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.

10.37 Layout of field routed, fine fittings, boiler trim piping, oil system and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. As such, layout of small bore piping in boiler and oil system shall be done as per the site requirement. Necessary sketch for routing these lines shall be prepared and got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

10.38 Erection and Welding of necessary instrumentation tapping points, thermowell, thermocouple pad, metal temp pad and clamps, root valve, condensing vessel, flow

metering & measurement devices, and control valves to be provided on boiler & its auxiliaries and piping are covered within the scope of this specification. The installation of all the above items will be Contractor's responsibility even if:

a) Items are not specifically indicated under the respective product groups as given in the technical specifications.
b) Items are supplied by an agency other than BHEL.

Pre-heating, NDE, and Post weld heat treatment for above shall be done as per the specifications as part of work.

10.39 Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc are received in assembled condition as integral part of equipments. Contractor shall dismount such instruments for calibration and hand over the same to BHEL. C & I erection agency will do storage / re-erection calibration etc.

10.40 Fixing and seal welding of thermowells & plugs before Hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermowells after hydro test/steam blowing of lines as part of work.

10.41 Actuators/drives of valves, dampers, gates, powered vanes etc may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work. Assistance for calibrating / testing the power cylinders / valves, gauges, instruments, etc. and setting to actuators coming under various groups shall be provided by contractor within the quoted rates.

10.42 All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. BHEL will provide the motorized insulation testers.

10.43 In installation of various equipments it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials. Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipments to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements will be provided by BHEL on free -returnable basis which shall be returned to BHEL after the use.

10.44 The work shall be carried out strictly in accordance to the "Field Quality Plan" approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.

10.45 Interconnection/ hookup, if any, with the existing system shall form part of work. Such interconnections, hookups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with

enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

10.46 Contractor shall regulate flow of material to and from site in such a manner and sequence that material accumulation at site does not lead to congestion at site. In case it is necessary to shift and restack the materials kept at work areas / site to enable other agencies to carry out their work or further any other reason, it shall be done by the Contractor most expeditiously. No claim for extra payment for such work will be entertained.

10.47 It may so happen that certain components like manhole doors, hanger etc may be supplied in loose items. They need to be assembled as per relevant drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.

10.48 The Contractor shall have total responsibility for all equipment and materials in his custody at Contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

10.49 BHEL is operating web based computerized E-store system that includes, inter-alia, issue of materials, daily progress reporting, Contractor's running monthly billing and material reconciliation through a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work.

10.50 In the event the computerized E-store/SOMS is inoperative for any reasons, the Contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the E-store/SOMS as and when the E-store/SOMS is reactivated/ normalized.

10.51 Gases like argon, oxygen, acetylene etc that are required for erection related activities shall be arranged by the Contractor at his cost. For T-91 material site weld joints argon as per grade-3 of is 5760: 1998 with oxygen and water vapour restricted to max 6 ppm each and with argon purity level of minimum 99.99% shall be arranged and used by the Contractor. The supply should accompany test certificate for the batch indicating individual element 'ppm' level and overall purity level.

10.52 It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement. Nitrogen gas, if required, for preservation of boiler and nitrogen capping during chemical cleaning process, will be provided by BHEL free of charge. Contractor shall arrange necessary connector, nipple, regulator, header and piping for usage of such gas from cylinders.

10.53 All lubricants and chemicals required for testing, preservation, chemical cleaning / acid cleaning, oil flushing, and the lubricants for trial runs of the equipments and trial operation of the unit will be supplied by BHEL free of charges.

10.54 It is not the intent to specify herein all details of all material. Any item related this work not covered by this but necessary to complete the system will be deemed to have been included in the scope of the work.

10.55 Site testing wherever required shall be carried out for all items / materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.

10.56 The contractor shall carryout additional tests if any, which the Engineer feels necessary because of site conditions and also to meet system specification

10.57 The work shall be executed under the usual conditions without affecting power plant construction / operation and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

10.58 All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

10.59 Wherever Construction sequences are furnished by BHEL, the contractor shall follow the same sequence.

10.60 Contractor shall, transport all materials to site and unload at site / working area for inspection and checking. All material handling equipment required shall be arranged by the contractor.

10.61 Contractor shall retain all T&P / Testing instrument / Material handling equipment's etc. at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from engineer in charge. The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.

10.62 The consumables (welding electrodes, special T&Ps etc), commissioning spares and erection material spares released in PG-MA XX-991, XX-992, XX-993, XX-988, XX-997 and other similar items are not billable. However, certain spare items when actually erected as a part of permanent equipment shall be paid as per agreed payment terms as applicable. The decision of BHEL Engineer in this regards shall be final and binding on contractor.

10.63 Effluent has to be disposed off safely from neutralizing pit to a safe area as per instruction of BHEL Engineer. Neutralisation pit for EDTA cleaning/Acid cleaning is to be made by the Contractor. After completion of job pit has to be dismantled and area is to be levelled before handing over of area to owner. The pit size shall be approx. 30x30x1.5m, however it shall suitably decide jointly at site as per site requirement. Cost incurred in construction of neutralization pit shall be borne by the contractor.

10.64 Contractor has to work in close co-ordination with other agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and Construction program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

10.65 Contractor shall remove all scrap materials periodically generated from his working area and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect.

10.66 The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer in- Charge.

10.67 Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and levelled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

10.68 It is the responsibility of the contractor to do the checking, testing etc. if necessary, repeatedly to satisfy BHEL Engineer with all the necessary tools and tackles, manpower etc. without any extra cost. The testing will be completed only when jointly certified so, by the BHEL Engineer/its agency.

10.69 The contractor's work shall not hinder other work, either underground or over ground, such as electrical, phone lines, water or sewage lines, etc. In areas of overlap, the contractor shall work in coordination with other related contractors.

10.70 Any damage by the landscape contractor's team to such utilities will be penalized and contractor shall be responsible for cost for such damages.

10.71 Contractor at his cost shall lay all necessary temporary piping including cutting and edge preparation, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

10.72 SITE INSPECTION

10.72.1 The owner / employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.

10.72.2 BHEL / Customer will have full power and authority to inspect the works at any time, either on the site or at the contractor's premises. The contractor shall arrange every facility and assistance to carry out such inspection. On no account will the contractor be allowed to proceed with work of any type unless such work has been inspected and entries are made in the site inspection register by customer / BHEL.

10.72.3 Wherever the performance of work by the contractor is not satisfactory in respect of workmanship, deployment of sufficient labour or equipment, delay in execution of work or

any other matter, BHEL shall have the right to engage labour at normal ruling rates and get the work executed through other agency and debit the cost to the contractor and the contractor shall have no right to claim compensation thereof. In such a case, BHEL shall have the right to utilize the materials and tools brought by the contractors for the same work

10.73 UTILITY POINTS

10.73.1 Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N2) etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by site engineer and shall route the piping to these points as per site conditions, and shall submit as built layout with 'BILL OF MATERIAL' to BHEL for approval.

10.73.2 The utility points shall be located at convenient point to handle and to be terminated with brass / bronze valve with suitable connection for hose pipe.

10.74 DOCUMENTATION

10.74.1 Contractor shall be supplied with two extra copies of the layout & isometrics drawings. Contractor to incorporate in one of the copy with Red ink all the changes / deviations / alterations etc. carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

10.74.2 After successful completion, testing and commissioning of installation work, as built drawings / documents if any, in line with the actual work carried out as per site routing drawing shall be submitted by the contractor as agreed for the project.

10.74.3 The contractor shall maintain a record in the form as prescribed by BHEL for all operations carried out on each weld and maintain a record indicating the number of welds, the name of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejections if any, percentage of rejection, etc. and submit copies of the same to the BHEL Engineer as required.

10.74.4 Other documents as specified in of Chapter – XI of Technical Conditions of Contract.

10.75 AS BUILT DRAWING:

After successful completion, testing and commissioning of installation work, Purchaser's drawings / documents shall be updated in line with the actual work carried out and as built drawings / documents shall be submitted by the contractor as agreed for the project. Contractor shall be supplied with one extra copies of the layout & isometrics drawings. Contractor to incorporate in one of the copy with red ink all the changes / deviations / alterations etc., Carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

10.76 PLATFORMS, CROSSOVERS & CANOPIES

Platforms, ladders, crossovers and canopies shall also be provided at places where it has not been shown in drawings but if felt necessary by site engineer.

Contractor has to fabricate and install canopies for all outdoor pumps and motors, actuators, lub oil units, control valves and at places as instructed by BHEL Engineer etc. Platforms, ladders, crossovers and canopies shall have to be fabricated from raw materials supplied by BHEL and erected by contractor as per instruction of BHEL and shall be paid as per accepted tonnage rate for "structures" i.e, Rate schedule Id. (1A)

10.77 Fin /attachment/scallop plates & associated items Cutting , restoration of Tubes, panels of Boiler

During course of erection in boiler pressure parts fin/attachment/scallop plates & associated items cutting to align difference tubes, panels will be required in boilers and this type of activity will be treated as normal scope of work without any commercial implication on BHEL. Even activity may have to be repeated as per job/Site requirement and for this also no extra work payment will be given to vendors as this type of job will be treated as normal scope of work.

10.78 Buck Stay Checking & Rectification

Vendor has to carry out inspection, rectification, Cleaning of buck stays along with adjoin areas during erection, commissioning, Operation, trial run has to be done from time to time. Buckstay corner link correction after initial erection has to be done and if changes noticed during operation of Unit has to be rectified. For this vendor has to arrange manpower and resources without any extra cost implication on BHEL treating it as normal scope of work. Any surrounding work in connection with inspection, rectification, cleaning of the same will be treated as normal scope of work.

10.79 Inspection, cleaning of pressure parts, Furnace, Pent House ,Burners ,ducts/and subsequent restoration, rectification, normalization.

During erection, pre-commissioning, commissioning, operation ,Stabilisation period trial Run - Inspection, cleaning of pressure parts, Furnace, Burners ,Pent House ,ducts, hoppers, and allied areas are to be carried out. For this vendor has to arrange manpower, T&P, other resources for inspection , cleaning of ash /oil shoots , coal rejects /clinkers and other foreign materials ,associated items from boiler, & surrounding areas. For this installation of sky climbers, scaffoldings and other requirement/resources/consumables as required are to be arranged by vendors for inspection, cleaning, testing followed by restoration/rectification/normalization. Vendor has to repeat this type of activity no. of times till handing over Unit to customer without any cost implication on BHEL treating this types of jobs as normal cope of vendor's work.

10.80 Statutory approval for Lifts, hoists, Cranes

Necessary approval for drawings, documents, Load Testing, license of hoists, EOT, Boiler lifts, Misc cranes like FANs, Mills ,Compressor House, different buildings erected by bidders has to be arranged for getting statutory fitness certificates ,drawings/documents from Statutory agency/Third party inspectors without any extra commercial implication on BHEL treating as normal scope of work.

Contractor has to arrange sufficient manpower (fitters, electricians with supporting helpers) and T&P /other resources with sufficient testing instruments, IMTE/MMD for erection and commissioning of these systems without any extra commercial implication on BHEL treating as normal scope of work. D.S.L / equivalent system for hoisting equipments are also to be erected and commissioned within the quoted rates.

Weight/loads required for load test of hoists shall be provided by BHEL free of cost.

10.81 Mill Reject Handling Systems (MRHS)

Erection, Testing& Commissioning of MRHS is to be included in Boiler agency's scope. BHEL will arrange supervision of Erection, Commissioning activities of MRHS & for this supervision of OEM Engineers/Supervisors will be arranged by BHEL from time to time free of cost. Mill reject Disposal till establishment in manual mode is to be done by boiler agencies till handing over to customer. For this vendor has to keep manpower, tractors, trailers of suitable capacity to dispose mill rejects, foreign materials till handing over of Unit to Customer. This is treated as normal scope of work without any cost implication to BHEL.

Silo Fabrication of approx. 60 MT is in agency scope. Approx. Silo dimension: Dia: 5 Mtr, Cylinder Ht.: 4.60 Mtr and Cone Ht 4.1 Mtr. inclduing SS lining. Material for silo fabrication shall be supplied by BHEL free of Cost. Payment against Fabrication and Erection of Silo shall be made as per item mention in BOQ.

All the GA and Fabrication drawing will provided by BHEL PEM at latter stage.

10.82 LDO Strainers, LDO Cleaning, LDO Pumps Commissioning/ servicing / Rectification

LDO Strainers, LDO Guns cleaning, LDO Pumps and associated items servicing, rectification, commissioning in LDO Pump house & in Boiler are to be done by Boiler vendor. Vendor has to arrange the scaffolding , Consumables, Diesel, petrol, Cleaning agents ,tools, T&Ps for these purposes. For carrying out above activities, draining, cleaning of LDO from Pumps, Strainers and associated items are to be done and contaminated LDO is/are to be collected in drums/containers/dirty oil tanks and for this vendors has to arrange facilities for disposal of the same. Emptying of dirty oil tank/drums/containers, cleaning and disposal of contaminated oil is in boiler vendor's scope. Extra pumps for disposal of contaminated LDO are to be arranged by boiler vendors. All above activities are required to be repeated in no.

of occasions till handing over of Unit(s) and are treated as normal scope of work without any extra commercial implications on BHEL.

10.83 Support for Handing Over of T&P, spares to BHEL/Customer, diversion to other BHEL Sites/Units

Vendor will assist in handing over of Special T&Ps for Erection/commissioning which were issued to them free of charge for returning to BHEL /Customer store.

10.84 Dewatering

Dewatering of Low Lying areas like lift pits ,Boiler working areas, other low lying areas (as per scope applicability) till handing over to customer is in bidders scope for which vendor has to arrange and maintain adequate no. of Diesel & electrical pumps of suitable capacities, operators, necessary manpower with sufficient quantity of suction & discharges hoses, pipes, Clamps, cables, Electrical panels/starters, diesel, consumables without any extra commercial implication on BHEL treating as normal scope of work. Dewatering pumps will be required to run to ensure job progress is not hampered & if required pumps are to be run on round the clock basis on working days & holidays, Sundays.

10.85 Housekeeping/Area Cleaning

The contractor has to do area cleaning on every date on daily basis. Noncompliance of the above cleaning shall call for penal recovery of Rs.2000.00 on each instance and at the same time, cleaning of the area shall be done by BHEL at the risk and cost of the contractor. No excuses on this above account shall be entertained by BHEL on whatsoever account.
Contractor shall engage separate gangs throughout the contract period, exclusively for proper housekeeping of the site. The contractor has to make necessary arrangements for collection and for bringing down the scrap from all locations and taking them away from the erection areas to various locations as indicated by BHEL Engineer. The house keeping must be a routine and continuous activity. in the various work fronts.

10.86 Approach platforms, fixtures

Steel items like angles, scaffoldings for erection of bracings, Tie beams are to be arranged by vendor for structural erection treating it as normal scope of work without any cost implication on BHEL.

10.87 Assistance during commissioning of panels, Equipment, system, actuators for valves (motor operated/pneumatic), gates, dampers

Agency has to give assistance for commissioning during initial period and subsequently during unit operation during stabilization period/trial run/PG Test. For this purpose items erected by agency has to provide manpower, other resources, diesel, other consumables, scaffoldings, Other T&Ps as required from time to time. These types activities will be repetitive in natures for no. of times and in cases dismantling, reinstallation of items/parts has also to be done till handing over of unit to customer. During case of dismantling /reinstallation logistic supports like Tyre mounted crane/Crawler

Crane/crane/truck/trailers as applicable including manpower are to be arranged by vendor. These types of activity is treated as vendor's normal scope of work without any extra commercial implication on BHEL.

10.88 Sky Climber

Agency has to supply, erection, commissioning, maintenance, shifting, resifting of sky climbers as per site requirement. Taking statutory fitness certificates from Statutory Authorities/Third Party Inspectors as per requirement from time to time lies with boiler vendor. Contractor shall take back the sky climber after completion of works as per instruction of BHEL Engineer.

10.89 All relevant provisions/responsibilities of contractors as mentioned in any of the chapter of this specification (same or different chapter) shall also be applicable, mutatis-mutandis, to any other chapter of this specification.

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

11.1 Refer forms F -14 to F-18 of volume I D (Forms & Procedure) of volume - I BCD. Plan and review will be done as per the formats.

11.2 The progress reports shall indicate the progress achieved against plan, indicating reasons for delays, if any. The report shall also give remedial actions which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original plan the slippages do not accumulate and affect the overall programme.

11.3 It is the responsibility of the contractor to provide all relevant information on a regular basis regarding progress of work, labour availability, equipment deployment, testing, etc.

11.4 Contractor is required to draw mutually agreed monthly work programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

11.5 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

11.6 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer. The periodicity of the reports will be decided by BHEL Engineer at site.

11.7 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

11.8 The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard.

11.9 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

11.10 The monthly report as a booklet shall be submitted at the end of every month and shall contain the following details :-

a) Progress photographs in colour.
b) Erection progress in terms of tonnage, welding joints, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.
c) Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan.
d) Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas cutters, electricians, crane operators and helpers. Data shall be split up under the work areas like Boiler (pressure parts, structures), Auxiliary boiler, Rotating machines, Electro static precipitator, Bunker structure etc.

e) Consumables report giving consumption of all types of gases and electrodes during the previous month.
f) Availability report of cranes.
g) Safety implementation report in the format.
h) Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

12 PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENT OF BOILER , & AUXILIARIES

12.1 Building foundations and other necessary civil works for supporting structures, equipments etc will be provided by BHEL / Customer . The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits have to be checked and logged by the Contractor. The permanent benchmark / reference marks will have to be transferred to new locations with sufficient care to maintain the accuracy and protected / preserved with adequate care (to enable rechecking at later dates) as per BHEL instruction.

12.2 Minor adjustment of foundation level, dressing and chipping of foundation surfaces and blue-matching (wherever required) for of all equipments as per BHEL Engineers instructions, should be done by the Contractor as part of the work. Contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations up-to **30 mm** for achieving proper levels will be within the scope of work/specification.

12.3 All temporary foundations and anchor points required for installing erection Equipments and winches, foundations for pumps, tanks etc are in the scope of Contractor. All building materials like cement, steel including re-enforcement bars, grits cements etc for such temporary foundations shall have to be arranged by the Contractor within the quoted rates. All such foundations shall be demolished and normal ground conditions restored after the usage.

12.4 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection.
Foundation pockets are to be cleaned thoroughly before placing the supports / columns / equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. If required cleaning of the threads to be done with proper dies.

12.5 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment. Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc., shall also be blue matched by Prussian Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineer's instructions.

12.6 All temporary foundations and anchor points required for installing erection Equipments and winches, foundations for pumps, tanks etc are in the scope of Contractor. All building materials like cement, steel including re-enforcement bars, grits cements etc for such temporary foundations shall have to be arranged by the Contractor within the quoted rates. All such foundations shall be demolished and normal ground conditions restored after the usage.

12.7 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments / equipments based on the foundations including shear lug provisions / openings.

12.8 Neutralisation pit for EDTA cleaning is made by the Boiler U#1 agency and same shall be used for Boiler Unit #2 also. After completion of job pit has to be dismantled and area is to be leveled before handing over of area to owner . Pit Size shall be approx. 30x30x1.5m. (Dismantling of EDTA pit is in the U#2 boiler erection agency scope).

12.9 Effluent has to be disposed off safely from neutralizing pit to a safe area as per instruction of BHEL Engineer.

12.10 Contractor shall carry out scrapping and blue matching of embedded plates/ packers of rotating equipments. Chipping and the leveling of concrete surfaces, fine dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of this work. Scrapping, chipping and matching shall be done so as to achieve prescribed percentage of contact between the two surfaces.

12.11 BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting / chiseling / grinding and de-burr the same. However, machining of the packers wherever necessary, shall be arranged by contractor.

12.12 Complete grouting of structures equipments, including anchor/ foundation bolts, beneath base, base hollows etc, as may be applicable, is included in the scope of Contractor. Arranging all labour, building materials including cement, ordinary portland as well as quick setting – free flow - non-shrink grout mix (e.g. conbextra GP-1/GP-2), form work, shuttering, and any other requirements is in the Contractor's scope. Contractor shall obtain approval of BHEL for cement (Ordinary Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use. Cleaning of foundation surfaces, pocket holes and anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods are within the scope of this specification/ work.

12.13 After the grouting has finally set and cured, alignment of equipments involved shall be checked again to verify for any disturbance or any other reason. If required, de-coupling of equipments has to be done for conducting the verification. In case any disturbance is noticed the cause, if any, shall be removed and re-alignment done as part of work.

12.14 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment. Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc., shall also be blue matched by Prussian Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineer's instructions.

12.15 Total grouting of the columns / equipments including pocket grouting, grouting at the gap between foundation and base plates top surface of column / equipments is in the scope of the contractor. All the grouting should be carried out by non-shrink cement like conbextra GP-1 / Conbextra GP-2 / Shrinkkomp or its equivalent etc. This special nonshrink cement shall be arranged by the contractor at his cost. The quoted rate shall be inclusive of the same.

12.16 All equipment bases and structural steel bases and foundations pockets shall be grouted and finished as per these specifications after surface preparation unless otherwise recommended by the equipment manufacturers. The surface preparation includes soda washing of the foundations to remove oil, grease etc. to ensure proper grouting.

12.17 The certificates of the grout are to be submitted to BHEL. If necessary test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc. to be arranged by the contractor including the fine aggregates.

12.18 All the materials required for grouting including special cements as approved by BHEL and other materials like Portland cement, sand chips, gravel etc., are to be arranged by the contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.

12.19 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / sheets at site by the contractor to meet site requirement. However machining of the packers, wherever necessary, will be arranged by BHEL at free of cost.

12.20 **PROCEDURE FOR GROUTING:** Contractor has to carry out the grouting as per the work instructions for grouting available at site or the grouting is to be carried out as per the supplier's recommendation / IS standard. Copy of those recommendations is to be submitted to BHEL for records.

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

13.1 Loading at BHEL / Customer stores and storage yard, transport to site, unloading at site / working area of equipment, placement on respective foundation / location, pre-assembly bay or at working area are in the scope of work. The scope includes taking materials / Equipments from customer stores / storage yard also. Contractors Quoted / Accepted rate shall be inclusive of the same. Required cranes, tractors, trailer or trucks/ slings/ tools and tackles / labour including operators, fuel, lubricants etc. for loading & unloading of materials will be in the scope of contractor.

13.2 The storage yard is located outside the Main Plant Boundary, in more than one location, at a distance of approximately 10 KM from the erection site.

13.3 Transportation of all items including ODC items from BHEL Store/Yard to Erection site shall be in the contractors scope. However, in some cases, consignments including ODC may be unloaded near erection site as per space availability and site requirements.

13.4 Loading at storage yard and transporting to site, unloading at site / pre assembly area or at working area, is in the scope of work. Required cranes for loading & unloading of materials, trailer shall be in the scope of contractor. The contractor shall provide any fixtures, concrete blocks & wooden sleepers, sandbags which are required for temporary supporting of the components at site.

13.5 The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection / location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage / loss of such equipment at site.

13.6 Contractor shall plan and transport equipments, components from storage yard to erection site in such a manner and sequence that material accumulation at site does not lead to congestion at site of work.

13.7 The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.

13.8 Sometimes it may become necessary for the contractor to handle certain unrequited components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

13.9 Contractor shall plan and transport equipments, components from storage yard to erection site in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. However, in specific cases **"as a special case to expedite the job"** the consignment received at BHEL stores can directly be diverted to the work site, as decided by BHEL, following issuance procedure of BHEL. Such direct issues shall be as per the Challan/dispatch document/LR received with the consignment. In such cases, contractor shall do unloading of materials from trucks/lorry at their own cost.

13.10 All materials issued by BHEL shall be stacked neatly, preserved, stored in the contractor's shed / work area above ground level by use of concrete or wooden sleepers. No materials shall remain on ground at any time. All concrete or wooden sleepers required for stacking

the materials shall be arranged by contractor at his own cost within the quoted rates. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.

13.11 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.

13.12 The contractor shall take care of material issued by BHEL and shall protect the same from damage and weathering. The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered. Contractor has to arrange required fire proof tarpaulins to protect the machined components / assembled parts drawn from BHEL store before and after erection as required at their cost.

13.13 The contractor shall take all such measures as may be reasonably necessary to ensure that its arrangements and those of its sub-contractors with respect to the transport of Goods, Materials and Labour to the site do not interfere with local traffic in the vicinity of the site and where such interference is unavoidable shall make such special arrangements as may be reasonably required to minimize the effect of such interference.

13.14 The contractor shall take all such measures as may be reasonably necessary to ensure that its arrangements and those of its sub-contractors with respect to the transport of Goods, Materials and Labour to the site do not interfere with local traffic in the vicinity of the site and where such interference is unavoidable shall make such special arrangements as may be reasonably required to minimize the effect of such interference.

13.15 The contractor shall in no case be entitled for any compensation on account of any delay in supply or non-supply thereof for all or any such materials. However in case of non-availability of any specific materials which delays the completion of work, such cases shall be recorded separately in monthly planning format (F 14) and shall be considered for time extension of contract.

13.16 The contractor shall solely be responsible for the safety & security of material after it is handed over and issued to contractor by the BHEL. BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.

13.17 Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day-to-day update of materials, issued to contractor, accounting for surplus/scrap material returned etc. These functions shall also be carried out through computerized system utilizing suitable software. Contractor shall engage experienced software personnel to associate on dedicated basis for efficient discharge of the same in time.

13.18 Open land for storage purposes shall be provided by BHEL on free of cost/as available basis. Temporary barbed wire fencing, as required, of the open storage yard is to be done by the contractor and is included under the scope of his work. Contractor shall also remove grass, bushes, trees etc wherever required off the land provided to him and shall make proper continuous up keeping of the open yard /land by removing grass, bushes trees etc and same is included under the scope of his work & No extra payment shall be made to the contractor in this regard. The bidder shall make complete arrangement of necessary security personnel's to safeguard all such materials in his custody. The contractor shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering. In

case, loss of any materials for whatsoever reasons attributable to the contractor, then cost of such materials shall be recovered from the running bill payment with applicable overheads.

13.19 All surplus materials shall be returned to BHEL store. All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be returned to the stores on weighment basis in consultation with BHEL Engineer and a receipt obtained for material accounting purposes. Scrap materials shall be sorted section-wise and returned separately at a place directed by BHEL Engineer within the project area. Return of such materials will not be entitled for any handling and incidental charges.

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

14.1 Erection

14.1.1 The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision/clarification of BHEL engineer will have to be followed.

14.1.2 In case of any class of work for which there is no such specifications as laid down in the contract such as blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.

14.1.3 The contractor is strictly prohibited in using any of the Boiler components like angles, channels, hand-rails for any temporary supporting or scaffolding work. In case of such misuse, a sum as determined by BHEL shall be recovered from contractor's bills. Also the contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be effected for such excess drawls at the rate prescribed by manufacturing units.

14.1.4 Any fixtures, scaffolding materials, approach ladders, concrete block supports, steel structures required for temporary supporting, pre assembly, checking, welding, lifting & handling during pre-assembly and erection shall be arranged by the contractor at his cost.

14.1.5 The temporary structures/ items welded to permanent members/pipes are to be cut and removed without any damage. Any damage so to permanent members/ pipes to be made good by the contractor at his cost.

14.1.6 In the case of structural members / ducts in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connect the joints at no extra cost.

14.1.7 Fine fittings and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

14.1.8 All welded joints should be painted with anti-corrosive paint, once NDE works are over.

14.1.9 All welded joints shall be subjected to acceptance by BHEL Engineer.

14.1.10 Work such as minor rectification of foundation bolts, reaming of holes, drilling of

dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.

14.1.11 All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope. No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc

14.1.12 Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.

14.1.13 In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.

14.1.14 Wherever elbows of 45 deg. or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used as per BHEl engineer nstruction. No extra cost shall be paid.

14.1.15 Erection of flow switches, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL/Customer stores, transportation to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

14.1.16 Contractor shall also weld small length of piping with root valve to the pressure, flow and level tapping points on piping or flow nozzles/orifices/ metering elements fixed on piping as per the instructions of BHEL Engineer.

14.1.17 Welding of all thermo wells, draft, pressure and temperature instrumentation points and all other instrumentation points on piping and auxiliaries and welding of thermocouple pads for permanent system as well as for performance guarantee test is in the scope of work.

14.1.18 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.

14.1.19 Wherever hanger and support materials are not received from manufacturing unit in time to suit the erection schedule, contractor shall erect the system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials available at site. The same shall be removed and returned to BHEL store after erection of permanent supports.

14.1.20 Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive is within the quoted / accepted rate.

14.1.21 All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints and other components as per instruction of BHEL Engineer during erection within the quoted rate.

14.1.22 Contractor shall cut / open works if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning, opening of valves, changing of gaskets, attending to leakages, minor modification, and rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower with T & Ps in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning, the same has to be rectified by the contractor at his cost.

14.1.23 Contractor shall engage separate gangs throughout the contract period, exclusively for proper housekeeping of the site. The contractor has to make necessary arrangements for collection and for bringing down the scrap from all locations and taking them away from the erection areas to various locations as indicated by BHEL Engineer. The house keeping must be a routine and continuous activity.

14.1.24 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up painting required to be done on any equipment or part during the course of erection will have to be done by the contractor.

14.1.25 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be removed / attended as per BHEL engineer.

14.1.26 Field Quality Assurance Formats:-It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL and customer as token of their acceptance. Payment to the contractor will be linked with the submission of these FQA log sheets.

14.1.27 All test require as per FQP (Field Quality Plan) will be in bidders scope. FQP shall be provided during execution time.

14.2 ERECTION OF BOILER & ITS AUXILIARIES AND ROTATING MACHINES

14.2.1 Brief list of System / sub-system to be erected by the contractor & approximate weight of individual PGMA's and number of welding joints mentioned in this Tender Specification are meant for giving general idea to the tenderer only about magnitude of the work involved. This should not be taken for billing or any other claims. All weights for such purposes will have to be taken from design documents only (shipping list).This section also gives general idea about various components to be erected with

expected accuracy level. However the contractor shall get the correct details from the engineer to avoid mistakes and rework.

14.2.2 Preparation of preassembly bed is very much essential for preassembly of MBLs, columns, ceiling girders, panels, coils etc. on consolidated ground and to avoid sagging and shrinking the temporary supports are to be provided. The preassembled component should have minimum three supports to avoid sagging.

14.2.3 The column and girder pieces are to be measured individually to check for camber, sweep etc. The level markings on the columns to be checked before erection. The verticality stickers are to be fixed over individual column pieces on both the flanges (90 degree apart in two places). Arranging these stickers shall be done by the contractor.

14.2.4 Tier by tier erection method is to be followed. Columns are to be tied up with horizontal and diagonal bracing in each tier before proceeding to next level. Log sheets are to be maintained in line with log sheets which are available with BHEL. After grouting the first tier columns, second tier erection is to be taken up. Adequate curing of the grout is to be ensured. Verticality of the columns is to be ensured either by plumb bob or theodolite. The tolerance shall be as indicated in BHEL's erection drawings. Care should be taken while erecting the vertical and diagonal bracings to maintain the work points as per drawing. Necessary lubricant for the girder pin assembly should be applied as per drawing within the quoted rates.

14.2.5 The following measuring and test equipments with proper calibration certificates are to be made available by the contractor before taking up the structural and other pressure parts erection. Steel tapes minimum 5M,30M in sufficient numbers, torque wrench 650-1000 ft pounds, bolt tension calibrator, torque wrench with calibration, temperature recorder, two theodolite with one second accuracy etc. Periodic calibration of the measuring instruments is to be done once in six months and certificate for the same to be submitted to BHEL for records.

14.2.6 Detailed procedure available with BHEL site office should be collected before taking up the job by the contractor for preassembly of ceiling girders. **Each ceiling girder will be supplied in only 2 pieces (Top & Bottom). For reference drawing attached. Bolting is to be carried out be contractor. The heaviest assembled ceiling girder including girder pin will be around 160 MT approx. and maximum elevation of ceiling girder bottom is 85.270 mtr. Depth of ceiling girder is 7.0 mtr. And length of ceiling girder is 29.910 mtr.**

a. **Total No. of Ceiling Girders: 5 Nos**
b. **During preassembly at ground, Seal weld may be required at Girder split splice location for ensuring stability and alignment.**
c. **Blue match on Girder Splice plates to be done.**
d. **Structural Framework and other preparatory works for ceiling girder pre assembly are to be done.**
e. **Suitable equipment for splice bolt hole reaming (only by mechanical means not by heat) and bolt tightener are to be used. The expected bolt size is M24 Grade 8.8 / M30 Grade 10.9 / M36 Grade 10.9.**
f. **Ceiling girder will be supplied with lifting lugs as per existing practice.**

14.2.7 Camber, sweep and twist are to be checked. The tolerances for individual piece camber

and sweep, individual length, level of girder assembly, flatness of the web, out of squareness of assembly, overall length of the assembly etc. to be ensured before taking up the job. Major deviation if any observed should be intimated to BHEL for getting the resolution before proceeding further.

14.2.8 Suitable crane to be used for handling / lifting the ceiling girder will be provided by BHEL. Leveled area will be provided by BHEL for erection. However, backfilling and consolidation, if required, shall be carried out by the contractor, at no extra cost. Necessary plates/sleepers required for marching and operation shall be provided by the BHEL for BHEL owned/deployed cranes. Positioning of the crane is to be decided in consultation with BHEL.

14.2.9 The erection of the welded beams, rolled beams, boiler roof frame assembly etc. to be taken up along with ceiling girders immediately as the crane moves from first girder to the last. The silencers of various safety valves also to be erected in the respective bays. The completion of the roof sheeting should follow to create a comfortable working space in the boiler cavity giving protection to all work men from rains and sun. It is expected that the contractor will complete the same before drum lifting/pressure parts erection. The materials for boiler roofing and side cladding etc. will be supplied by BHEL and contractor has to erect the same at the quoted /accepted tonnage rate.

14.2.10 The tightening procedures for HSFG bolts are to be obtained from BHEL at site before taking up the work. Normally it is done by turn of nut method. Torque wrenches also can be used .The bolted joints will be checked jointly by BHEL/Customer engineers for required tightness and retightening is to be done as per requirement. The tightened bolts will be marked with colour paints. Facility for random checking by torque wrench will have to be done. The required calibrated torque wrench will be provided by the contractor.

14.2.11 Some platform materials in PG-36 and PG-38, approach ladders, suspension materials etc. will be supplied in running meters. The contractor has to fabricate these materials wherever they are supplied in running meters to the required size / shape, to be welded and erect them within the quoted rates.

14.2.12 It shall be the responsibility of the contractor to provide ladders on column for initial works till such time stairways are completed. For this the ladder should not be welded on the column and should be fabricated clamping type ladders. No temporary welding on any structural members is permitted except under special circumstances with the approval of BHEL. The necessary materials for the ladders are to be arranged by bidder within quoted rate. Any ladder supplied by the manufacturing unit for this purpose will be issued to contractor free of cost and the same is to be returned once the platforms are completed.

14.2.13 Scrap disposing chutes are to be provided by the contractor within the quoted rate at different areas like along the boiler main column, bunker structure and duct supporting structures. Material for the scrap chute will be provided by BHEL.

14.2.14 All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include

a) Machine / flame / electric cutting, grinding, welding, radiography and stress relieving.
b) Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, cleaning, checking, levelling, blue matching, aligning and assembly.
c) Machining, surface grinding, drilling, doweling, shaping.
d) Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication.

14.2.15 Certain adjustments in length of steel /pipe/tube members may be necessary while erecting high pressure pipelines of boiler and piping (pre-fabricated lines) and the contractor should remove the extra lengths to suit the final layout after preparing edges afresh and adopting specified heat treatment procedures at no extra cost, wherever indicated. Depending upon the type of deviation BHEL will consider the reimbursement at man hour rates.- If the drawing provides for erection allowance, then it becomes part of the work and no compensation is payable. The prepared edges in pressure parts shall be applied with wieldable primer as preservation and supply of the primer is in contractor scope.

14.2.16 Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection.(Walls with stiffeners in welded condition will be provided).

14.2.17 All the dampers, valves, lifting equipments, power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre-commissioning. The bearings of dampers shall be properly cleaned, serviced and lubricated before commissioning at no extra cost. Even after commissioning, if there are problems in the operation they have to be attended by the contractor during the tenure of the contract.

14.2.18 In case of any class of work for which there is no such specifications as laid down in the contract such us blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.

14.2.19 Spring suspensions / constant load hangers have to be pre-assembled and adjusted for the required loading and erected as per instructions, of BHEL Engineer. Any adjustments, removal of temporary arrestors / lockers, etc., have to be carried out as and when required at no extra cost to BHEL.

14.2.20 No temporary supports shall be welded on the pressure parts of piping. Welding of temporary supports, cleats, etc. on the boiler columns shall be avoided. In case of absolute necessity contractor shall take prior approval from BHEL Engineer. Further, any cutting or alternation of member of the structure of platform or other equipment shall not be done without specific prior approval of BHEL Engineer.

14.2.21 The contractor shall fabricate piping, install lube oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lube oil system, carry out the hydraulic test of oil coolers. etc.

14.2.22 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain a reliable and complete pipe installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and

provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. (Any machining or threading is involved will only be done by BHEL).

14.2.23 Normally the high pressure valves will have prepared edges for welding. But if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like "T" pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding. Edge preparation becomes the part of erection work. No extra payment shall be made for this.

14.2.24 All valves will have to be checked, cleaned, lapped or overhauled in full or in part before erection, after chemical cleaning and during commissioning as may be necessary. After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, over hauling, re-fixing as per BHEL Engineer's instructions is within the scope of work/specification. The contractor, at his own cost, shall arrange experienced technicians for the above work, including required consumables.

14.2.25 Adjustments like removal of ovalities in pipes and opening or closing the fabricated bends of all piping including high pressure piping to suit the layout shall be considered part of work and the contractor is required to carry out such work free of cost, as per instructions of BHEL, which shall include specific heat treatment procedures etc.,

14.2.26 Pipes are sent in standard length and will be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends up to NB 65 mm will have to be fabricated at site adopting specified heat treatment procedures, wherever required at no extra cost. Only cold cutting methods are to be employed for cutting of pipes and tubes irrespective of the size and material. Gas Cutting, if any, will be allowed only in CS LP piping as per instruction of BHEL Engineer.

14.2.27 **The enclosed welding schedule for Boiler in "Chapter-XXI Welding Schedule" is tentative and for reference only. The applicable welding schedules will be issued during erection of work at site.**

14.2.28 Attachment, welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., both for regular measurements and performance testing to be provided on boiler / its auxiliaries or pipelines covered with in scope of this tender, will also be the responsibility of the contractor and the same will be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be contractor's responsibility even if, (a) Product group (PG) under which these items are released are not covered in the scope of this tender, (b) Items are supplied by an agency other than BHEL if they are integral to the scope envisaged under this package. Payment will be regulated as per the agreed terms and conditions.

14.2.29 The contractor shall fabricate piping, install lub oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lub oil system, carry out the pressure test of oil coolers etc.,

14.2.30 All the tubes and pipes shall be cleaned and blown with compressed air and shown to the Engineer before lifting. Sponge ball test shall be carried out for all tubes before erecting the same. Bigger size pipes should be cleaned with flexible wire brush, wherever necessary. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.

14.2.31 All attachment welding including those for insulation and refractory work coming on the pressure parts shall have to be done by the contractor. The hooks are suitable for stud welding machines. Contractor's quoted rate shall include all these contingencies. Attachment welding on pressure parts shall be done by qualified and certified welders only. Welding of Insulation hooks at site shall be welded on the fins by manual welding / stud welding machines.

14.2.32 It is the responsibility of the contractor to do the alignment, checking, etc., if necessary, repeatedly to satisfy BHEL Engineer / customer Engineers with all the necessary tools and tackles manpower, etc., without any extra cost. The alignment will be complete only when jointly certified so, by the BHEL Engineer & customer. Also the contractor should ensure that the alignment is not disturbed afterwards.

14.2.33 Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before and after installation.

14.2.34 Fine fittings, boiler trim piping, oil system and other small bore piping have to be routed according to site conditions and hence shall be done only in position. As such, layout of small bore piping in boiler and oil system shall be done as per the site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

14.2.35 Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be assembled and erected by contractor. However, the contractor shall be paid for this work on accepted tonnage rate for erection of structures (Rate schedule identifier - 1A). The steel materials required for these works shall be supplied by BHEL free of cost and the contractor will have to install them to suit the requirement. Works of major nature not covered under this clause.

14.2.36 Complete penetration of water wall (Panel to panel) tube to tube and fins welding shall be achieved either by single side or double side welding. The decision of BHEL Engineer is final.

NOTE: The water wall/spiral wall panels will be supplied with fin cut to a length of 300 mm on ends for alignment and welding of tube to tube of panels at site.

The bidder may require to cut fins further to a maximum length of 1000 mm for alignment and welding of tube to tube in water wall/spiral wall panels and welding of

fins on both sides after completion of panel to panel welding within the quoted rate. No extra payment will be made for the above works.

14.2.37 Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.

14.2.38 Certain extra lengths of various tubes/pipes and fabricated ducts are provided as erection allowance and the same have to be cut/adjusted to suit the site conditions and layouts or certain small lengths may have to be added for adjustments to suit the site conditions. For any mismatch while matching the joints in tubes, the cutting, adjusting, re welding, addition spool pieces should be done by the contractor to match site conditions without any extra payment.

14.2.39 Assistance for calibrating / testing the power cylinders / valves, gauges, instruments, etc. and setting to actuators coming under various groups shall be provided by contractor within the quoted rates.

14.2.40 Hanger rods are shown in the pressure parts arrangement drawing for boiler. Any cutting / welding and required heat treatment and necessary NDT of such hanger rods will be done by the contractor. The hangers for pressure parts will be tested for even distribution of load with the help of torque wrench.

14.2.41 Skin casing sheet for covering the boiler roof panels, and other areas will be supplied as fabricated items. Any cutting and re-fabrication to suit the site conditions shall be carried out within the quoted rates.

14.2.42 For all the site routed piping as built drawings are to be submitted by the contractor immediately after erection. The Number of site welds indicated for site routed piping under the heading “Quantum of HP joints” is approximate. It is to be noted that piping for fine fittings, trim piping, oil system (PG 42) soot blower system shall be supplied mostly in running meters which will be erected and all joints are to be welded as per the drawings/site routing within the quoted rates by the bidder.

14.2.43 Hydraulic test of SCAPH has to be carried out on the ground before lifting it to the position.

14.2.44 Seal boxes should be reinforced with insulation pins as per drawing releases in attachment drawings and after that all seal boxes to be painted with bituminous paint of IS158 by the bidder. The required paint shall be supplied by the bidder within the quoted rate.

14.2.45 Grab Bars for accessing into the furnace area shall be provided in each seal box as per drawings.

14.2.46 **Heavy component lifting:** Before lifting the heavy components like header, panels, burner assemblies, down comer pipes etc. soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch. The end caps provided at shop for various stubs are to be removed during final fit up only.

1. While Lifting the headers lifting lugs or shell portion of the headers only to be used. The temporary supports to be removed prior to hydraulic test. While erecting the

temporary supports, care should be taken so that they do not affect the erection of permanent supports. Tack welding of suspension rods with bearing plates to be done after final adjustment. Details for welding of bearing plates can be referred in the drawings/check list.

2. Precautions to be used while erecting the collector channel supports.
   Equal loading of the hangers is to be ensured. Ring headers are erected before erection of water wall bottom hopper panels. Headers are to be arrested before welding to panels/headers/tubes/coils as the case may be. Sequence of welding to be followed while welding higher size joints.
3. Each water wall tube is provided with an orifice assembly in the bottom ring header. Orifice adopter is welded inside the header and welded at shop. After chemical cleaning operations, the orifice assemblies are to be erected at site as per directive of engineer and drawings.
4. Erection of various components is taken up from top to bottom. Planning has to be done every month in consultation with the engineer. Pre assembly of seal boxes for the peep hole openings, pressure tapping, soot blowers etc. can be done on the ground before erection, if feasible. The burner blocks are to be erected in convenient position before closing the furnace with panels. For panel to panel erection and welding panels erection attachments are supplied by units. Furnace alignment with respect to boiler /furnace axis is very vital and important. The alignment is to be achieved. Details to be checked with engineer.
5. The gaps between coils and steam cooled / WW panels /between coils etc. to be maintained in line with drawing. Please check up the permissible tolerance before taking up the work.
6. Preassembly of end bars with crown plates including stress relieving for coil assemblies.
7. Pump case / volute is welded with suction manifold in line with procedures available with site office.
8. The required accuracy level to be ensured before welding as per drawing. Necessary radiography/NDT along with heat treatment to be done.
9. CC pump motor installation is taken up only after completion of system pipe work supports. When mounted the pump should accommodate movement in the pipe without imposing excessive loads on the casing and branches. Sufficient clearance should be available beneath the motor to facilitate removal during maintenance. It is to be assembled as per the directions available with engineer.
10. Ensure completion of the maintenance hoists meant for CC pumps immediately else the area may be used by other agencies for laying the cables for various equipments coming in that area, inadvertently and they have to be removed later. Heat exchanger installation is also to be completed and necessary cooling water lines, thermocouples, pressure gauges etc. to be completed. The power cable connection made to the pumps should ensure free down ward expansion of the boiler at the level.
11. Down comer pipes erection can be done by carrying out preassembling the pipes whatever feasible as per availability. The suction manifold received in loose pieces and to be pre-assembled in the floor nearby. After welding the suction manifold, it is to be positioned, aligned and then only the down comers from the steam separator/

drum are to be connected. Erection of suction spool pieces, and hand operated valves for the system to be erected. The CC pump volute without impeller is fitted to the bottom of the suction spool .Bottom flange of the volute is carefully levelled and aligned before welding the suction spool. After completion of welding in all respects cutting and trimming of erection attachment to be done. CC pumps volute is to be blanked for carrying out hydro test. After hydro test, the blanks are removed and pump erection taken up. The tightening of the bolts to be done with torque wrench as per the instructions of the supplier.

12. Before taking up the erection of coils, pre erection checks to be carried out like width and length of the coil, availability of flexible connectors, damages on the coils, permanent bows if any, sponge test for the coil and completion of ground inspection by inspector of boilers as deemed. Ensure the removal of the transportation supports in each coils prior to erection.
13. Erection of LTRH/ Economizer coils as applicable can be done by preassembling the upper and lower coils. Pre erection checks like width, length etc., and sponge test of coils for thoroughness to be done before erection. Required hanger tubes erection to be completed before LTRH / Economizer coils erection. **The preassembly of cassette baffles of LTRH and Eco coils can be carried out before their erection.**
14. Check for the gaps between SH steam cooled front wall and Eco/SH horizontal assemblies, gap between SH steam cooled rear wall and SH horizontal assemblies/ eco assemblies, spacing between rear WW arch and pendant assemblies and finish SH coils. Detailed drawings are to be referred during execution. The items indicated are suggestive only.
15. Check for the inner space between eco coils, LTRH, RH and SH coils as per drawing
16. Ensure proper completion of steam cooled spacers. Check for clearances for soot blower lance tubes.
    Ensure that soot blower lance tube in 0 dead travel position unless until charged. Radiant roof skin casing sheets are to be welded after application of castable refractory.
17. Before erecting the valves and other mountings, check for the tag for correct rating with valve schedule. Ensure correct flow direction. Ensure easy accessibility for operation and maintenance of valves.
18. While erecting the safety valves, check for the set pressure and type. The lever arrangement, blow down ring approach for floating should be ensured. Drip pan drains with proper slope to be given to safe location. Check the exhaust pipe arrangement for expansion and proper guides to be given. Ensure anchor points for the above pipes.
19. Ensure removal of drains plugs provided in the silencers, the gap between exhaust pipe and roof is sealed properly.
20. DWLGs to be erected as per drawing. Joint protocol to be made for its correct erection with supports.
21. Other tapping points meant for monitoring the level should be erected and protocol is to be made. Maximum use of the pads and lugs welded on the steam separator/drum to be used for giving supports.

22. Sample coolers are to be erected preferably in clean area. All the lines should be air blown before termination on both ends. Sockets are to be used for sampling lines. **TIG welding must be used for sampling lines instead of arc welding.**
23. All the drain lines should have sufficient slope towards drain. Provide expansion loops in all the vents and drains as per the drawings. Electrometric relief valve controller is supported separately in column so that the vibration from boiler is not transmitted. Provide pre compression springs where required to take care of the load. All the motor operated valve stems should be vertical preferably. All the valve packing with asbestos base to be lubricated once in 6 months till handing over. Necessary gland packing will be supplied by BHEL.
24. Prior to erection of any pressure part like headers, pipes, tubes, panels etc. inspection to be done for any foreign materials and damages and they are to be removed/ attended as per BHEL engineer.
25. Transport binders on all coils are to be removed.
26. Gas distribution baffles and vibration snubbers, mechanical spacer bars etc. are to be erected as per drawings.
27. Buck stays are preassembled and raised to their respective elevations and hung prior to erection of furnace walls. Before fixing them to furnace walls, ensure completion of panel to panel welding and voids in the buck stay region. The necessary scalloped bars/plates/pads are to be welded after leveling. Ensure completion of vertical buck stays including support hangers, links. The erection of leveler channels with guides to be completed.
28. All the furnace guides to be erected as per drawing keeping gap of about 3 mm for free boiler expansion.
29. The necessary connection to the wind box is to be completed in all respects as per drawing. If any drain holes are envisaged, the same to be provided. No pipe line supports should be taken from the buck stays without getting the approval from engineer.
30. Sagging of roof tubes results in condensate stagnation during shut down. Hence ensure that radiant roof and back pass roof tubes are erected without sagging.
31. Total boiler is to be examined in all levels for free expansion. All the arrestors are to be removed. Expansion indicators are to be erected in various levels as per drawing / instruction of engineer.
32. Some of the few important locations for voids filling:-
    - Around penetration for pendent surfaces and radiant roof/SH screen tubes/second pass roof tubes
    - Between loose front WW tubes above front upper panels and below radiant roof
    - Gap between radiant roof tubes at the junction of front wall
    - Extreme rear arch tubes and side WW/extended WW panels
    - Extreme SH screen tubes and SH extended steam cooled walls

- Gaps between tubes /nipples in the steam cooled rear, side and front wall and respective headers
- Extreme tubes of front and side WW lower panels
- Side WW/extended side WW and extreme tubes of radiant roof
- Extended side steam cooled wall and extreme tubes of SH screen tubes
- Steam cooled side wall and extreme tubes of second pass roof
- Between tubes in upper corner tubes
- Between tubes in lower transition tubes
- Gap between tubes/nipples of side WW lower header at the ash hopper throat region
- Voids due to lifting slots in fusion/fin welded panels
- Voids due to erection slots in fusion/fin welded panels
- Fusion/fin welded panel fin slits at the panel tube-tube butt joint locations
- **The above list is suggestive only. Voids are to be closed suitably to retain refractory in position and to achieve the gas tightness**

14.2.47 **Erection of Boiler structures and points to be taken care of for achieving verticality of Boiler columns.**

a. The column pieces are pre-assembled and site match marks to be provided.
b. Pre assembly checks to detect and deviations in the columns like length, camber sweep, twist etc.
c. Checking of foundations for its levels distance, diagonal, distance etc.
d. Proper tightening of the foundation bolts.
e. Erection of columns tier by tier and box by box. Grouting to be done immediately after 1st tier erection.
f. Ensuring the availability of guy ropes, etc. during column erection and removal of guy ropes after ensuring the verticality of columns.
g. Using calibrated theodolite for verticality measurement of columns.
h. Tightening of HSFG bolts to be done by turn of nut method only after ensuring the verticality of the columns.
i. Measuring adjacent diagonals of the ceiling girders after its erection.
j. Ensuring the verticality of the columns before and after the steam separator erection.

14.2.48 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.

14.2.49 The fans shall be checked for blade clearance and other vital tolerances. The Flow control

devices in fans like IGV/Damper units shall be serviced. Necessary assistance for balancing of equipment during trial run shall be provided by the contractor.

14.2.50 Vital clearance of mill should be checked at site and adjusted if required.

14.2.51 The HT motor bearings shall be blue matched at site and checked for bearing clearance. Scrapping of bearing housing, if required shall be carried out by the contractor. No extra claim for blue matching of any two surfaces will be entertained. The HT motors will be checked for air gap and adjustment of stator / rotor to magnetic center shall be carried out as part of erection.

14.2.52 D.S.L / equivalent system for hoisting equipments are also to be erected and commissioned including load testing by the contractor within the quoted rates. Required manpower including electricians is to be arranged by the contractor for carrying out commissioning of electrical hoist and load testing of the above electrical hoist. Required loads will be provided by BHEL free of cost.

14.2.53 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up painting required to be done on any equipment or part during the course of erection will have to be done by the contractor.

14.2.54 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.

14.2.55 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.

14.2.56 All the bearings, gearboxes etc., of the equipment / actuators and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing / gear boxes etc., with kerosene or some other agent if necessary by dismantling some of the parts of the equipment during erection and shall arrange for regreasing / lubricating them with recommended lubricants and assembling back. Lubricants will however be supplied by BHEL at free of cost.

14.2.57 The actuators / motors of valves may be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions BHEL Engineer including placement on foundation.

14.3 MILL BUNKER STRUCTURE, COAL BUNKER, GALLERIES, SILOS ETC.

14.3.1 Erection, alignment, welding, bolting, grouting and painting as applicable for fabricated structures (supplied form BHEL units) of Mill bunker structures, Coal bunkers, Transfer points, Trestles, Conveyor galleries etc.

14.3.2 Supply and installation of items as per BOQ for Bunker structural works in Mill Bunker structures, Transfer points, Trestles, Galleries etc.

14.3.3 Where ever the design & supply together is covered in the scope of bidder necessary approvals from BHEL / CUSTOMER shall be taken by bidder for the design, inspection

procedure & vendor. List of items for which such approvals required will be frozen during execution of the contract.

14.3.4 Contractor shall procure and supply the items to project site as per the BOQ for structural works from BHEL / CUSTOMER approved vendors, meeting the specification (enclosed), Drawings and instructions of the Engineer.

14.3.5 The structures of Bunker, Fuel bunker, Junction tower and Trestles & galleries are supplied in respective PGs as mentioned in Chapter IX.

14.3.6 Total no. of bunker per Boiler is Nine. The bunkers will be supplied in segments. Contractor has to carry out longitudinal welds for joining segments in staggered arrangement and circumferential weld for forming the shell & Hopper. The ring stiffeners will be welded with the shell and will have a site joint at the shell joint location.

14.3.7 SS liners will be fixed in the shells and for site joint location it will be supplied as loose, which has to be fixed by the contractor by welding.
Minimum 4.0 mm thick stainless steel liner of grade SS:304(as manufactured by SAIL Finish Grade 2B (Cold rolled, Annealed & Pickled and Skin passed)) on M.S. plate for inside surfaces of bunkers including fixing with stainless steel studs, bolting (including countersunk), welding with electrode classification E308L for welding of stainless steel to stainless steel and E309 for stainless steel to mild steel etc. all complete.

14.3.8 Contractor shall provide the temporary structures like scaffolding, Access ladders, working platforms etc. and removal of the same after completion of Bunker erection.

14.4 Reconciliation of Material issued by BHEL (free of cost):

General Notes

a. All materials as specified in relevant BOQ shall be issued free of cost by BHEL for use in the work covered in this contract from BHEL stores/storage yard. The contractor shall collect these materials from BHEL stores/storage yard at specified places at his own cost and store the same at his stores as per standard norms. Materials issued will be used only for construction of permanent works.

b. BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.

c. The contractor shall take care of material issued by BHEL and shall protect the same from damage and weathering.

d. The contractor shall in no case be entitled for any compensation on account of any delay in supply or non-supply thereof for all or any such materials. However, in case of non-availability of any specific section(s) which delays the completion of work, such cases shall be recorded separately in monthly planning format (F 14) and shall be considered for time extension of contract in line with GCC.

e. Contractor will have to make his own arrangement at his own cost for procurement of any other materials except as mentioned above/ BOQ, as required for the works and of such quality as acceptable to BHEL.

f. The contractor shall maintain proper store account for all the BHEL issued materials and shall give **Three (03) copies of monthly-computerized reconciliation statement** of such account showing total receipt, consumption and balance at site to the BHEL. BHEL Engineer's certification for the reconciliation of steel shall be final. The detailed reconciliation (dia. Wise or as required) shall be done **at least once in three months (03) or before submission of final bill which comes earlier**.

g. Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day-to-day update of materials, issued to contractor, accounting for surplus/scrap material returned etc. These functions shall also be carried out through computerized system utilizing suitable software. Contractor shall engage experienced software personnel to associate on dedicated basis for efficient discharge of the same in time.

h. The contractor shall solely be responsible for the safety & security of material after it is handed over and issued to contractor by the BHEL.

i. BHEL issued materials, shall not be under any circumstances whatsoever, and shall be taken out of the project site unless otherwise permitted by BHEL for outside job.

14.12 MAIN SUPPORTING STRUCTURES, EXTERNAL STRUCTURES, ELEVATOR STRUCTURES, STAIRWAYS, GALLERIES & PLATFORMS & HANDLING ARRANGEMENT

14.12.1 In some cases, the structural material will be supplied in random lengths, which have to be fabricated to suit the requirement as incidental to work. Also, it may sometimes be necessary to remove some of the erected members to facilitate erection of bigger/ pre-assembled equipments. In such cases, the removal and re-erection of such members as agreed by the BHEL Engineer, will have to be done by the Contractor as incidental to work.

14.12.2 Contractor shall arrange materials required for temporary cat ladders & working platforms during erection of columns, platforms and other structural components. Such arrangements shall, as far as possible, be only of clamping & bolting type, as welding on columns etc will not be permitted. After the completion of work these shall be removed.

14.12.3 All the hand rails and toe guards shall be provided as per drawings and site requirement. hand rails supplied in running lengths shall be suitably cut, edge prepared and welded. Also, hand rails/ guards may have to be provided from the safety point of view in certain places though not indicated in the erection drawings. The weld joints of hand rails shall be ground smooth to flush finish.

14.12.4 Electroforged floor grills will be supplied for this project. These may have to be cut to suit requirement. Cutting shall be done only by mechanical cutters **and not by gas cutting**. Cold galvanizing compound is to be applied on the cut surface/edge. Cold galvanizing paint supply is in Contractor scope.

14.12.5 Fixing of floor grills shall be done by self-tapping screws **and not by weldable studs.** Special purpose electrically operated hand tools are available in the market for this, which drills, taps and fixes the screws in a single operation. Supply of necessary self-drilling-cum-tapping screws and fixing clips are in contractor scope. Contractor shall deploy the **drilling cum fixing machine** required for this purpose as a regular scope of work.

14.12.6 The Contractor shall also install additional platforms of permanent nature for approaching different equipment as per the site requirement and to meet O&M requirements, though these may not indicated in the erection drawings. Materials required for such platforms will be supplied by BHEL in random sizes on free issue basis. These have to be fabricated to suit the requirement. Payment only for erected weight as certified by BHEL engineer shall be made at the rate applicable for structures. No payment is envisaged for fabrication of structures.

14.12.7 All relevant provisions as above shall apply, mutatis-mutandis, to the work of external structures, interconnecting structures, elevator structures & equipment handling system etc.

14.14 OTHER PRODUCTS AND SYSTEMS AND REQUIREMENTS

a) The ducting covered under this scope of work is flue gas ducting up to boiler outlet flange, boiler outlet flange to ESP inlet, hot and cold secondary air ducting from FD fans outlet to wind box, hot and cold primary air ducting from PA fans to mills including interconnections, flowmeters, dampers/gates and their drives, supports and suspensions etc. for these systems.

b) Ducts / expansion bellows (metallic & non-metallic) are normally supplied in loose components / segments and these are to be assembled and welded/ jointed at site before erection. The fabric portion of non-metallic expansion joints (NMEJ) namely bolster, fabric belt and canopy shall be installed by Contractor under supervision/guidance of equipment supplier/BHEL for the first few cases. Contractor shall ensure that all subsequent NMEJ are assembled with due care and proper procedure. In similar manner all joints, connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be made leak proof and tested as per technical instruction / requirement.

c) Certain structural items like silencer supports, roof cladding structure, platform etc. will be supplied in running lengths which shall be cut to required suitable sizes and adjusted/trimmed as part of work.

d) Contractor has to make canopies for motors, actuators, lub oil units, control valves, etc. material for this will be supplied in random lengths / sizes. No separate payment for fabrication is envisaged. Only the erection tonnage rate applicable for structure will be paid for this work.

e) Actuator / drives of dampers, gates etc. may have to be serviced, lubricated before erection, during pre-commissioning and commissioning, including carrying out adjustments required as incidental of the work.

f) All welded joints should be painted with anticorrosive paint / primer immediately after completion of all work. Necessary paints and other consumables for the above work are in the scope of the Contractor.

g) Hangers and suspensions, support steels for ducts and other equipments, piping etc. will be supplied in running/random lengths/ sizes, which shall be cut to suitable sizes and adjusted as required.

h) Touch up and preservative painting of all components issued to and/or erected by Contractor shall form part of scope of work. The Contractor shall arrange all paints, primer and consumables, T&P and facilities.

14.15 Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost.

14.16 No members of any ladder / structure / platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / Customer without any additional cost.

14.17 The contractor shall erect scaffolding / temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion and removed from work site.

14.18 It shall be the responsibility of the contractor to provide ladders on columns for initial work till such time stairways are completed. For this, the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL. In case it is absolutely necessary then the contractor shall cut the temporary structure and rectify the column as directed by the engineer.

14.19 Certain adjustment in length may be necessary while erecting pipelines / ducts / casings etc. The contractor should remove the extra lengths / add extra lengths to suit the final layout after preparing edges afresh by adopting specified heat treatment procedures.

14.20 Suspensions for ducting will be supplied in running lengths, which shall be cut to size and adjusted as required. Ducts / expansion bellows are dispatched to site in loose walls plates / pieces and these are to be assembled and welded at site along with stiffeners etc., before erection within the finally accepted rates. All joints connecting duct expansion piece and dampers shall be seal welded on inside as well as on outside.

14.21 Ducts/ expansion bellows (metallic & non-metallic) are normally supplied in loose wall plates/ segments and these are to be assembled and welded at site before erection. Correction of ovalities/ distortion of ducts, expansion bellows etc occurred during transportation/ handling are to be carried before erection as part of work. Erection of mechanical components of non-metallic joints is included in the scope of work. All joints connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be made leak proof and tested as per technical instruction / requirement.

14.22 Mechanical erection works associated with the power cylinders, valves, valve actuators etc., coming under various groups shall be provided by contractor within the finally accepted rates. The Erection and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.

14.23 The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition. Checking of alignment and recoupling of the motor to the driven equipment as per instructions of BHEL engineer and to their satisfaction. All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. Vendor shall all necessary MMDs including the motorized insulation testers for the above test.

14.24 The contractor shall fabricate pipe, special bends etc., threading and welding as required for installing lube oil system and carry out the acid cleaning of the fabricated piping. The contractor shall also service the lube oil system, carrying out the hydraulic test of oil coolers etc.

14.25 Contractor shall carry out kerosene testing of all bearing housings of various rotating equipment like pumps, fans etc., as per BHEL engineer's instructions. Performance of hydro test of oil coolers of rotating machines and hydro test of other equipment as per BHEL engineer's instructions is included in the scope of work. Forced lube oil system of motors or rotating equipment form parts of the work under this specification.

14.26 Piping - The piping components are sent in parts for convenient transportation / layout requirements. They are to be cleaned, pre-assembled in stage by stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.

14.27.1 The work on piping systems (air, water, oil, steam, gas etc.,) will include laying, edge preparation, fixing and welding of the elbows / fittings / valves etc., welded on the lines, fixing and adjustment of supports / hangers / shock absorbers and carrying out all other activities / works to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineer's instructions and / or as per approved drawings / documents.

14.27.2 Pre Assembly joints to be marked in isometrics drawings in consultation with BHEL Engineers and submit to BHEL before starting work. Contractor to maintain Line History sheet (LHS) of all Pipe lines as per BHEL Format and submit before HT to BHEL/Customer for getting HT Clearance.

14.27.3 Erection of all drains / vents / relief / escape / safety valve, piping to various tanks/ sewage / drain canal / flash box / flash tank / sump / atmosphere etc. from the stubs on the piping to the equipments erected by the contractor is completely covered in the scope of work.

14.27.4 Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive within the quoted / accepted rate.

14.27.5 Pipes shall not be dropped to avoid impact or bump.

14.27.6 The scope of work includes marking of labelling & flow direction on the piping over insulation/other parts at the one place or number of places as instructed by BHEL Engineer. All consumable required for this work shall be in the scope of contractor.

14.27.7 Normally weld neck valves will have prepared edges for welding. But if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like tees, weld neck flanges, reducers, elbows, flanges, inserts etc., shall be suitably edge prepared and matched with pipes for welding. No extra cost shall be paid for this.

14.27.8 In case of any class of work for which there is no such specifications as laid down in the contract such us blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.

14.27.9 Erection of platform and supporting structures around the equipments / valves / filters etc., is covered in the scope of contract and shall be erected by the contractor as per accepted tonnage rate for structure.

14.27.10 The Contractor shall carry out the reaming and honing of coupling holes with his own reamers, honing machine and honing accessories etc at his own cost.

14.27.11 Wherever pipes / bends / equipments are supplied in pre-fabricated / assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor‘s scope.

14.27.12 All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints, as per the instruction of BHEL Engineer.

14.27.13 All piping supplied in running meter has to cut and edge prepare as per the standards / drawings and as per the instruction of BHEL Engineer within the quoted rate.

14.27.14 Wherever drawings indicate site routing and site fabrication, such pipes (in general equal to and less than 2” dia) will be issued in running meters as straight length. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. In some cases attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor.

14.27.15 Fittings like bends, tees, elbow, mitre bends, reducers, flanges, thruster blocks, etc., will be supplied as loose items and edge preparation if required shall be carried out by the contractor.

14.27.16 Certain adjustments in length may be necessary while erecting pipelines. Removing / adding extra lengths / to suit the final layout, preparing edges afresh and adopting specified heat treatment procedure are in the scope of work.

14.27.17 For pipes nominal size 2” and below routing shall not be shown in piping layouts or in isometrics and the same to be routed / connected as shown in schematics. For the above sizes if the routing is shown in layouts it is only for guidance and the same shall be routed and supported as per site requirement / convenience as per BHEL Engineer‘s advice.

14.27.18 Piping below size 2”, valves, flanges, fittings etc. shall be supplied as commercially available. Hence fit-ups, edge preparation including welding of stubs, shall be included in the contractor‘s scope.

14.27.19 Contractor should fabricate bends of </=2‖ diameter size at site from running meters of piping for the above and cut, edge prepare and lay the piping as per BHEL Engineer‘s instructions.

14.27.20 Minor adjustment like removal of ovalities in pipes and opening or closing of the fabricated bends by process of heat correction or any other method approved by BHEL Engineer to suit the layout, with specified heat treatment procedure shall be carried out by the contractor within the quoted rate.

14.27.21 Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., by grinding / gouging and not by hammering. Any burrs left on the equipments / piping, after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.

14.27.22 The surface of the pipes to be joined shall be suitably prepared as per instructions of BHEL Engineers. Edge preparation shall be done by chamfering machine, whenever required and all welding surfaces must be cleaned thoroughly. All works due to the mistake of the contractor shall be repaired / redone at contractor‘s cost. Instrumentation drains, stubs which are sent in loose from manufacturing units are to be welded at site as per BHEL Engineer‘s instructions.

14.27.23 All the weld joints on equipments and piping shall be ground or filed after completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,

14.27.24 Flow nozzles, orifice, spray nozzles etc., shall be mounted / erected after chemical cleaning / flushing / or steam blowing at site.

14.27.25 Erection of Flow nozzles, flow switches, steam traps, filters, flow meters, other metering elements, spray nozzles, steam traps, flow orifices, flow indicators, control valves, aux. control valves, NRVs, suction strainers, servomotors, CRH NRV, HPBP Valve and suction strainers of BFP, CEP & Booster pumps etc forming part of the system (under this scope of work) irrespective of the suppliers is also to be carried out by the agency without any extra cost after chemical and / or steam blowing / oil flushing at site. This will include collecting from BHEL / Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

14.27.26 Certain instruments like pressure switches, gauges, air sets, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismount such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.

14.27.27 The contractor has to fabricate stainless steel orifice plate within the quoted rate. No extra payment will be made for fabrication of above orifice plates. The required stainless steel plate will be supplied by BHEL.

14.27.28 Fixing, fitting, welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc., on different lines / equipments (which will be supplied by BHEL) is within the scope of work. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system for the erected equipments / pipe lines is the scope of this specification.

14.27.29 The contractor shall also weld all thermo wells, small length of pipes to all pressure, flow and level tapping points, isolating valves and root valves on all equipment under scope of erection of this contract. All embedded temperature measuring elements provided in the bearings will have to be terminated at the junction box by the contractor. Thermo wells tapping point connections incorporated shall be plugged during the pressure testing and steam blow out of piping systems. Upon completion of blow out operation all thermo wells and flow elements with branch pipes be installed and welded.

14.27.30 For hangers and supports the instruction given in the drawings and documents must be followed for handling, erection and setting of cold / hot values and locking etc.

14.27.31 The hangers and supports for pipelines and pressure parts may be supplied in dismantled / knocked down condition. It is the responsibility of the contractor to assemble them as per approved drawings and install them in position as per site engineer instructions.

14.27.32 Contractor has to fabricate and erect temporary spool pieces wherever required due to non receipt of valves in time and after receipt of valves the spool pieces are to be replaced with regular valves at free of cost. For spool pieces materials will be supplied free of cost by BHEL.

14.27.33 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.

14.27.34 Welding, non-destructive testing and heat-treatment as prescribed in BHEL Welding / Heat treatment manual is to be carried out by the contractor. The contractor shall conduct non-destructive tests like radiography, ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test etc. on weld joints, castings, valve bodies and other equipments etc. as per BHEL Engineer‘s instructions within the quoted rate.

14.27.35 Contractor shall arrange all equipments, alignment bolts, tools, Consumables like welding electrodes in their scope (all types except those supplied by BHEL), and argon gas cylinders etc.,

for welding of pipes at his cost. Consumables like jute, cotton waste, hacksaw blades, petrol, Kerosene oil etc. are in contractor's scope. Only filler wires as stipulated by manufacturing units and identified in relevant shipping list will be supplied to the contractor free of cost. Any excess requirement shall be arranged by the contractor / BHEL at contractor's cost. Argon / Nitrogen gas for stainless steel tubes purging during welding to be arranged by contractor within the quoted rates.

14.27.36 The Matching Pieces / Nozzles / Reducers (including the reducers to be connected with HP Heaters) supplied for connecting BFP discharge piping with the Heaters are forming part of the systems and are also in the scope of work including issue, transportation, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

14.27.37 Cutting and removal of dummies for all the shop welded stubs (irrespective of the equipments supplier for the above) for all the terminal points and preparation of edge where the piping is to be terminated is also in the scope of the contractor without any extra payment.

14.27.38 For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.

14.27.39 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.

14.27.40 The actuators / motors of valves may be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions of BHEL Engineer including placement on foundation.

14.27.41 All dimensions / elevations refers to centerline of pipe unless otherwise specified, the pipe routing shall be carried out as per the drawing. Wherever the dimensions are not specified / shown as approximate the same may be routed as per site requirement / convenience as per site engineer's advice.

14.27.42 Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.

14.27.43 Contractor has to arrange required fire retardant covering material at their cost to protect the machined components, assembled parts and insulation materials drawn from BHEL before and after erection.

14.27.44 Prior to erection of any components, inspection to be done for any foreign materials and damages and they are to be removed / attended as per instructions of BHEL engineer.

14.27.45 The temporary structures / items welded to permanent members / pipes are to be cut and removed without any damage. In case of any damage, the same has to be made good by the contractor at his cost.

14.27.46 Erection of all the items/piping systems, supplied by BHEL's Manufacturing units or Vendor as integral part of the systems covered under this scope of work, shall be done by the contractor as per the accepted tonnage rate.

14.27 GALVANISED STEEL PIPING

a. Galvanized pipe shall be joined by screwing in to socket and screwed ends of GI pipes shall be thoroughly cleaned and painted with a mixture of red and white lead before joining. The exposed threaded portion on either side of the socket joint shall be applied with Zinc Silicate Paste. All these consumables are in the scope of contractor and shall carry out within the quoted rate.

b. GI pipe with flanged joints shall have screwed flanges. Flanged joints faces shall be painted with red lead and bolting up evenly on all sides with compressed asbestos gaskets in between two flanges.
c. Teflon tapes shall be used to seal out screwed joints and shall be applied to the male threads only. Threaded parts shall be wiped clean of oil or grease with appropriate solvent if necessary and allowing proper time for drying before applying the sealant. Pipe ends shall be attached by screwing the pipe through the flange and pipe and flange shall be refaced accurately. Required Teflon tapes are to be arranged by the contractor at his cost.
d. Required threading should be done by the contractor at site as specified in the drawing. The pipes shall be cut only by Hacksaw / Machining. Required Teflon tapes are to be arranged by the contractor within the quoted rate.

e. ALL THE SCREWED JOINTS ARE TO BE SEAL WELDED IF REQUIRED BY CUSTOMER, SUITABLE ELECTRODES FOR FULL SEAL WELDING ARE TO BE ARRANGED BY THE CONTRACTOR AT HIS COST.

f. PVC WELDING: For PVC welding required solvent cement and cleaning agent / consumables will be supplied by BHEL. Necessary storage and application procedure to be followed as per supplier recommendation. Contractor shall take adequate care in handling, usage of these consumables to avoid wastage.

14.28 ROTARY MACHINES: Certain rotating machinery after initial runs and commissioning of the equipment have to be hot aligned as per the instructions of BHEL engineer. Cleaning fans, ducting etc., free of extraneous steel, scaffolding materials electrodes, all foreign materials etc., before trial run of rotating machinery, and at various stages of pre-commissioning activities as per BHEL engineer's instruction, is within the scope of work.

14.29.1 Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with kerosene or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.

14.29.2 After initial trial of rotating equipment, control and power cabling for motors and other equipment / instrumentation shall have to be disconnected for checking alignment and re-setting / re-alignment / hot alignment. Contractor shall have to arrange for disconnecting control and power cabling as per BHEL engineer's instructions and clearance and reconnect the control and power cabling after realignment. Quote tonnage rate shall be inclusive of the above.

14.29.3 Packer plates supplied may have to be machined to the correct dimensions. It may also be necessary to blue match the same with each other/ with equipment / with foundations as per BHEL instructions

14.29.4 Contractor shall arrange changing of preservative oil in the gearboxes, journal and other bearing assemblies of rotating equipment when in storage areas or after erection of equipment as the case may be as per the instructions of BHEL engineer. Necessary lubricants / oil will be supplied by BHEL and the same will be drawn by contractor from BHEL / Customer 's stores

and transporting to site. No additional payment will be made for such works even though supply of lube oil might have been made under regular dispatch-able unit (DU) number against product group main assembly (PGMA) and appearing in the shipping list. Prior to the commissioning of the equipment, oil should be drained and collected in drums provided by BHEL and returned to BHEL / Customer 's stores.

14.29.5 The fans, mills and other rotating machines shall be checked for clearances and other vital tolerances. Necessary assistance for balancing of equipment during trial run, if required, shall be provided by the contractor free of cost.

14.29.6 Whenever required the contractor shall arrange for pre-qualification of process task Performers.

14.29.7 Non specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.

14.29.8 The terminal points decided by BHEL should be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.

14.29.9 Actuators / drives of dampers, gates, powered vanes etc. may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.

14.29.10 All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary by dismantling and refitting before erection. If, in the opinion of Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.

14.29.11 All the shafts of rotating equipment shall be properly aligned to those of the matching equipment within design tolerances All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

14.29.12 All the motors and equipment shall be suitably doweled after alignment of shafts with taper / parallel machined dowels as per the direction of the Engineer. Dowel pins required are be machined by the contractor at his own cost. However the materials for dowel pins shall be issued by BHEL free of cost.

14.29.13 The HT motor bearings shall be blue matched at site and checked for bearing clearances. The contractor if required shall carry out scraping of bearing housing. No extra claim for blue matching up to 1mm initial gap will be entertained.

14.29.14 The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.

14.29.15 Certain instruments like pressure gauges, pressure transmitters, temperature gauges, flow switches and indicators, etc., are received in assembled condition as integral part of equipment.

Contractor shall be responsible for safe receipt, installation and custody of these instruments supplied mounted on skids / equipment. The calibration of skid / equipment mounted instruments shall be arranged by BHEL through other agency engaged for C&I. Contractor will be informed by BHEL engineer about the details of C&I agency. The contractor shall coordinate with the C&I agency for removal, calibration and re-installation of the instruments. Though C&I agency will remove and reinstall the instruments after calibration, the contractor for this package will maintain the list of all the instruments removed & reinstalled. Instruments prior to removal and after reinstallation shall be considered in custody of the contractor for this package.

14.29.16 All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR valve, before they are energized. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.

14.29.17 The contractor shall completely erect and test all the piping systems, covered in the specification including sampling lines up to and including sample coolers, hangers & supports, valves and accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning and touch up painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged, screwed or other type joints are specified or sown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings.

14.29.18 The contractor shall ensure lowering of pipes in position with adequate precautions as to avoid any damage to either material or men. Only the anchoring points earmarked for the purpose of lowering the pipes are to be used.

14.29.19 It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.

14.29.20 Wherever piping erected by the contractor is connected to equipment / piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor who is erecting the piping under this specifications.

14.29.21 Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes within the scope of the work.

14.29.22 All fittings like `T'-pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or over hauled in full or in part before erection and during commissioning.

14.29.23 The contractor shall be responsible for correct orientation of all valves so that seats, stems and hand wheels will be in desired location. It is the responsibility of the contractor to obtain

the information regarding orientation of valves not fully located on drawings before the same are installed.

14.29.24 Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.

14.29.25 The adjustment of all hangers & supports erected in both cold & hot conditions for maintaining the proper slopes towards the drain pots and application of cold pull in the piping wherever required is also included in the scope of the contractor.

14.29.26 Spring suspensions / constant load hangers have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrests / locks etc., have to be carried out as and when required.

14.29.27 Contractor shall install piping in such a way that no excessive or destructive expansion forces exists in either the cold condition or under conditions of maximum temperature and pressure. All bends, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.

14.29.28 The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Other means shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the pipe and building structure.

14.29.29 All the valves, including motorized valves, flap valves, dampers, actuators, etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates.

14.29.30 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The methods used the tools and the equipment deployed shall be subject to the approval of Engineer. The competent technicians shall carry out the bolting work.

14.29.31 The contractor shall prepare as built piping drawing & submit to BHEL Engineer for approval & verification of material used.

14.29.32 Plate Type Heat exchangers will be supplied for cooling of Auxiliary Cooling water lines. Vendor scope covers erection of these PHEs as per the instruction of BHEL engineers.

14.29.33 Contractor has to make canopies for motors, actuators, lub oil units, control valves etc. Material for this will be supplied in random lengths / sizes. No separate payment for fabrication is envisaged. Only the erection tonnage rate applicable for Misc eqpt. / structure steel of rate schedule will be paid for this work (Payment ID 1A).

14.29.34 BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL, will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting/chiseling / grinding/machining and de-burr the same. However, machining of the packers wherever necessary shall be arranged by the contractor.

14.29.35 All lifting tackles including wire-ropes slings, shackles, used by the contractor, shall be got approved by BHEL Engineer. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damages to equipment and personnel. Calibration/fitness testing certificates from recognized agency are to be submitted to BHEL site office for equipment/instrument/appliances to be used, as per requirement of BHEL/ISO system. Expenditure on such works forms a part of the scope of work.

14.29.36 The contractor shall erect scaffoldings/Temporary platforms supports etc required during erection before the permanent supports are erected. These should be of adequate capacity and shall never be overloaded. These should be replaced when not found suitable during erection work. All structure materials required for the above shall be arranged by the contractor at his own cost. No such material shall be supplied by BHEL in any case. Welding of temporary supports, cleats etc on the columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. Further, any cutting or alteration of member of the structure or platform or other equipment shall not be done without specific prior approval of BHEL Engineer.

14.30 CEILING GIRDER –

14.30.1 Arrangement drawing: Attached

14.30.2 Pre-checks of ceiling girder before Assembly-Identify Girder Top & Bottom pieces – Check Work order / PGMA / DU No, girder designation etc. Place girder pieces on levelled bed in sequence for bolting. Use lifting lugs provided in the web of the girder during all handling operations. Buff clean the seating surfaces, check and repair damages if any on machined surfaces of individual pieces, by grinding before bolt placement.
Verticality of the web of both top and bottom pieces of the girder shall be checked by plumb and piano wire method. Check the bolt hole size verticality and co-axiality with "GO" and "NO GO" gauges.

14.30.3 Post-checks of ceiling girder before assembly - Matching ends of top piece and bottom piece of ceiling girder shall be butted over whole length with a clearance not exceeding 0.2mm and held tightly together in hand snug tight condition.
Ensure the horizontal plane of Girder assembly by verifying the center line of girders to be at the same level by water level method.

Check the squareness of the girder compartment by verifying the spacing between the girders and diagonals between work points.
Centre line alignment of welded beams, rolled beams shall be within 2 mm.

14.30.4 **Bolting methodology of the ceiling girder. (Refer Document Std. Pub 2302: Tightening Procedure HSFG Bolts and IS3640, attached herewith)**
To ensure the monolithic behavior in Ceiling girders splice (split location), it is mandatory to adopt Fit- Bolt concept: (reference document attached).

14.30.5 **List of T&Ps required for assembly and Erection.**
The list of T&Ps being followed for bolted structure is to be adopted, like (but not limited)

1. **BHEL Scope - 600MT crane**
2. **Contractor Scope:**
   a. **Torque calibrator**
   b. **Electrical torque wrench,**
   Refer Trichy Document Std. Pub 2302: Tightening Procedure HSFG Bolts, attached herewith
   c. **Impact wrench**
   d. **Torque wrench**
   e. **Theodolite**
   f. **Steel tape**
   g. **Steel ruler**

14.30.6 **In case of any damage in surface of the "flange to be bolted" - Damage in surface of the flange to be bolted has to be repaired by grinding and Splice protection sheet to the required thickness after confirmation from Engineering.**
Splice protection sheet / structure is the part of ceiling girder.

14.30.7 **Procedure for Blue matching - Buff clean the seating surfaces and blue match girder Top piece with bottom piece to ensure minimum 80% contact area in the locations where the gap exceeds 0.2mm. Use lifting lugs provided in the web of the girder during all handling operations.**

WELDING, HEAT TREATMENT & RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

15.1 The pressure parts, equipments and piping shall be erected in conformity with the provisions of Indian Boiler Regulations and as may be directed, as per other standard / specification in practice in BHEL. The method of welding (viz) ARC, TIG or other methods as indicated in the detailed drawing or as instructed by BHEL Engineer shall be followed. BHEL Engineer will have the option to change the method to suit site conditions.

15.2 Welding of pressure parts, high tensile structural steel, Piping shall be done by certified high pressure welders who possess valid certificate and who are approved by BHEL Engineer.

Links & Pipes for interlinking SH headers & RH headers are supplied with P91/P92 materials

15.3 All welders including tack welders, structural and high pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification and performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

15.4 Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welders having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

15.5 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor’s expense. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the quality engineer.

15.6 The contractor shall carry out the root run welding of all PP, HP / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas.

15.7 All expenses for testing of contractor's welders including destructive and Non- destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost.

15.8 Only BHEL approved electrodes and filler wire will be used. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will

have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number / batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved / accredited test house traceable to National / International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same. Separate ovens shall be used for baking and holding.

15.9 All butt / fillet welds shall be subject to Non–Destructive testing as per the Drawing/Procedures/Welding Schedules/Documents at no additional cost. **100% RT will be applicable to all the circuits however applicable percentage of RT shall be guided by the field welding schedule.**

15.10 **Non Destructive Testing (NDT) - Phased Array Ultrasonic Testing (PAUT) and Computerised RT for the materials/items erected by the bidder, if applicable, shall be carried out by a septate agency. The bidder shall make all the arrangements, as and when required, such as manpower assistance, safe approach and scaffolding platform, to enable the PAUT and Computerised RT Testing agency/ies to execute their work. No separate payment shall be made in case of preparation of safe approach and scaffolding platform for PAUT Testing (NDT) agency/ies. In case, bidder fails to provide safe approach and scaffolding platform to the agency within 2 days from the date of completion of joint/intimation, BHEL shall make the arrangement at risk and cost of bidder without any further notice under clause 2.7.2 of GCC.**

15.11 **Non Destructive Testing such as RT, UT, MPI, hardness test, SR etc. wherever applicable shall be in Contractor scope. In case of any delay (i.e. 2 days from the date of completion of joint/intimation) in execution of NDT, BHEL shall be entitled to execute the work at risk and cost of Contractor.**

15.12 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. Contractor has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final.

15.13 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer. Prepared edges to be preserved / applied with wieldable primer.

15.14 All welds shall be painted with anticorrosive red oxide paint once radiography and stress reliving works are over. Necessary consumables and scaffolding etc including paints shall be provided by contractor at his own cost.

15.15 Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, Non Pressure Parts like Crown Plate support assy, including attachment welding wherever necessary, are parts of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.

15.16 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor shall arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress-relieving operations. The contractor should take a note of the following,

- Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
- All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.

  The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of SR operations.

15.17 The contractor shall also be equipped for carrying out other NDT like LPI /MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by contractor within the quoted rate.

15.18 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.

15.19 The contractor for radiography work shall use Iridium-192; the geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while radiography is being carried out. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).

15.20 Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only are used for weld joint radiography. Film density shall be between 1.5 and 2.0.

15.21 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.

15.22 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.

15.23 Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification. The joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld. For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.

15.24 Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of

Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.

15.25 All arrangements for carrying out radiography work including dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.

15.26 The contractor shall have a dark room & pit room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories. All radiography films shall be developed in the dark room at site.

15.27 In case of radiography of less than 100%, the joints identified by BHEL at random shall be radiographed.

15.28 Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radio graphed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out.

15.29 All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radio graphed and submitted to BHEL / Customer .

15.30 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC /DRP certificate to be provided before taking up the work.

15.31 Radiography of joints shall be so planned after welding, that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.

15.32 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.

15.33 However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radio graphed at contractor's cost.

15.34 **In case of failure of PAUT/Computerised RT test result due to defect in joint, the joint shall be cut, re-welded and re-tested at contractor's cost. Cost of PAUT and/or Computerised RT testing, as applicable, (actual payable to NDT agency) arising due to joint failure, shall be recovered from the contractor due amount with 5% overheads.**

15.35 **Engagement of PAUT testing agency by BHEL, shall not vacate contractor from their responsibility of workmanship till trial run/PG Test/warrantee period whichever is later. Repair in weld joints, as and when required, shall be attended by the contractor.**

15.36 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary

arrangements including labour, supervisors/ Engineer required the work as per directions of BHEL.

15.37 The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules.

15.38 The contractor shall deploy required number of H.P. welders to carry out the H.P. weld joints. The welding works should not be held up due to shortage / want of I.B.R./H.P. welders.

15.39 All welded joints shall be subjected to acceptance by BHEL Engineer.

15.40 The technical particulars, specifications and other general details of work shall be in accordance with BHEL welding, Heat treatment and NDE manuals or equivalent as decided by BHEL Engineer.

15.41 Contractor shall carryout Radiography as per welding Manual booklet applicable as per IBR, enclosed. However, percentage radiography shown in the respective drawings shall be final and binding on the contractors.

15.42 The field joints are to be radiographed and preheating and post weld heat treatment shall be done as per BHEL procedure and manuals.

15.43 The percentage of Radiography are tentative, which may be increased depending upon the quality of joints at the discretion of BHEL.

15.44 Penetrometor as per ASME/ISO shall be used for all exposures.

15.45 Lead numbers and letters (generally of 6mm size) are to be used for identification of radiographic contract No., joints identification, sources used welders identification, SFD used are to be noted down in the paper cover of radiography. Lead intensifying screens for front and back of the film shall be used as per the instructions of BHEL Engineer.

15.46 The contractor shall be fully equipped with radiography equipments, films, chemicals and other dark room facilities. There must be a number of radiographic personnel with sufficient experience and certified by BARC for field radiographic inspection. Further, the contractor must follow strictly the safety rules laid down by BARC, from time to time, contractor's radiographers shall also be registered with BARC for film badge service.

15.47 Contractor shall provide all skilled, unskilled work men required for the job, which will include Engineers, supervisors, operators, as required for timely and satisfactory execution of radiography work.

15.48 All the radiographs shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.

15.49 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of Engineer and Re-radio graphed. The decision of Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor.

15.50 The contractor shall also be equipped for carrying out other NDT like liquid penetrant inspection, magnetic particle inspection, etc. as and when required in the interest of work within the quoted rates.

15.51 For carrying out ultrasonic testing of welded joints of large size tubes and pipes, it will be necessary to prepare the surface by grinding to a smooth finish and contour as desired by BHEL Engineer. The contractor's scope of work include such preparation and no extra charges are payable for this.

15.52 It may also become necessary to adopt inter layer radiography / MPT / UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The contractor shall take all this into account and quote the price inclusive of all such work and radiography.

15.53 The welded surface irrespective of place of welding shall be cleaned of slag and painted at the center with primer paint to prevent corrosion at no extra cost towards this.

15.54 All welders shall be tested and approved by BHEL Engineer before they are actually engaged on work though they may possess the required certificate. BHEL reserves the right to reject any welders without assigning any reason. The welder Identification code as approved by the BHEL Engineer shall be stamped by the welder on each joint done by them. The contractor will be responsible for the periodic renewal, retesting of the welders as demanded by BHEL.

15.55 BHEL Engineer is entitled to stop any Welder from the work if his work is unsatisfactory for any technical reasons or there is a high percentage of rejection of joints welded by him, which in opinion of the BHEL Engineer will adversely affect the quality of the welding though the Welders, has earlier passed the tests prescribed by BHEL Engineers. The welders having passed qualification tests do not relieve the contractor of a contractual obligation to check the welder's performance.

15.56 All charges towards testing of Welders for destructive and non-destructive test, testing and approval of welders for engaging in the erection work shall be borne by the contractor.

15.57 The welding process, weld joint details, joint configuration and material specification may change to suit the design requirements. The contractors quoted rates shall be inclusive of each contingency. All welds involved in the erection of temporary pipe lines for hydraulic test, chemical cleaning, steam blowing etc. to be carried out within the quoted rates. The number of joints to be welded as mentioned in the welding schedule consists of butt welds. All other welds viz. attachment welds on pressure parts/non-pressure parts, fillet welds in non-pressure parts welding in the boiler and Rotating Machines has to be carried out by the bidder within quoted rates.

15.58 **For uniform heating and better closed loop control, pre heating, post heating, controlled rate of heating & cooling and post weld heat treatment cycles for tube specifications SA213T91 & SA213T92 should be carried out using flexible ceramic pads with suitable heating machine**.

15.59 **MPI must be done on joints, those are undergone ultrasonic testing**.

15.60 Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the Contractor in accordance with BHEL engineer's instructions. Where the electric resistance heating method is adopted Contractor shall make all arrangement including heating equipment with automatic recording devices, all heating elements, thermocouples and attachment units, graph sheets, thermal chalks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

15.61 (A) In case of old type of Induction Heating Equipment: Contractor shall provide the input electrical power connection including arrangements such as DB, cables etc., thermocouple attachment unit, thermocouple and compensating cables with male female plugs, induction heating annealing cables (from the capacitor panel to joint and for wrapping around the

weld joint) (spec: single core 240 sq mm, 1200a, 3khz), Supercera Ceramic Fibre Blanket (25mm thick, Roll Size-7.62x0.61mtr), Cloth Fibre Glass (1mm thick, 1 mtr width), Ceramic Fibre Rope (12mm dia.), Cord Glass Fibre (3 mm dia.), Six Nib Pen Cartridge, Z-Fold Chart Paper, stainless steel nut bolts for connecting interconnection, output and annealing cable and other consumables as may be required. Quantum of annealing cable requirement will depend on many parameters e.g. weld joint size, heat input, type of connection i.e. series or parallel etc.

15.62 (B) In case of Compact Induction Heating Equipment: Contractor shall provide the input electrical power connection including arrangements such as DB, cables etc., thermocouple attachment unit, thermocouple and compensating cables with male female plugs, induction heating annealing cables (from the main panel to joint and for wrapping around the weld joint) (spec: single core 160 sq mm, 860amps, 10khz), High Temperature Ceramic Fibre Cloth Bed Role (25mm thick, 500mm width, 7500mtr length), Fibre Glass Cloth (1mm thick, 600mm width), Ceramic Fibre Rope (12mm dia.), Cord Glass Fibre (3 mm dia.), stainless steel nut bolts (M10x40, M10x50) for connecting output cable, annealing cable and other consumables as may be required. Quantum of annealing cable requirement will depend on many parameters e.g. weld joint size, heat input, type of connection i.e. series or parallel etc.

Likely supplier of Annealing cables: Mansfield Cable Co. Noida (UP).

15.63 **List of Penalties on Violations on Quality Provisions**

Sr no	Violation	Penalty in Rs
1	Mother oven not working	500 per day & ban on its use
2	Slackness in control over baking of welding electrodes(Doc.)	200 per incident
3	Holding oven not working/plugged in	500 per incident/day & ban its use
4	Portable oven not working/Plugged in	100 per incident & welder to be sent home
5	Use of cold electrodes(Except E6013)	1000 per incident & welder to be sent home
6	Unauthorized welder on job	5000 per incident & welder to be sent home
7	Delay in NDT Agency deployment w.r.t jointly agreed Ere. Prog	500 per incident
8	Failure to monitor Welder's Performance (RT, SR, Penalty Joint etc.)	5000 per week
9	Improper acts w.r.t maintain SR Charts	10000 per incident
10	Site Welding/QLY Engineer not deployed w.r.t mutually agreed Ere. Plan	500 per day
11	Delay in (RT, SR, UT) report submission &	10,000 per week

	customer acceptance Log sheets esp. for Billed qty. from dt. of Billing (Vendor)	
12	Lack of safe approach Scaffolds/Platform for inspection & non-availability of calibrated MMDs –	1000 incident.

15.60.1 RECEIPT INSPECTION OF WELDING ELECTRODES / FILLER WIRES

1. All electrodes / filler wires received at site stores shall be segregated for type and size of electrode.
2. Ensure that electrode packets received are free from physical damage.
3. Where electrodes are damaged, the same shall be removed from use.
4. Only electrodes identified in the "Rationalized List of Electrodes" are to be accepted.
5. Where filler metals are supplied by manufacturing unit, inspect for damages, if any.
6. Ensure availability of relevant test certificates. Refer tables of chemical compositions and mechanical properties for acceptance.
7. Endorse acceptance / rejection on the test certificate.

15.60.2 STORAGE & IDENTIFICATION OF WELDING ELECTRODES / FILLER WIRES

1. **Scope**

1.1 This procedure is applicable for storage of welding electrodes / filler wires used at sites.

2. **Procedure:**

2.1 Only materials accepted (based on receipt inspection) shall be taken into account for storage.

2.2 Storage Facility:

2.2.1 The storage facility shall be identified.

2.2.2 Access shall be restricted to authorized personnel.

2.2.3 The storage area shall be clean and dry.

2.2.4 Steel racks may be used for storage.

2.2.5 Avoid storing wood inside the storage room.

2.2.6 Maintain the temperature of the storage facility above the ambient temperature.

2.2.7 This can be achieved by the use of appropriate heating arrangement .

2.3 The electrodes / filler wire shall be segregated and identified for

1. Type of electrode e.g. E7018.
2. Size of electrode e.g. Dia 3.15 mm.

2.4 Colour coding for filler wires:

2.4.1 On receipt of GTAW filler wires, codify the filter wires as per table I below . Both ends shall be coloured.

Table - 1

Specification	**Brand Name***	**Colour Code**
RT 1/ 2 Mo (ER80s-D2)	TGSM	Green
RT 1 Cr 1 / 2 Mo (ER80S-B2)	TGS 1CM	Silver grey/White

RT 2 1/ 4 Cr 1 Mo (ER90S-B3)	TGS 2CM	Brown / Red
RT 347 (ER 347	TGS – 347	Blue

(* or other approved equivalents)

2.4.2 Where another set of colour code is followed, maintain a record of coding used

2.4.3 Where the filter wire is cut, apply the appropriate colour code at both ends of the piece.

2.4.4 For other filler wires, a suitable colour distinct from table 1 shall be applied

15.60.3 BAKING AND HOLDING OF WELDING ELECTRODES

A. Purpose:

This section details activities regarding baking and holding of welding electrodes used at sites.

B. Procedure:

1. While handling, avoid contact of oil, grease with electrodes. Do not use oily or wet gloves.
2. It is recommended that not more than two days requirements are baked.

C. GTAW Filler Wires:

1. These wires do not require any baking.

D. Covered Electrodes:

I. Baking and holding

II. Identify baking oven and holding oven.

III. They shall have a temperature control facility upto 350 °C for baking oven and 200 Deg. C for holding oven.

IV. A calibrated thermometer shall be provided for monitoring temperature.

V. On opening a packet of electrodes, segregate and place them in the baking oven. Avoid mix up.

VI. After loading, raise the baking oven temperature to the desired range as per Table below.

VII. Note the time when the temperature reaches the desired range. Maintain this temperature for the duration required as per Table below.

VIII. On completion of baking, transfer the electrodes to holding oven, maintain a minimum temperature of 100°C till issue.

IX. The electrode shall not be subjected to more than two cycles of baking. Maintain a register containing following details:

a. Brand name (e.g. Supratherme)
b. Size (e.g Dia 4.0 mm)
c. Quantity (e.g. 110 pieces)
d. Time at required temperature ie. Above 2500C
e. Time of Transfer to holding oven. Activities a, b, c to be recorded before loading into the oven.

Baking and Holding Parameters

AWS Classification (*)	Baking		Holding Temperature ^{0}C (@)
	Temperature ^{0}C	Time (Hours)	
E7018	250 – 300	2	100 min
E7018-1	250 – 300	2	100 min
E7018-A1	250 – 300	2	100 min
E8018-B2	250 – 300	2	100 min
E9018-B3	250 – 300	2	100 min
E8018-B2L	250 – 300	2	100 min
E9018-B3L	250 – 300	2	100 min
E309 & E347	250 - 300	1	100 min

Note : (*) For other electodes, supplier's recommendations shall be followed.

(@) Maintain the temperature in the oven till issue.

15.61 Steel Structure of Boiler, Mill Bunker building including Coal bunkers, Ducts, Hoppers, etc.

(a) Only material which has been identified against mill sheet or test certificates shall be used for construction. All plates above 40mm thickness shall be 100% ultrasonically tested.
(b) Visual inspection of all welds shall be performed in accordance with AWS D.1.1.
(c) NDT requirements of structural steel welds (other than Coal Bunkers) shall be as under:-

(i) 100% RT/UT on butt-welds of plate thickness > 32 mm.
(ii) For plates of 25mm < thickness < 32mm - 10% RT/UT and 100% MPI
(iii) For plates of thickness < 25mm - 10% MPI/LPI.
(iv) All fillet welds of built up plate girders shall be inspected 100% by MPI.

15.62 NDT and PWHT of Pressure part and integral piping shall be guided by the site erection welding schedule.

15.63 Non-destructive examination of welds shall be carried out in accordance with the relevant design/manufacturing codes. However, as a minimum, the following requirements shall be met. Further, statutory requirement, wherever applicable, shall also be complied with.
(1) Temperature > 400 Deg, C or pressure exceeding 71 bar.
(i) 100% RT/UT on butt welds and full penetration branch welds.
(ii) 100% MPE.

(2) Temperature > 175 Deg, C upto 400 Deg. C or pressure exceeding 17 bar

and upto 71 bar.

i. 100% RT/UT on butt welds and full penetration branch welds for pipe dia more than 100 NB.

ii. 10% RT/UT on butt welds and full penetration branch for pipe dia upto 100NB.

iii. 100% MPE.

(3) For all other pipes not covered above, shall be subjected 100% MPE/ DPT in case of under ground pipes and 10% MPE/DPT in case of piping above the ground. Further, 10% of butt welds of underground piping shall be subjected to RT.

The scope of the work will comprise of but not limited to the following:
(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

16.1 The pressure testing for boiler / piping system shall be carried out as per IBR / Customer / customers' consultant specification / BHEL. Customers' consultant specification forms the part of this tender specification.

16.2 All pressure parts and piping systems shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall supply necessary labour and other services and make necessary arrangements to carry out the required tests as per the instructions and directions of the BHEL Engineers.

16.3 The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost.

16.4 Soundness of the welds shall be tested hydraulically under the supervision of the BHEL Engineer and Customer, to the pressure indicated in the drawing. Prior to the test, the boiler / piping system shall be inspected by the BHEL Engineer to the extent necessary to ensure compliance with clearance for the test, which will be obtained by the contractor from the Engineer.

16.5 Hydraulic testing, as required shall be carried out by the contractor. The servicing, installation, electrical connection, Erection and dismantling of Hydraulic Test pump, temporary pipelines, fittings, etc. shall be carried out by the contractor as part of this work.

16.6 All the hydraulic tests shall be repeated till all the pipelines / boiler to satisfy the requirements / obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted at various stages to the satisfaction of IBR inspectorate / BHEL / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost. The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for successful and reliable operation. These would include hydraulic test of piping, pre-boiler system detergent flushing/chemical cleaning, steam blowing, water washing etc. as instructed by BHEL.

16.7 Test records shall be made for pressure testing of above piping system. These records shall contain the following information:

a) Date of test
b) Identification of piping tested
c) Test fluid
d) Test pressure
e) Approval of the Engineer.

16.8 Contractor has to arrange required pumps with sufficient capacity for filling water in the tubes and pipes for conducting Hydraulic testing of LP lines. Contractor has to arrange Hydraulic Test pump / Hand Pump at his cost for Hydraulic testing of LP lines.

16.9 Hydraulic testing pumps for HP lines (Above 400Kg/cm2) shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, Erection and dismantling and returning to BHEL stores, etc, shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.

16.10 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.

16.11 In certain places blanking has to be resorted prior to Hydraulic test and spool pieces have to be erected in place of control valves, orifices and other fittings and these spool pieces have to be subsequently replaced with the regular valves/ fittings by the contractor at no extra cost.

16.12 For conducting Hydro test / steam blowing internals of valves and NRVs are to be removed, Hydro Test devices are to be fixed and after Hydro Test the internals are to be re-assembled by the contractor as instructed by BHEL without any additional cost.

16.13 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL. All thermowell points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

16.14 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration / venting / draining points with valves as per BHEL Engineer's instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL. Contractor shall cut steel blanks from steel provided without charging extra. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL Engineer's instructions.

16.15 The contractor shall make all necessary arrangements including making of temporary closures / dummy on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost. Necessary blanks will be provided by BHEL.

16.16 The contractor shall see that the water shall not be allowed to accumulate in open trenches where work is in incomplete stage, precautionary works such as blank flanging the open ends of the pipe line and filling the pipe line with water etc. shall be taken as directed by the engineer. Such works shall be to the contractor's account and no separate payment will be made for the same.

16.17 The contractor shall carryout the required test on the pipelines such as Hydraulic Test of various piping systems, Ultrasonic Test for weld defects and finding thickness, Dye penetrant test, Magnetic particles test for Weld defects and materials defects etc. All facilities (manpower, materials, equipment, consumables etc.) including proper approaches wherever required shall be provided by the contractor for satisfactory conduction of above tests. Special equipment such as magnetic particle tester, ultrasonic test kit and engineers required for these tests shall be arranged by the contractor along with Qualified technician within finally accepted rates.

16.18 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.

16.19 In general Hydraulic testing of piping shall be performed after all eventual pipe branches have been completed and valves installed. Should it be required to hasten erection work, pressure tests may be performed by sections. For this scope of work, the erected pipe lines shall be hydraulically tested as per site requirement in segments. For conducting hydraulic test, both ends of pipe lines shall be blanked by welding of plates. Only one or two set of plates and structural materials for blanking required for one segment will be provided by BHEL free of charge. After completion of hydraulic test in one segment, the same plates are to be cut and removed and utilized / welded on the other segment of the pipe lines, to carry out the hydraulic test for the respective segments. No separate plates for blanking for each segment will be provided. After completion of Hydraulic test, the required edge preparations shall be carried out on the end of pipe lines and to be welded with the respective pipe lines. In such cases joint connection shall be checked during a final and additional test, if required. The contractor shall note this aspect and quote accordingly.

16.20 During hydraulic test, the pipes being tested shall be isolated from the equipments to which they are connected.

16.21 Openings on piping for pressure / temperature impulse connections shall be fully closed during the test to prevent dust or foreign matter entering into the instrument piping inadvertently.

16.22 The following specifications shall also be completed with during hydrostatic test.

a. Vent nozzles with valves shall be provided at the highest point of the runs, to eliminate air pockets. At the lowest point drain nozzles, with valves shall be provided to drain water from pipes. The nozzles and valves shall be of the same materials as the pipe.

b. The lowest part of the pipe shall always be filled first with water.

c. Pressure shall be slowly increased (without shocks) to the stipulated value and maintained as long as required to visually check all joints.

d. Following the control specified above the pressure shall be slowly decreased to the design pressure after which the pipe shall be subjected to the peening test, applying

knocks every 150 mm approx. especially in the welded joint areas, with a 0.5 – 1.5 kg. Hammer (depending on the pipe wall thickness). The hammer used shall be a round headed one.

e. Following the peening test, the pressure shall be increased to the stipulated value and all welded joints shall be visually inspected.

f. Following these test, the pipe shall be drained or pumped out to the other section to be hydro test using the drain out pump to be provided by Contractor and wherever necessary shall be flushed with air for all pipes.

g. The pressure test is considered satisfactory if no cracks, unjustified pressure reductions, leakages, seepages etc., appear.

h. Should defects be found, these shall be repaired in the same manner as these during radiographic examination. Hydraulic test shall be repeated after defects have been repaired.

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The scope of the work will comprise of but not limited to the following:

TESTING, PRE – COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

17.1 The Contactor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would include Air leak test of Boiler, Ducts, hydraulic test of boiler, of Piping, and flow test, clean air flow test, Gas Distribution Test, chemical cleaning of piping and boiler, water washing, oil flushing of oil system, Steam blowing etc. as instructed by BHEL using contractors own consumables, labour and scaffoldings etc. Air leak test on pressure parts preliminary to hydraulic test by compressed air shall also be carried out to check and rectify the various leakage and defects etc. All the chemicals required for carrying out these activities will be supplied by BHEL free of cost.

17.2 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications though some of the tests / activities are not listed in these specifications.

17.3 After completion of erection of furnace, ducts and air heaters, a test shall be performed on the steam generator by the contractor to establish the tightness of the erected equipment from the outlet of Forced Draught (FD) fan through the steam generator up to terminal point/ as per scope of work.

17.4 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL to their client and also the relevant statutory authority at various stages of work.

17.5 The scope of pre-commissioning, commissioning and post commissioning activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning, steam blowing or any other tests as the case may be and will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the offsite disposal of effluents of the tests under the scope of this contract as per instruction of BHEL Engineer.

17.6 Chemical cleaning (Acid cleaning of piping / EDTA cleaning / alkali flushing) will involve the installation of temporary piping, valves, cutting of some of the existing valves, placing the rubber, wedges in the valves, gagging of valves, and installation of temporary tanks for chemical and for mixing. Necessary temporary access platforms to mixing tank are to be made by the contractor. The dissolving tank, neutralizing tank etc. required for acid pickling will have to be fabricated by the contractor within the quoted rate. Required materials will be provided by BHEL free of cost. Chemicals for chemical cleaning will be provided by BHEL and handling of chemicals & other consumables and other connected activities has to be carried out by the contractor at their cost. All other consumable would have to be provided by the contractor.

17.7 Lying of insulation of this temporary piping, tanks are to be carried out by the contractor within quoted rate, and required insulation materials will be provided by BHEL. The welding joints in the temporary pipe lines for acid cleaning and steam blowing are to be welded by HP welders only. Required NDT tests are to be carried out for the above joints as part of work as per customer / BHEL requirement.

17.8 All items / material required for conducting hydraulic test, alkali boil out, acid cleaning/EDTA cleaning steam blowing etc., will be supplied by BHEL / its customer. However, servicing, dismantling and returning of the same to stores is the responsibility of the contractor who is erecting the equipment / piping. Broadly the work on temporary systems will be as under:

- Erection etc. of all temporary piping including valves, tanks, effluent pumps, electrical control panel and cabling along with insulation and supports for steam blowing; chemical cleaning and effluent disposal are to be carried out as part of work. Contractor will be responsible for their operation and any servicing required during the pre-commissioning activities. He will also service the equipment and handover the equipment to the other agency for further erection / commissioning activities. All the pumps, motors and electrical control panels/ switch gear, valves and actuators will be furnished to the contractor after due servicing.
- Erection etc. of blowers and blanks and putty, temporary fixtures & ducts required for conducting air tightness test are to be installed. (Putty to be procured by the contractor).
- Dismantling of the temporary equipment, piping and return the same to the BHEL stores is also included in the scope of work.

The above is only a broad breakup of the temporary works. The engineer at site will make final break up. His decision will be final and binding.

Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic test and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.

17.9 Commissioning of the boiler will involve trial run of all the equipment erected. The boiler has to be lighted up for refractory drying, alkali boil out, acid cleaning/ EDTA cleaning, passivation, preservation, steam blowing and floating of safety valves. Flushing of all the lines by air, oil or steam as the case may be, trial run of the boiler, servicing of valves and any other works incidental to commissioning are to be carried out. Contractor shall supply manpower round the clock.

17.10 It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement. The required N_2 will be provided by BHEL for boiler preservation if required.

17.11 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps,

IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

17.12 It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers/supervisors.

17.13 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.

17.14 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.

17.15 During commissioning, opening / closing of valves, changing of gaskets, Re-alignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price /rates shall also include all such work.

17.16 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and re-alignment are necessary, the contractor at his cost shall do the same as per Engineer's instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.

17.17 All temporary supports shall be removed in such ways that pipe supports are not subjected to any sudden load. During hydraulic testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.

17.18 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.

17.19 Cleaning and servicing of all the filters / strainers, in the system shall be done by the contractor within the accepted price. All oils and greases to be filled in the main equipments as first fill and subsequent topping up's will be furnished by BHEL.

17.20 At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the BHEL Engineer and incorporate the same at no additional cost. The contractor shall carry out any other test as desired by BHEL Engineer/ Manufacturer on

erected equipment covered under scope of this contract during testing and commissioning to demonstrate the physical completion of any part or parts of the work performed by the contractor.

17.21 Hydraulic testing pump for Boiler shall be provided by BHEL free of hire charges (as mentioned in Chapter V). The testing pump will be issued to the contractor in working conditions. Installation, electrical connection, Erection and dismantling and returning to BHEL stores, etc., shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.

17.22 All pressure parts and some of the Low Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall make necessary arrangements including supplying the Low pressure Hydraulic test pump and other services to carry out the required tests as per the instructions and directions of the BHEL Engineers within the quote rates.

17.23 The valves, dampers, actuators etc. will have to be checked cleaned and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.

17.24 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable deaeration / venting / draining points with valves as per BHEL Engineer's instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL Contractor shall cut steel blanks from steel provided within quoted rate. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities / scars of cutting weld filled and ground as per BHEL Engineer's instructions. Seal welding of thermo-wells and blanks of Temperature Element are to be removed by grinding only after steam blowing.

17.25 The hydraulic testing of the equipment and piping, covered under this scope of work has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Before hydraulic test, all the hangers are to be locked by locking pin / plate or temporary support. After completion of Hydraulic test, these are to be removed and all hangers are to be readjusted if required, to the desired value within quoted value.

17.26 All the tests shall be repeated till boiler / pipelines / equipments satisfy the requirements / obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted at various stages to the satisfaction of BHEL / Boiler Inspector / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost.

17.27 Transportation of oil drums from customer/ BHEL's stores, filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer / BHEL stores. Similarly, transport of chemicals for various pre-commissioning activities / processes mentioned in the above clauses and returning of remaining and / or the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.

17.28 Replacing / cleaning of filters of the erected equipments, piping system etc. during pre-commissioning / commissioning stage are within the scope of work.

17.29 Contractor shall lay the temporary pipelines with fittings, accessories and erection / commission pumps, tanks, valves, fittings, hangers and supports and other installations as instructed by BHEL, Engineer for the purpose of chemical cleaning / alkali flushing / steam blowing / steam washing / steam flushing / water flushing / water washing / oil flushing etc. of piping and other equipments are in the scope of work. Necessary, materials for this will be provided by BHEL. Payment will be made at the rate applicable. Weight for the same will be based on jointly measured quantity and corresponding standard weights. No payment will be made for the equipments brought by the Contractor such as pumps etc and foundations made by the Contractor for temporary systems. Weight for the same will be based on jointly measured quantity and corresponding standard weights. Overhauling / cleaning / servicing of valves, pumps, fittings in temporary system and acid cleaning tanks etc prior to the above operations / activities will also be carried out by the contractor at his cost. All the chemicals will be supplied by BHEL free of cost.

17.30 Steam blowing lines for Oil piping shall be erected as per the instructions of BHEL Engineer. Necessary pipes and other items will be supplied by BHEL free of cost. All arrangements for erection including welding have to be arranged by the contractor as a part of the work. After completion of steam blowing, all the temporary lines to be dismantled and restoration of piping to be carried out, within quoted rate.

17.31 During steam blowing operations the required manpower shall be arranged by the contractor as per the instructions of BHEL Engineer within the quoted rates. The manpower for the above operation may be required round the clock if necessary. The contractor shall carry out the above operation as per the instructions of BHEL Engineer within the quoted rates.

17.32 During the initial stages of work, trenches for draining water may not be available for alkali flushing or mass flushing for discharging and draining the system and piping. Necessary low point drains and temporary piping for this will have to be erected by contractor from materials provided by BHEL.

17.33 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, re-fixing as per BHEL Engineer's instructions is within the scope of work/specification.

17.34 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces.

17.35 Contractor may have to replace old/damaged gaskets / packing etc. for equipments and the same shall be carried out by contractor as per requirement. Materials will be given by BHEL.

17.36 In case any erection defect is detected during various tests / operations trial runs as detailed above such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. The parts to be replaced shall be provided by BHEL free of cost. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

17.37 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.

17.38 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

17.39 During this period though the BHEL's / Client's staff will also be associated in the work, the contractor's responsibility will be to arrange required tools, man and plants till such time the commissioned units are taken over by BHEL's client.

17.40 Contractor shall cut / open works if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning opening of valves, changing of gaskets, attending to leakages, minor modification / rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.

17.41 For conducting gas tightness test, it may be required to erect the blowers and connecting ducts and commission the same for tightness test. It is the responsibility of the contractor to erect the blowers & dismantle once the test is over. Contractor shall carry out the work within the quoted rate and BHEL will provide blowers and dummies free of cost for conducting the test.

17.42 Contractor has to remove the all temporary supports, structures from inside of ducts and grind the all points after cutting and proper clean the duct and make it free from duct, weldments and burrs.

17.43 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programs made to achieve the schedule agreed with

customer After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part commissioning assistance for a period of six months after synchronization or till handing over of sets to customer, whichever is earlier.

17.44 Commissioning of the boiler will involve trial runs of all the equipments erected, lighting up of the boiler for refractory drying, blowing of the steam lines, floating of safety valves, flushing of all the lines by air, oil or steam as the case may be, trial run of the fans, Lub. Oil pumps, Mills, servicing of all equipments like dampers, actuators, valves etc. and any other works incidental to commissioning. Contractor shall provide required workers along with supervisors with all the requisite tools round the clock and material for all these works, which shall form part of the work to be done.

17.45 After floating of safety valves, the commissioning activities and trail operations will continue up to handing over of the unit. Contractor shall provide the manpower for three months from trial operation or submission of final bill with material reconciliation whichever is later. It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers as per the work requirement along with supervisors including necessary consumable tools etc., during this period. The rate quoted shall indicate all these contingencies also. The various categories of workers required for pre-commissioning, commissioning and post-commissioning activities are as follows:

a) Pipe fitters
b) Millwright Fitters
c) HP & structural welders
d) Riggers
e) Unskilled workers
f) Supervisors
g) Electricians
h) Laggers
i) Sheet metal fabricator/fitter
j) Any other category of workers as may be required.

Further in addition to the above, contractor has to arrange the following minimum manpower exclusively for assisting BHEL commissioning engineers during stabilization and trial operation period. This manpower will be directly controlled by BHEL commissioning engineers.

1. **One Engineer in charge for three shifts.**
2. **Two supervisors per shift for three shifts**
3. **Three fitters per shift for three shifts**
4. **Six helpers per shift for three shifts**

It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL commissioning Engineers and hence, overtime, may be involved. The contractor's quoted rate shall be inclusive of all these factors also.

17.46 During commissioning any improvement or rectification due to design requirement is involved and if the contractor is asked to carry out the job, they shall be paid at man-day rates. For this purpose, daily labour report indicating therein nature of work carried out, consumables used, etc. shall be maintained by contractor, and got signed by BHEL Engineer every day. It is not obligatory on the part of BHEL to get the works done by the contractor. They can employ any other agency if they so desire at that time.

17.47 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.

17.48 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.

17.49 The contractor has to provide required man power assistance during pre-commissioning and commissioning checks of motor operated valves, actuators, control valves etc. without any extra charges.

17.50 It shall be specifically noted that the employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also

17.51 **Boroscopic examination of headers etc. to be conducted after steam blowing. This requires cutting of Headers/ tubes to facilitate the boroscopic examination and re welding etc. are part of work and the same to be carried out with in the quoted rate. Boroscope shall be provided by BHEL free of cost.**

17.52 D.S.L / equivalent system for hoisting equipments are also to be erected and commissioned including load testing by the contractor within the quoted rates. Required manpower including electricians is to be arranged by the contractor for carrying out commissioning of electrical hoist and load testing of electrical hoist. Required loads will be provided by BHEL free of cost.

17.53 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works for dismantling, cleaning, lubricating and refitting are to be carried out by contractor at his cost.

17.54 No payment will be made for temporary installations made for testing of systems & similarly no payment will be made for electrical installations made for any temporary system.

All materials, equipment's necessary for installation of temporary system as above will be supplied by BHEL as free returnable issue in random sizes / lengths. However, servicing, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the Contractor.
In accounting of temporary materials following wastage allowances are provided:

1. Structural items : 4%

- ✓ Contractor shall cut / open / dismantle work, if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

- ✓ Similarly, during the course of erection, if certain portion of equipments erected by the Contractor has to be undone for enabling other Contractors / agencies of BHEL / Customer to carry out their work, Contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other Contractors / agencies of BHEL / Customer as per BHEL engineer's / agencies of BHEL / Customer s instructions. Claims, if any, in this regard shall be governed as relevant clauses of 'General Conditions of Contract

17.55 Contractor shall provide assistance in conducting of performance guarantee test (PG test) of the equipments under the scope of work. Contractor shall install all necessary tapping points; instruments etc and provide necessary assistance within the quoted rates. In case PG test is getting delayed beyond the contract period (normal plus extension if any) due to reasons not attributable to the Contractor, PG test issue will be mutually discussed and decided. However installation of necessary tapping points, impulse pipes, approaches etc are to be completed by the Contractor.

17.56 The contractor shall carry out all required tests, pre-commissioning and commissioning activities required for the successful and reliable operation of boiler, rotory machines etc.

17.57 The 'Initial Operation'/trial operation of the complete facility as an integral unit shall be conducted for continuous upto period specified. During the period of trial operation, all systems in the scope shall operate continuously at full load at designated fuel for a period not less than 72 hours. The Initial Operation shall be considered successful, provided that each item/ part of the facility can operate continuously at the specified operating characteristics, for the period of Initial Operation with all operating parameters within the specified limits and at or near the predicted performance of the equipment/ facility.

17.58 Specialized test equipment, if any, shall be provided by BHEL / its client free of hire charges. However, contractor has to take proper care of the equipment issued to him.

17.59 Contractor shall conduct the air/gas tightness test of all the ducts, dampers and gates under the scope of work. Erection etc. of blowers and blanks and putty required for conducting air tightness test shall be carried out as part of work. (Putty to be procured by the contractor without any extra cost to BHEL).

17.60 It is possible that due to any reason the final supporting may not be completed before conducting Hydraulic Test. The contractor may have to strengthen or install any additional supports as per instruction of BHEL. This work is a part of the work and no additional payment shall be made on this account.

17.61 All the shafts of the equipment shall have to be properly aligned to that of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid over-heating of bearings or other conditions, which may tend to shorten the life of the equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and lubricated as per recommendations of BHEL engineer.

17.62 Lubricating oil units of the rotating machines are to be cleaned thoroughly before pouring of final lubricating oil. Topping up of lubricants during running of the set till handing over to be done by the vendor. Required lubricants both for first filling and topping up are to be supplied by BHEL free of cost. The empty containers of the lubricating oils should be returned to BHEL stores/place indicated by BHEL from time to time.

17.63 The instruction of the motor manufacturer regarding storage of the motors and re conservation must be strictly followed without any deviation.

17.64 It shall be the responsibility of contractor to attend all punch points post commissioning and resolve the deficiency as may be necessary for handing over the unit to BHEL's Client.

18 PAINTING

Touch-up Painting: All Boilers structures/ components shall be supplied from BHEL units/ workshops with finish coats of paint. Therefore final painting is not applicable in the scope of contractor. However touch up painting (wherever required), **incidental to the work, shall be in the scope of the contactor, including supply of the required paints and primers and associated consumables.**

Though the final painting is not there in the scope of the contractor, in case any shop painted structure/component is required to be repainted due to the reasons attributable to the contractor such as Mis-handling, damage during erection process, other reasons incidental to the work etc, such re-painting/finish painting of the components/structures shall be in the scope of the contractor including the supply of paints and primers along with all required consumables & deployment of tools e.g wire brush, paint brush, Spray M/c, cleaning agents etc.

Contractor shall carry out surface preparation and touchup painting works as per BHEL/Customer specification and instruction of BHEL engineer at site.

18.1

Paints and painting work carried at site shall confirm to the following codes and standards:

IS:5 – Colour for ready mixed paints and enamels

IS : 101 Part 1 to 9 – Methods of sampling and test for paints, varnishes and related products

IS : 1477 Part I&II – Code of practice for painting of ferrous metals in building

IS : 2932 – Specifications for enamel, synthetic and exterior,
a) Under Coating
b) Finishing

IS: 9407 – Colour code for identification of pipelines used in thermal power plants.

Contractor shall satisfy himself, availability of all information in the specifications for proper selection of the paints and ensure their applications as per Codes.

For Bunker Material: Material shall be supplied with Intermediate Coat of two component Polyamide Cured pigmented with Micaceous Iron Oxide (MIO content minimum 30%) Epoxy based Paint (Solid by Volume Minimum 80 +/- 2%) of Minimum 100 Micron DFT. This Coat shall be applied in Shop after an interval of Minimum overnight (from the application of Primer Coat) by Airless spray technique. Intermediate Coat shall be followed with the application of Finish Coat of two pack isocyanate Cured colour acrlyic based Paint (Solid by Volume Minimum 55 +/-2 %) of Minimum 70 Micron DFT with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied in shop/site after an interval

of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer. The painting includes protection and cleaning, scaffolding, touchup etc. all complete as per specifications. Touch paint to aforementioned specification is in the scope of Contractor including paint supply.

18.2 Primer Painting**: (wherever applicable incidental to touchup painting & preventive painting)**

a) After surface preparation, two coats of **epoxy resin based zinc primer** shall be applied. Dry film thickness of each coat shall be as per the recommendations of primer/paint manufacturer. Primer shall be applied by either spraying or bushing ensuring a continuous film without "holidays". Primer coat shall be immediately applied without any time lag after the surface preparation.

b) Any equipment shall be carefully examined and where ever the primer coat is damaged shall be recoated with primer. However over the field welds, bolts and nuts etc. two primer coats as per a) shall be applied.

18.3 Finish Painting (wherever applicable incidental to touchup painting & preventive painting)

a) After the primer coat has dried out, the surface shall be cleaned of dust without scratching or in any way damaging the primer coat. Over this, dry surface finish painting shall be carried out.

b) Finish painting shall be carried out in two coats. Dry film thickness of each coat shall be as per the recommendation of the primer/paint manufacturer. Minimum thickness including primer and paint coating shall be as per specification.

c) Paint shall be applied either by brushing or spraying. It shall be ensured that brush marks are a minimum and the requirements of workmanship are as specified in IS: 1477 (for site painting works on systems, structures and components).

d) Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of ready mixed type in original sealed containers as packed by the paint manufacturer. Addition of thinners shall not be permitted.

e) No painting shall be done in frost/foggy weather or when the humidity is high enough to cause condensation on the surface to be painted. Paint shall not be applied when the temperature of the surface to be painted is 5^{o} C or below.

18.4 Touch-up painting on damaged areas –

a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer has to be applied by brush immediately after the surface preparation.
Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.

18.5 Painting of welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc. has been carried out by the bidder.
Clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.
(Painting procedure to be followed for touch-up painting on damaged areas.

18.6 The scope of work includes touchup painting and colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/Customer engineer at site for the equipments / components covered in these specifications.

18.7 In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

18.08
Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents.

18.09
During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, contractor shall repair the same free of cost.

18.10
Specified drying time shall be permitted from one to another coat.

18.11
This work requires working at higher altitudes from ground level to as high as 50 mtr and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of standard quality for safe and smooth execution of work.

18.12

Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by Contractor, BHEL shall have the right to recover the cost of such damages from the Contractor.

18.13
Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the Contractor without any extra charges.

18.14
In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipments inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. Laying of air hose pipe and any other line required shall be done by Contractor at his cost

18.15
Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

18.16
Acceptance of Final Painting for required thickness shall be as per the thickness measured by Alcometer by customer/BHEL Engineer. Contractor shall have to carry out painting till the required thickness is achieved.

18.17 Prior to application of refractory, bituminous painting (including supply) on the pressure parts and other area is under Contractor scope.

18.18 Painting two coats of bituminous paint on Insulation cladding sheet inner surface.

PAINTING SCHEME: Attached in VOL-I-E-2754 as "Annexure-3 Painting Schedule & Scheme"

19 APPLICATION OF INSULATION AND REFRACTORY

19.1 Handling at site stores / storage yard, Transportation to site of work, Application of refractory &Insulation materials and connected works for Boiler, Auxiliary boiler, ducts etc. Rotary machines and binding and cladding with sheets etc., using their own tools plants, tackles, all consumables, supervisor and men as enumerated in the scope of contract at Boiler and auxiliaries, Auxiliary boiler etc.

19.2 Application of refractory, wool insulation, sheet metal cladding, welding of hooks / supports to hold insulation and refractory's as wherever necessary for all the equipment covered in this contract are to be carried out as per instruction of BHEL Engineer at site. The systems covers under this contract including but are not limited to the following.
Boiler & its Auxiliaries, Boiler integral piping, Non Pressure Parts, Duct, dampers gates and its support structure, Rotating Equipments, Air Pre Heaters, ID/FD/PA fans etc. It also includes connected ducts, HP&LP piping, temporary acid cleaning and steam blowing piping connected tubes, oil and coal burners, oil and fuel and draft plants, all drain lines, traps, flanges, fine fittings, sampling lines, fans and other equipment like Vessels, Flash tanks, steam separator, ceiling heat recovery area etc.

19.3 The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.

19.4 All insulations and refractory materials including iron components and other sheets casing materials, etc., required as per drawing will be supplied by BHEL and the same have to be erected / applied as per the drawings and specifications of BHEL by the contractor.

19.5 Clean the Surface to be Insulated from Rust, Dust, Grease, Loose scale, Oil, Moisture, etc. Care shall be taken that flexible insulation is not unduly compressed. After insulating the equipment the gaps / joints shall be filled with loose wool/ moulded insulation as applicable

19.6 Painting of inner side of sheet metal covering over the insulation walls with two coats of anti-corrosive paint (IS-158) to be applied to the entire satisfaction of BHEL Engineer and application of bituminous sealing compound on cladding/ sheet metal joints shall also be carried out by the contractor. Retainer type 'A' must be coated with Aluminium paint. For which the required amount of paint, thinner and other accessories for painting, cleaning the surfaces etc., shall be supplied by the contractor within the quoted rate.

19.7 Bituminous sealing compound will be provided by BHEL free of cost which is supplied by the respective Mfg. Units.

19.8 It is the responsibility of the contractor to ensure that the insulation and refractory materials and sheet metal covering issued to him for application are well protected against loss or damage or weather conditions tending to affect its quality by the provision of close / semi closed sheds at his cost. All the insulation and refractory materials and sheet metal covering etc., issued to the contractor shall be properly stored and handled before application due the same. If any damage occur to the materials due to improper storage or due to any causes attributable to the contractor except for normal breakage or damaged material shall be to the cost of the contractor.

19.9 Contractor is liable for the exact accounting of the materials issued to him and any unaccountable losses shall be made good by him. The necessary accounting of the material issued will have to be furnished by the contractor periodically

19.10 The contractor shall provide the required quantity of wire, nails and other materials for centering works at their cost.

19.11 Wherever iron components are to be welded on non-pressure parts, the contractor shall employ only approved structural welders. It shall also be the responsibility of the contractor to arrange for welding hooks, flats, plates, supports and other fixtures also. All consumables tools and plants etc., required for the work shall be arranged by the contractor at their cost.

19.12 Contractor shall observe all precautions for laying and curing of Castable refractory. Any defective works found shall be re-laid by contractor at his own cost including materials.

19.13 Wool insulations are received at site as bonded and un bonded mattresses in standard sizes. These has to be dressed / cut to suit equipment / site work by the contractor.

19.14 For the insulation of hot air duct, gas duct, ID duct etc., un faced bonded wool, mattresses is to be used with wire netting (wire netting is supplied separately) on the outside for rigidity.

19.15 Dressing of insulation bricks to suit site conditions curing the refractory concrete applied, sheet cladding over insulations, form the part of this work.

19.16 Removal type of insulation to be provided for valves fittings, expansion joints etc., as per the drawings or as directed by BHEL Engineer.

19.17 All piping insulations shall be carried out in such a manner as to facilitate removal of bolts nuts and washers from the flanges.

19.18 Refractory works at complete combustion chambers, ceiling heat recovery area, oil and coal burner areas and application of castable refractory wherever specified in drawing or as directed by BHEL Engineer have to be carried out.

19.19 Fabrication of covering sheets may be necessary like preparing the sheets to the sizes and shapes specified in drawings, beading, swaging, beveling of sheets crowning of the sheets if necessary the same to supports over wool insulation with screws as specified in BHEL drawings or as instructed by BHEL engineer.

19.20 Fabrication, fixing or welding of hooks / supports to equipment of boiler parts, piping and other connected equipments to support wool insulation applying of primer paint to welded portion parts welding certain supports on parts other than pressure parts to hold refractory's (by engaging approved welders) as per the drawings or as instructed by BHEL Engineer will have to be carried out by the contractor.

19.21 The contractor shall leave certain gap and opening while doing the work as per the instructions of BHEL Engineer to facilitate inspection by Boiler Inspector or doing commissioning to fix gauges, fittings, instruments. Those gaps will have to be finished as per drawings at a later date by the contractor at his cost, as required by BHEL .

19.22 Cladding sheets shall be suitably pressed along with diagonals to form diamond shape so as to improve the strength of the sheets, to avoid humpiness and to give aesthetic look.

19.23 Plates ,bars, rods and other materials that are to be cut, and re-welded from the fabricated places to suit erection requirements for which no extra payment will be made to the contractor.

19.24 A log book shall be maintained by the contractor for the clearance of the area for application of refractory and insulation. If the contractor does the work on his own accord without prior permission the area should be redone at his cost.

19.25 The contractor shall draw only one week's requirement of material for their work from BHEL stores and keep them in their semi-closed shed near to the work area. The materials required for a particular space of work only shall be taken to the work spot. At the end of the day's work the leftover or unused materials shall be taken back to their semi-closed shed for keeping the materials safe. Necessary records shall have to be maintained by the contractor in respect of the above drawls / deposits, on daily basis as instructed by BHEL.

19.26 Wastages allowance for the materials issued are envisaged as follows:

a) Castable refractory 2%
b) Insulation bricks & mortar 2%
c) Wool mattresses 2%
d) Cladding sheets 5%

19.27 Making structural supporting works for pourable insulation, laying pourable insulation, adhering to all specifications and instructions shall be the responsibility of the contractor

19.28 Upon completion of daily work , the contractor shall remove from the vicinity of work all scrap packing materials rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer. Also, the contractor will demolish all the hutments, sheds, offices, constructed by him and shall clean the debris after the contract is over. In the event of his failure to do so, the same will be arranged / removed by BHEL Engineer and the expenses incurred with overhead will be recovered from the contractors.

19.29 Welding of hooks as per pitch, non-pressure parts, applying red oxide paint to the welded portion as directed as per drawings before application of mineral wool mattresses will have to be done by the contractor.

19.30 Applying different layers of mineral wool as directed and as per drawings and specifications for boiler and its auxiliaries, pipelines valves and other vessels and after fixing require holdings materials, suitably if necessary, fabrication of rings etc., and fixing as directed and as per drawings and specifications shall also form part of this work.

19.31 If necessary the hooks may have to be made from the rods, raw materials supplied in running lengths. The contractor may have to carry out this work also and use the same hooks.

19.32 In case the contractor is required to dismantle and re-erect certain area as and when required for pre-commissioning / commissioning activities the rate as indicated in the rate schedule shall be paid by BHEL for erection. However, for dismantling no extra charge will be paid under any circumstances.

19.33 Wherever additional / clamps, frame works, etc., are required to be fabricated and installed even though not indicated in the drawings shall be fabricated and installed at their cost. Only steel materials shall be given by BHEL free of cost , consumables like electrodes, gases etc., are to arranged by the contractor at his cost.

19.34 Contractor has to arrange required fire retardant covering material at their cost to protect the insulation materials drawn from BHEL before and after erection.

19.35 The contractor shall provide any fixtures, concrete blocks / wooden sleepers, etc., which are required for temporary supporting of the insulation materials at site.

19.36 Delay in clearance of mechanical equipment and piping for insulations is unlikely to happen. However, if any delay occurs, the contractor shall not claim anything extra, like idle charges.

19.37 Welding of all seal boxes covers after completion of refractory work shall be done by the contractor. No extra charges will be payable for the same.

19.38 Application of Castable refractory between tubes around burners on ceiling and as directed by Engineers and as per detailed drawings and specifications will have to be done by the contractor.

19.39 Welding of iron components directly on pressure parts and HP piping is are to be carried out by certified IBR high pressure welders.

19.40 Application of insulation and removal of the same for temporary piping under scope of erection of this contract is also included in the scope of the work. However, BHEL will supply the insulation materials free of cost.

19.41 Dressing of insulation to suit site conditions, sheet cladding over insulations, form the part of this work.

19.42 The temporary structures / items welded to permanent members / pipes are to be cut and removed without any damage. Any damage so to permanent members / pipes to be made good by the contractor at his cost.

19.43 The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision / clarification of BHEL Engineer will have to be followed.

19.44 All rectification including painting of Employer's structure which are damaged by contractor during his work.

19.45 Special type of insulation wool used in penthouse shall not be cut. Indiscriminately. All chicken mesh, cut bits shall be accounted for.

19.46 The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during all stages of work. Scaffolding materials (poles, gratings etc) shall be of light weight construction. Contractor shall arrange steel pipes & clamps with accessories like base plate attachment, fixing pins, struts etc for scaffolding required for this work. However, BHEL's decision in this regard shall be final and binding. Contractor shall arrange the scaffolding materials in sufficient quantity.

The Contractor shall provide the required quantity of wire, nails, and planks for formwork and other materials for shuttering and curing works.

19.47 All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall

have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length. Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work.

19.48 The mineral wool mattresses (bonded / un-bonded) / LRB mattresses are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.

19.49 The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec.

19.50 The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing.

19.51 The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important.

19.52 It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions. Closed / semi closed sheds or any other arrangements required for this will by him at his cost. If any damage occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.

19.53 Aluminum sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets, crowning the sheets if necessary will be carried out by him. Two coats of anti-corrosive black bituminous paint are to be applied on inner surfaces of the cladding. Bitumen sealing compound on the joints if necessary is included in the scope of this work. Contractor may note that he will also supply anti-corrosive black bituminous paint & bituminous sealing compound required for above works at his cost. However if supply by the BHEL MUs same will be issue free of charges to contractor.

19.54 Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractors responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract.

19.55 A logbook shall be maintained by the contractor to obtain clearance for application of insulation. If the contractor does the work on his own accord without prior permission the area may have to be redone at his cost.

19.56 The work shall conform to dimension and tolerances specified in the various drawing and documents that will be provided during the execution. if any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by engaging other agencies or departmentally and recoveries will be deducted from Contractor's bills towards expenditure incurred including applicable departmental charges.

19.57 All insulation and refractory materials including iron components and outer sheet casing materials, cladding sheets etc required will be supplied by BHEL and the same have to be erected/ applied as per the drawings and specifications of BHEL by the Contractor.

19.58 Wool insulation is received at site as loose bonded mattresses in standard sizes. These are to be dressed/cut to suite the equipments. Multiple layers of wool have to be applied as directed and as per drawings and specifications for all equipments/ systems covered under the scope of work.

19.59 The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for alunimium sheets have to be adhered to.

19.60 Cladding/outer casing shall be fixed expeditiously, so as to avoid damage to the insulation from the weather. The overlapping surface of outer casing/cladding sheet shall be coated with sealing compound, which will be supplied by BHEL free of cost.

19.61 To take care of bimetal corrosion due to variety of metals in contact of each other viz retainer to support, support to outer casing/cladding, cladding-to-cladding etc, suitable paints specified by BHEL, to be applied and/or neoprene rubber packing/strips or any other insert may have to be fixed as required.

19.62 The Contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL Engineer to facilitate inspection during commissioning to fix gauges, fittings, instruments etc. these gaps will have to be finished as per drawings at later date by the Contractor at his cost.

19.63 Contractor shall cut open works in needed as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over without any extra payment.

19.64 If during erection and commissioning any of the parts are to be insulated temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature

the same may necessitate removal and re-application of insulation and sheet metal cladding, which shall be done by the contractor and the erection rate quoted shall be inclusive of such contingencies.

19.65 Removable type of insulation shall be provided for valves, fittings, expansion joints etc. as per the drawings or as directed by BHEL Engineer.

19.66 All temporary pipelines required during testing, pre-commissioning and commissioning should be insulated as directed by BHEL at no extra cost to BHEL. However required insulation material shall be issued by BHEL free of cost.

19.67 The following works are also included in the scope of this contract.

Cutting of cladding sheets as per the profile of the equipment and painting on inner surface two coats of bituminous paint. Paint will be arranged by Contractor.

Cutting of the wool mattresses in the required shape and application of finishing cement of required thickness wherever required.

20 PRESERVATION & PROTECTION OF COMPONENTS

20.1 At all stages of work, equipments/materials in the custody of Contractor, including those erected, will have to be preserved as per the instructions of BHEL. Necessary preservation agents including the primer & paint, for the above work shall be provided by the Contractor.

20.2 The Contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

20.3 Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of Contractor in compliance of this requirement, BHEL will make suitable arrangement at Contractor's risk and cost.

20.4 The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc shall be returned to BHEL stores by the Contractor.

20.5 The Contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilisation of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the Contractor. Decision of BHEL on this will be final and binding on the Contractor.

20.6 For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.

21.1 The project shall be monitored by BHEL/NTPC through software based project monitoring tool: IOPMS (Integrated online project monitoring software).

a. The Key deliverables of online software-based project monitoring tool shall be as follows:
   1. Design & Development (Phase-I) – 2 month
   2. Implementation (Phase-II) – 2 month
   3. Handholding (Phase-III) – 2 months
   4. Sustenance (Phase-IV) – 6 months
b. BHEL shall be closely working with the NTPC team during the above four phases and shall train the NTPC team in carrying forward the system.

21.2 The project shall be monitored by BHEL/NTPC through Drone Based Project Monitoring & visualization system:

a. BHEL shall supply, installation & commissioning of Drone Based Project Monitoring & visualization system with all associated viewing and monitoring platform & its integration with IOPMS including configuration & generation of customized reports.
b. Periodic (monthly) Construction Progress Monitoring through Orthomosaic mapping ,3D Modellng and visualization with time lapse photography and 2D Video comparison shall be done till COF of the last unit and extensions if any Progress Monitoring shall be done with photogrammetry techniques taking high resolution Drone images from a calibrated camera. All the photographs shall be preciously georeferenced by GPS, Glonass etc. for accurate aerial triangulation process for generation of orthomosaic and 3D data.
   I. BHEL shall carry out the entire exercise of Survey and processing of the orthomosaic
   II. BHEL shall install 3D Platform for viewing relevant data to be generated during the survey as well as in further phase of the project parallel to initiating the reconnaissance survey. BHEL shall install the platform both in the staging and production environment.
   III. The platform shall provide capabilities to view and analyze the data submitted during reconnaissance survey phase.

c. Key Deliverables:
   - High resolution Geo-tagged images
   - 3-D Model
   - Orthomosaic
   - Contour Map at required scale and interval
   - Profile Graph (Longitudinal/ Cross sectional)
   - Quantity Estimates Report
   - Photogrammetric data (Measurements) reports.
   - Periodically Aerial Videography (4K Aerial videos)
   - High resolution Geo-tagged images
   - Real time data /video shooting on requirement basis.
   - Including web based output for visual monitoring on NTPC server

21.3 Special conditions

a) If the Engineer-in-Charge is not satisfied with the work of manpower deputed for the work, he may insist for replacement through written notice. After receiving such notice, the Bidder shall depute replacement manpower within 3 days.

21.4 Intent: Objective of such system is sequential and timely availability of Material, Manpower and T&P as well as ensuring quality during erection. which is critical for Project success. Smart Project Management System (SPMS) shall cover entire lifecycle of project material – dispatch from

vendor/sub-vendor location, receipt at NTPC Project, in plant material management, status till installation at site with the use of Smart material management system and also Smart Monitoring and tracking of Construction manpower and T&P. SPMS shall also include tracking of mandatory spares. The whole system must result in controlling project costs, compressing schedules, improving risk management, ensuring quality during erection and to avoid delay in project execution due to non-traceability of material. Smart Project Management system (SPMS) shall be valid up to the COF of last Unit.

21.5 Supply Chain Management: BHEL/its OEM/its suppliers shall affix RFID tags/Trackers/QR Code on the item & punch the same before dispatch with RFID reader/BLE beacon & enter details of item associating with RFID tag no./Tracker no.

A. Each item identifiable with PGMA-DU / other identification scheme of the BHEL/OEM/OES shall have a RFID/QR.

21.6 WORK FLOW:

I. BHEL shall enter the details of material shipment in a web portal/Mobile Application and will generate a unique code before the material is dispatched & affix the same to material package & configure the same with RFID tag attached.

II. Receipt of this material at NTPC gate by authorized personnel (e.g. CISF) at NTPC gate by scanning the same RFID - automatic status update in web portal from "under transit" to "receipt at site". BHEL will use the same RFID to store the material at site - status will be updated in web portal regarding storage location at site. Now status shall reflect "material in storage" along with storage location. So material is identified till it is erected at site.

BHEL shall supply RFID readers/BLE beacons & Hardware & Software for communication & installation & commissioning for OEM/OES works, employer's site material gate & BHEL's stores at site.

Further, BHEL shall provide sufficient nos. of RFID readers/ BLE Beacons to create multiple zones in store & support warehouse management which shall facilitate contractors/user to track & locate items location in Store/Warehouse.

21.7 GPS tracking for Over Dimension Consignment (ODC)

BHEL shall install GPS trackers (with inbuilt GPRS module) in ODC consignments vehicles and manage the tracking of such vehicles on real time basis. The tracking shall be real time and web based.

21.8 Construction Manpower Tracking

a. Implementation of RTLS (Real Time Location Tracking system) along with the supply of associated wearable tags/ RFID tags affixed to helmet. This shall be applicable for all manpower hired/deployed by BHEL's Contractor for this project. Every personnel entering in to NTPC site premises for carry out any work shall be tracked. [Separate tagging for visitors]. Geofencing/BLE beacon based zoning of the erection area shall be done to track workforce deployment and safety purposes. Work force monitoring Dash board (planned vs actual deployment) shall be made available. Total 10 nos. of zones /Geo-fence shall be created. As a minimum complete main plant area & offsite system such as CHP, AHP, CWPH, CT, DM, PT & Switchyard shall be covered with the system.
b. BHEL shall supply Real Time Location Tracking System (RTLS) to track the near real time location of operator/worker in the plant based on 802.11 active RFID tags or similar other technology e.g. LPWAN LoRa that serves the intent of the specifications here.

c. The system can also make use of the wireless mesh network. BHEL shall provide all required hardware along with fixed & running charges e.g. RFID readers, BLE beacons & LoRa backhaul.
d. The system shall comprise of wearable tags for operator/worker during operator movement or any other field activity for example construction work, maintenance. The system shall cover all areas as identified during detailed engineering & are to be configured as per the scope of this contract and shall be able to differentiate between different floor levels in a building or a particular area. The system shall be able to simultaneously track all the wearables. The system shall be able to provide a list of workers in a particular area or zone at any point of time.
e. For the purpose the complete area shall be divided into various zones or areas. It shall be possible to assign/mark each of the wearables against the details of the person (for example name, employee no., photo, employing agency, etc.) who is carrying that particular wearable device. If an operator who is being tracked through this system moves out of the system range, the system shall be automatically able to start tracking that operator again as soon as he/she re-enters the area of coverage.
f. Further, it shall be possible in the system to keep a log of movement of the field worker for a configurable amount of time (hours/days/months) in FIFO mode till the last tracked location, even if the worker moves out of range. The system shall be so designed that it shall be able to detect and differentiate between multiple tags at the same location. Also, the system shall provide a provision to automatically raise an alert if the tracked tag/operator has not moved from a certain location even after a certain period of time has elapsed. The accuracy of location shall be of the order of few meters (up to 10 meters) or better. Further the system shall be capable enough to add 30% more wearable trackers/tags to system without the need of purchasing/upgrading any hardware for the infrastructure except for the additional trackers/tags.

21.9 T&P tracking & Equipment monitoring

Heavy equipment will be tracked with real-time position location for fleet management. Deployment vs planned reports shall be generated. Equipment Condition monitoring data like Service Meter Reading, Operation maps, Loading, fuel levels, operating info, idle time etc. shall be captured. IIOT based such solution shall be based on open protocols & all hardware & software for IIOT architecture VIZ Sensors, Gateways, Database/Cloud application, Communication Hardware & software & Visualization layer has to be supplied by Contractor within quoted price of this package. All T&P equipment deployed by contractor to be covered. Minimum 5 signals per equipment has to be included by BHEL's Contractor.

21.10 Real time monitoring reports/Dashboard and integration with Employer's system

BHEL shall coordinate with NTPC and offer SPMS to furnish a complete system as per above specified requirement, and also to coordinate with NTPC for proper interfacing of NTPC's existing system e.g. Contract Labor Information Management System (CLIMS), NTPC's existing Access Control System with all other equipment and systems shall be supplied by BHEL. SPMS shall be integrated with NTPC's Project monitoring center (PMC) through NTPC LAN. All hardware & software e.g. Firewall with IPS shall be provided by BHEL.

21.11 Quality Control

i. Smart Storage area/yard monitoring

All storage area including the open yards and covered sheds shall be equipped with smart storage monitoring system. All the boundaries of the storage areas shall be geofenced with fixed camera and entire inside area of storage (both open yards and covered sheds) shall be

covered with PTZ cameras such that there shall not be any dark patch. Minimum 80 number of CCTV cameras shall be installed. All camera shall have analytics to identify storage condition, water logging, excess vegetation, any intrusion. In addition to this, each PTZ camera shall have auto tracking analytics to track any intruder. All hardware and software required to meet above intent shall be supplied by BHEL. Feed of all these cameras shall be available in quality control room.

ii. Quality control Room –
BHEL shall establish Quality control room. It shall have all the real time data of the PWHT (Post Weld Heat Treatment) & CCTV cameras feed installed at strategic locations in the plant like SG, TG area where erection work is in progress and digital records of NDT. Minimum 25 no of Camera is considered for this purpose. Locations of these cameras will keep on changing depending upon the requirement at site. All hardware and software required to meet above intent shall be supplied by BHEL.
Quality control room will not be a dedicated physical room, rather all the data will be available on server & two no of LED screens will be placed adjacent to the Head of FQA for monitoring the project progress activities.

iii. Heat Treatment Smart PWHT -
Pre-heating, post-heating and post-weld stress relief heat treatment chartless recorder / IIOT sensors duly password protected with a connectivity to remote server /Cloud.

iv. Computed Radiographic Testing (RT)–
Computed RT shall be used as an advanced Engineering Practice. BHEL/its contractor shall ensure **minimum 10% computed radiography of weld joint** shall be performed in construction phase.
BHEL/its contractor shall ensure the transfer & storage of these records in Server.

21.12 Safety Control Room:
BHEL shall supply and install IP based CCTV system along with IP based announcement system which shall be used for monitoring safety during construction from Safety control room. It shall be possible to make announcements to alert the workers whenever required. These cameras shall be installed at all strategic locations in the plant area. Initially these installations will be temporary & locations will keep on changing depending upon the work in progress.
Drone based safety monitoring shall be done during day to monitor critical works at a close range. The images / Video feed from drone shall have sufficient resolution to identify the work under progress.
Analytics for Safety vest and helmet shall be deployed on all 25 nos. of cameras and any safety violation shall be alerted through IP based announcement system. Any over speeding of vehicle shall also be warned through speakers automatically.
24/7 safety control room shall be functional.

22.1 Specific Exclusion:

a. All civil work other than specifically mentioned in this Technical condition of Contract.

b. Non-Destructive Testing - Phased Array Ultrasonic Testing, Computed radiography.

c. E&C of Piping outsite SG area

d. E&C of ESP

e. E&C of FGD.

f. Execution of ACW & CW Piping work.

Following points may be noted with respected to the Welding schedule

Erection/Final Welding Schedule of subject Project shall be made available during Erection

1. Erection and assistance for commissioning & Trial Operation including handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site of; Boiler and its auxiliaries, Boiler integral piping, Structure for bunker (BHEL Mfg units Supplied items), Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, SCR ready items, Lining and Insulation, Supply and application of touchup painting, (As and wherever required) package of Unit #1 at 2X660 MW NTPC Talcher Odisha

And

2. Erection of Bunker & allied works, including supply & installation of items as per BOQ of Unit #1 at 2X660 MW NTPC Talcher Odisha

SECTION	DESCRIPTION OF PACKAGES / ITEM OF WORK	Percentage weightage w.r.t Total Price
A	E&C of Boiler & Auxiliaries	93.7%
B	Erection of Bunker & Allied works	6.3%
C	Execution/Mobilisation of special resources (ORC/PVC Shall Not be applicable on Section C)	-
	Total Contract Value	**A+B+C**

SN	Contract (Main Package)	QTY	UOM	Weightage/ Factor "X"
1.1	Structure	19,093.000	MT	0.461580209328
1.2	Pressure Parts	8,991.939	MT	0.271853135486
1.3	Non Pressure Parts (Upto ESP Inlet Funnel)	5,170.415	MT	0.130341577832
1.4	Rotating Machines	3,674.697	MT	0.064509512921
1.5	Insulation- Wool Matress	1,051.000	MT	0.026632218188
1.6	Insulation- Pourable and Castable	250.000	MT	0.006228310304
1.7	Insulation- Iron Parts	170.000	MT	0.004690500949
1.8	Insulation- Aluminium Cladding Sheets	281.000	MT	0.009252041731
4.1	SG area Piping P-91/92	52.000	MT	0.004638452236

4.2	HP Piping Including P-11,P-12,P-22	109.150	MT	0.007614730293
4.3	LP Piping	162.200	MT	0.008427672774
4.5	Hangers/Pumps & Tanks	105.950	MT	0.003962903236
4.6	SS Piping	2.000	MT	0.000268734723

Estimates of Bunker and Allied work		**UOM**	**Qty**	**Weightage / Factor "X"**
1514	Providing and installing **under deck insulation** with resin bonded **rock wool 50 mm** nominal thickness conforming to IS 8183 having a density of 48kg/cum using **minimum 0.05 mm thick aluminium foil** on exposed surface followed by 0.6 mm dia and 25 mm mesh GI wire netting, fixed at various elevations with rawl plugs including clips but excluding cost of insulation.	**SQM**	100	0.001298924612
1516	Providing and fixing non metal opaque **PVC sheet similar to ONDEX roofing** or equivalent including all fixing accessories.	**SQM**	67	0.001582694328

A1519	Fixing **Factory made (Continous Line) prefabricated sandwiched Permanent colour coated metal cladding** comprising top sheet as troughed(minimum depth of trough shall be 30 mm) permanently colour coated sheet & bottom sheet as **plain** permanently colour coated for covering of exposed metal/concrete / brick surfaces with **insulation shall be of Polyurethane type of minimum 50mm thick (excluding trough). The polyurethane shall be Chlorofluorocarbon (CFC) free and self-extinguishing and shall conform to IS 12436: 1988. It shall have Modular Density 40 +/- 2 Kg/m3 and Thermal Conductivity @ 10 Deg.C 0.017 - 0.020 W/M 0k, Water absorption (% by vol) 3.1, Critical Oxygen Index 23 and Compressive Strength 1.2 Kg/sq.cm,** sandwiched between the two sheets, each sheet shall be high strength tensile steel sheet **0.5mm bare metal thickness (minimum)** of YS350 as per IS 15961 /grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z 275 / aluminium-zinc alloy coating to class AZ150 on both sides, both sheet shall be permanently coated with silicon modified polyster (SMP with silicon content of 30% to 50%) paint of minimum 20 micron DFT on exposed surface on 5 microns (min.) epoxy primer/phosphate primer coat and 10 micron (min.) SMP on 5 micron (min.) epoxy primer/phosphate primer on other face, SMP paint system shall be of **industrial finish of product type 4** of AS/NZS 2728,troughed sheet shall be of approved profile, sectional properties, (suitable for the specified loading / deflection and purlins / runner spacing), colour and shade, at all levels, including all labour, materials, equipment, handling, transportation, special coated fastener conforming to **corrosion resistant Class 3 of AS3566 and tested for 1000 hours salt spray test**, fixing insulated sandwiched metal sheet with the structural members below for supporting the sheeting system, scaffolding, equipment, end and side laps, cutting of openings, preparation of working drawings, testing, etc., all complete, as per specifications. Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non stainless material and be flexible enough not to interface with fit of the sheets. Coated surface shall be provided with a **protected guard film** (polyethylene) of about 40 microns to avoid any damage to the coating during handling. Overlap shall be min. 100 mm or as specified by manufacturer.	**SQM**	1094	0.005747560163

A2301	Erection of Medium and High Tensile structural steel (**Grade designation E350 Quality B0 (Fully killed), conforming to IS 2062. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised and shall also be 100% ultrasonically tested as per ASTM –A578 level BS2.)** with rolled section / built up section / combination of both conforming to IS:2062, pipes conforming to IS:1161/ IS:1239, chequered plate conforming to IS: 3052, mild steel rounds, monorails, stays, safety chains, ladders, MS grating etc. in columns, beams, gantry girders, bunkers, silos, hoppers, roof trusses, portals, laced purlins, space frames, hangers, struts, monorails, galleries, stiffeners, wall beams, sheeting runners, brackets, stub columns, bracings, cleats, trestles, base plates, splice plates, chequered plate flooring, decking and seal plates, steel frame grid over false ceiling, walkway platforms, ladders, stairs, stringers, toe-guard/kick plate, grizzly gratings, treads, landings, hand-rails etc including 2 coats of redoxide zinc-chromate primer (one coat at shop and one coat after erection), connection design & preparation of fabrication drgs, collection of steel from stores, fabrication, straightening, cutting, bending, rolling, grinding, machining, drilling, welding, electrodes and other consumables, alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, edge preparation, preheating (min preheat and interpass temperature of 20o C for welding over 20 mm and upto 40 mm & 66o C for welding over 40 mm and upto 63 mm & 110o C for thickness over 63 mm & use of low hydrogen/ radiogenic electrodes), post heating, testing of welders, inspection of welds, visual inspection, non destructive and special testing, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete. Including appointment of a **independent** seperate agency, approved by BHEL, for review and approval of fabrication drgs, in consultation with BHEL.(Rate shall be exclusive of surface preparation and primer)	**MT**	2229	0.806510152736

A2305	Providing and applying **Intermediate** Coat of two component Polyamide Cured pigmented with Micaceous Iron Oxide (MIO content minimum 30%) Epoxy based Paint (Solid by Volume Minimum 80 +/- 2%) of Minimum 100 Micron DFT. This Coat shall be applied in Shop after an interval of Minimum overnight (from the application of Primer Coat) by Airless spray technique. Intermediate Coat shall be followed with the application of **Finish Coat** of two pack isocyanate Cured colour acrlyic based Paint (Solid by Volume Minimum 55 +/-2 %) of Minimum 70 Micron DFT with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied in shop/site after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer. The painting includes protection and cleaning, scaffolding, touchup etc. all complete as per specifications.	**MT**	0	
2307	Fabrication, erection and alignment of factory made **electroforged galvanised grating** units with mild steel having minimum **hot dipped** galvanisation conforming to IS:2062, finish blast cleaned to Sa 2 ½ finish or cleaned by acid pickling as per ISO 8501-1 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. including fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete.			
a	Minimum galvanisation of 610 g/sqm	**MT**	59	0.021352523676
2308	Fabrication, erection and alignment of **factory made galvanised welded grating units** with mild steel conforming to IS:2062 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. including 2 coats of redoxide zinc-chromate primer (one coat at shop and one coat after erection), fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete.	**MT**	1	0.000361907181
2311	Fixing in position of **permanent mild steel bolts** (class 4.6 as per IS : 1367 and grade `C' as per IS: 1363) and nuts, washers etc. up to and inclusive of 39 mm diameter and upto 300mm long for structural steel work etc all complete.	**MT**	2.229	0.000806691106
2312	Fixing in positing of **high strength structural bolts** (of property class 8.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	**MT**	78	0.028227855346

A2312	Fixing in positing of **high strength structural bolts** (of property class 10.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	**MT**	11	0.004032550764
2313	**Dismantling of steel structure**, lowering of material and carriage of the dismantled material up to field fabrication shop / projects storage including temporary dismantling, cutting, re-welding, supporting, and restoring to correct position all temporarily dismantled members, re-alighment of all adjacent connected members to their correct positions (weight of such adjacent members and temporarily dismantled members not payable), scafolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	**MT**	10	0.001623353690
2314	**Addition to, alterations in and/or modifiction of "Erection Marks"** including cutting of parts, gauging of welds, cutting, grinding, fabrication, welding, drilling holes, straightening, removal of bends, raising to the required level, painting, transportation, return of unutilised steel pieces to the project store, temporarily dismantling, cutting, re-welding, supporting and restoring to correct position of all the temporarily dismantled members, realignment of adjacent connected members (weight of such temporarily dismantled and adjacent members not payable) etc all complete for the following:			
a	In erected position	**MT**	5	0.002088348562
b	In fabrication yard	**MT**	5	0.001671887152
2315	**Re-erection of dismantled fabricated structural steel** members including carriage of modified "Erection Marks" from the field fabrication shop to erection site, lifting to required posiion, aligning in position, tack welding, final welding and touch up painting including temporary dismantling and re-erection of temporarily dismantled members, cutting, rewelding, supporting and restoring to the correct position of all temporarily dismnatled members, re-alignment of adjacent connected members(weight of such temporarily dismantled members and adjacent members not payable), scafolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	**MT**	5	0.001228742406
2317	Fabrication and erection of minimum **4 mm thick stainless steel liner conforming to ASTM A 240 S204 (Type 304)** ; Finish Grade 2B (Cold rolled, Annealed & Pickled and Skin passed) on M.S. plate for inside surfaces of hopper & mouth of hopper of bunkers including fixing with stainless steel studs, bolting (including countersunk), welding with electrode classification E308L for welding of stainless steel to stainless steel and E309 for stainless steel to mild steel, fabrication detailed drawing etc.all complete. (The measurement for the item of stainless steel liner in hopper shall be based on the actual finished weight of SS liner over hopper)	**MT**	56	0.058313517961

A2319	Providing and fixing preformed flexible open ended bellow strap of neoprene of minimum thickness 2 mm and minimum width 200 mm under un-stretched condition with aluminium stripped edges as sealing below top of bunker and bottom of tripper floor to avoid the coal dust nuisance all complete.	**RM**	198	0.013919376387
2321	Fabrication and fixing of **MS pipe hand railing of 32 mm/40 mm dia** including transportation, loading/unloading, paintng etc. all complete as per specification.	**MT**	3	0.001085721543
2322	Fabrication and fixing of **GI pipe hand railing (900 mm high) of 32 mm/40 mm dia (**Medium Grade) including galvanisation @ 610 gm/sqm over blast cleaned steel surfaces etc all complete. item includes transportation, loading/unloading, suitable paint etc.	**MT**	10	0.003438118219
2323	Conducting **radiography test on welds** wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	**RM**	20	0.002390021286
2324	Conducting **ultasonic test on welds** wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	**RM**	20	0.000410017133
2325	Conducting **ultasonic test on steel plates** as per ASTM-A435 or equivalent wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	**SQM**	20	0.000192925547
2326	Conducting **magnetic particle test on welds** wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	**RM**	20	0.000289186937
2327	Conducting **dye penetration test on welds** wherever specified by the engineer including provision of necessary equipments, measuring devices, gauges etc. all complete (over and above the work already specified in the specifications.)	**RM**	20	0.000298853353
2328	Supply, fixing l**ightning arrester and air terminal over roo**f of power house building, pump house and other structures inluding all materials, labour, electrodes etc complete (all materials to be supplied by the contractor).	**NO.**	1	0.000099020346
MRS	Fabrication (site fabrication), transportation and erection of Medium and High Tensile structural steel (Grade designation E350 Quality B0 (Fully killed), conforming to IS 2062. Rolled section / built up section / combination of both conforming to IS:2062, pipes conforming to IS:1161/ IS:1239, chequered plate conforming to IS:	**MT**	60	0.043030049567

	3052, in silo collection of steel from stores, fabrication, straightening, cutting, bending, rolling, grinding, machining, drilling, welding, electrodes and other consumables, alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, edge preparation, preheating (min preheat and interpass temperature of 20o C for welding over 20 mm and upto 40 mm & 66o C for welding over 40 mm and upto 63 mm & 110o C for thickness over 63 mm & use of low hydrogen/ radiogenic electrodes), post heating, testing of welders, inspection of welds, visual inspection, non destructive and special testing, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete. Blast cleaning of steel structures by shot blasting to near white metal finish conforming to Sa 2 ½ finish of Swedish standard ISO-8501 and shall have profile of 40 to 60 micron and applying two component self/moisture curing Inorganic Zinc ethyl Silicate Primer Coat (Solid by Volume Minimum 62+/- 2% and Zinc content %age on dry film minimum 80%), Zinc dust pigment conforming to ISO 3549 and Zinc dust pigment content determined in accordance with ASTM D 520, Minimum Dry Film Thickness (DFT) of primer coat of 70 Micron, including touch-up painting, using Airless spray technique in shop etc all complete. Providing and applying Intermediate Coat of two component Polyamide Cured pigmented with Micaceous Iron Oxide (MIO content minimum 30%) Epoxy based Paint (Solid by Volume Minimum 80 +/- 2%) of Minimum 100 Micron DFT. This Coat shall be applied after an interval of Minimum overnight (from the application of Primer Coat) by Airless spray technique. Intermediate Coat shall be followed with the application of Finish Coat of two pack isocyanate Cured colour acrlyic based Paint (Solid by Volume Minimum 55 +/-2 %) of Minimum 70 Micron DFT with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied in shop/site after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer. The painting includes protection and cleaning, scaffolding, touchup etc. all complete as per specifications. (Rate shall be inclusive of surface preparation, blasting, primer and painting (includign supply of paint))			

S.N	Section C: Execution/Mobilisation of special resources	UOM	Qty	Basis	Rate (in Rs.)	Amount (in Rs.)
1.0	Construction and maintenance of labour colony having adequate no. of rest rooms along with toilets & fencing etc. as per drawing attached and TCC including associated civil and structural works on built, own and operate basis. Proposal for construction of these hutment is to be got approved from BHEL before organizing material and execution. Payment towards construction/development of labour colony of 03 Sets as per drawing attached and as above shall be paid by BHEL as per following payment terms: i) On receipt of material for each set of labour colony at site - 50% ii) On completion of installation of labour colony for each set - 20% iii) Handing over for accommodation of labour with all amenities for each set - 30% Land for labour colony shall be provided by BHEL free of cost as per availability outside project area within 5Km, Necessary levelling/dressing of land shall be done by the contractor. All arrangement for electricity and drinking/service water to be arranged by the contractor within his quoted price.	Labour coloney set	3	FIXED VALUE	50,00,000	150,00,000
2.0	Backhoe Loader/JCB	Months	12	FIXED VALUE	1,00,000	12,00,000
3.0	Man lifter of min. 17mtr height capacity	Months	15	FIXED VALUE	1,00,000	15,00,000
4.0	Deployment of 3 nos. of Safety personals at site, within 15 days, as and when intimated by BHEL. This deployment shall be over and above the requirement as per Health and safety Environment plan. The deployed manpower shall report to BHEL and may be deployed at any location within the plant. BHEL shall make payment on pro rata monthly basis on actual deployment at the rate of Rs. 25,000/- per person per month (considering 26 working days in a month). In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will levy penalty of Rs. 100 per service day, for delay.	Manmonth	66	FIXED VALUE	25,000	16,50,000
5.0	Deployment of 2 nos. of Computer operator at site, within 15 days, as and when intimated by BHEL. The deployed manpower shall report to BHEL. BHEL shall make payment on pro rata monthly basis on actual deployment at the rate of Rs. 25,000/- per person per month (considering 26 working days in a month). In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will levy penalty of Rs. 100 per service day, for delay.	Manmonth	66	FIXED VALUE	25,000	16,50,000

S.N	Section C: Execution/Mobilisation of special resources	UOM	Qty	Basis	Rate (in Rs.)	Amount (in Rs.)
6.0	Transportation charges towards extra movement of material (beyond 5 Kms) from BHEL storage yard to Project premises (in case storage yard is beyond 5 Km)= Rate is calculated considering storage yard shall be at 10 KM approx. - Rate shall vary depending upon the actual distance of Storage yard from Project gate. Hoever, Rate of Rs. 5 per Km per MT shall remain fixed	MT	41562	Rs. 5 per KM per MT	25	10,39,043
	TOTAL AMOUNT OF SECTION C					**2,20,39,043**

Note: The quantity indicated in the BOQ is approximate only and is liable for variation. Payment will be as per actual quantity executed as certified by BHEL Engineer above Unit rate of individual items of BOQ.

Instructions to the bidders

1. Schedule of Rates and Quantities consist of the followings:
   (i) Section-A: E&C of Boiler & Auxiliaries
   (ii) Section-B: Bunker & allied works
   (iii) Section-C: Execution/Mobilisation of special resources (Prices Fixed by BHEL)

2. **Bidders to quote Total Lump-sum Price for Section-A & Section-B in Rupees in VOL-II-Price-Bid-2754 at BHEL E-procurement Portal.** Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void.

3. Prices for Section-C: Execution/Mobilisation of special resources are already fixed by BHEL.

4. Offer evaluation (L-1, L-2 status) of the bidders shall be done based on the Total Lumpsum Price of **Section-A+ Section-B** as quoted in the Volume II Price Bid.
5. Final awarded price shall be based on Total summation of prices of **Section A + Section B + Section C**

6. BHEL has pre-fixed the Weightage/Factor as detailed above in this chapter for deriving the Unit Rates. By multiplying BHEL pre-fixed Weightages / Factor and the total prices derived in sl no. 2 above; unit rate of individual items shall be derived. Unit Rate/Item Rate thus arrived shall be rounded off to two decimal places.

7. Based on the quantities of individual item and the item rates arrived in Sl No 6 above, the total amount for individual items shall be derived. Total amount thus derived shall be rounded off to two decimal places.

8. Section C: Consists of Execution/Mobilization of special resources, for which Rates are fixed throughout the contract period and Extension period (PVC shall not be applicable for Items under section C).

9. **Bidders to note that this is an item rate contract. Payment shall be made for the actual quantities of work executed at the unit rate arrived above.**

10. For the convenience of bidders, BHEL has issued an excel sheet with all the requisite formulae as described above. ***However, the referred excel sheet shall not form part of contract document. Further, this sheet should not be uploaded at the e-Portal.***

THIS TENDER SPECIFICATION CONSISTS OF FOLLWING ANNEXURE:

S.N.	DESCRIPTION
Annexure-1	TnP Hire Charges 01.09.2021 to 31.08.2023
Annexure-2	Guidelines for NDE and Heat Treatment Agency-PSWR
Annexure-3	Painting Schedule
Annexure-4	Labour Colony drawing
Annexure-5	GA Drawings
Annexure-6	Ceiling Girder
Annexure-7	Technical Specification – NTPC

NOTE- ALL THE ABOVE MENTIONED ANNEXURE ARE UPLOADED ON E-PROCUREMENT PORTAL AS VOL-I-E-2754.