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

S. No.	E- TENDER SPECIFICATION NUMBER
01	BHE/PW/PUR/MAUDT- AUX BLR/2379

FOR

Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site Erection, Testing and assistance for commissioning & Trial Operation including application of Insulation, Refractory, supply & application of final painting and Electrical and C&I works etc. of Auxiliary Boiler at 2X500 MW NTPC Mouda Project.

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 Specifications**
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 bhel.com (Briefly) and detailed in BHEL e-Procurement Portal as files titled
NIL	Tender Specification Issue Details	(Part of **Vol-IA-2379**)
NIL	Notice Inviting Tender	(Part of **Vol-IA-2379**)
I-A	Technical Conditions of Contract	Vol-I-A-2379
I-B	Special Conditions of Contract	Vol-I-BCD-2379
I-C	General Conditions of Contract	(Part of Vol-I-BCD-2379)
I-D	Forms & Procedures	(Part of Vol-I-BCD-2379)
I-E	Technical Specifications	Vol-IE-2379
II	Price Bid Specification as specified in E-Procurement Portal	Volume-II-2379

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

S. No.	E- TENDER SPECIFICATION NUMBER
01	BHE/PW/PUR/MAUDT- AUX BLR/2379

FOR

Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site Erection, Testing and assistance for commissioning & Trial Operation including application of Insulation, Refractory, supply & application of final painting and Electrical and C&I works etc. of Auxiliary Boiler at 2X500 MW NTPC Mouda Project**.**

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

AGM (Purchase)
Place: Nagpur
Date:

2379

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Date: 02/03/2021

NOTICE INVITING E-TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD/ UPLOAD THE TENDER/ OFFER FROM/ON BHEL E-PROCUREMENT PORTAL → https://eprocurebhel.co.in

To,

Dear Sir/Madam,

Sub : NOTICE INVITING E-TENDER

Sealed offers in two part bid system (National competitive bidding (NCB) ~~or International Competitive Bidding (ICB~~ are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-1) 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/MAUDT- AUX BLR/2379**	
ii	**Broad Scope of job**	Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site Erection, Testing and assistance for commissioning & Trial Operation including application of Insulation, Refractory, supply & application of final painting and Electrical and C&I works etc. of Auxiliary Boiler at 2X500 MW NTPC Mouda Project	
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 Specifications*	*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 : 02/03/2021 , Time :17:00* *Closes: 16/03/2021 , Time : 11:00* Brief information of the tenders shall also be available at central public procurement portal. (*https://eprocure.gov.in/epublish/app*)	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date: 16/03/2021, Time: 12.00 Hrs*** ***Place: on E-Tender Portal https://eprocurebhel.co.in***	*Applicable*
vi	**OPENING OF TENDER (Techno-**	***Date: 16/03/2021, Time: 16.00 Hrs*** *Notes:*	*Applicable*

S No.	ISSUE	DESCRIPTION	
	Commercial Bid)	*(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.*	
vii	**EMD AMOUNT**	***Rs 1,98,000/- (Rupees One Lakh Ninety-Eight Thousands 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**	*Free*	
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: P R Chiwarkar Designation:AGM Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Phone: Landline: +91-712-2858-633 Mob: +91-9422805222 Email :prchiwarkar@bhel.in Fax:+91-712-2858600 2) Name: Viveka Nand Jha Designation:Dy Manager Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Phone: Land Line: +91-712-2858715 Mob: 9429198214 Email :vivekjha@bhel.in Fax:+91-712-2858600	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		*Not Applicable*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**		*Not 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	SHREE MOHINI COMPLEX 345, KINGSWAY,NAGPUR
NAME OF BANK	STATE BANK OF INDIA
NAME OF BANK BRANCH AND BRANCH CODE	SBI,KINGSWAYBRANCH,BRANCH CODE-00432
CITY	NAGPUR
ACCOUNT NUMBER	31380025872
ACCOUNT TYPE	CURRENT A/C
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.

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.
iii. 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.
iv. 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.

v. 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	○ Envelopes I ○ Envelopes II ○ 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 'LOAD' wise and 'PERFORMANCE' wise as per the following:

1 **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.

2 **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 = **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 '**T_T**' for total similar Packages '**P_T**' for all Regions (i.e. **T_T** = $T_1 + T_2 + T_3 + T_4 + .. T_N$)

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 '**P_T**' for all Regions (i.e. 'S_T '= $S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

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

Aggregate of Performance scores for all similar packages in all the Regions
= ----------
---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 = **P_T** i.e. Sum (Σ) of columns (iii) to (ix)

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
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) = $\mathbf{T_T}$
3	Monthly performance scores for the corresponding period (as in Row 2)	$S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, … $S_{1\text{-}T1}$	$S_{2\text{-}1}$, $S_{2\text{-}2}$, $S_{2\text{-}3}$, $S_{2\text{-}4}$, … $S_{2\text{-}T2}$	$S_{3\text{-}1}$, $S_{3\text{-}2}$, $S_{3\text{-}3}$, $S_{3\text{-}4}$, … $S_{3\text{-}T3}$	$S_{4\text{-}1}$, $S_{4\text{-}2}$, $S_{4\text{-}3}$, $S_{4\text{-}4}$, … $S_{4\text{-}T4}$	$S_{5\text{-}1}$, $S_{5\text{-}2}$, $S_{5\text{-}3}$, $S_{5\text{-}4}$, … $S_{5\text{-}T5}$	.. … … … …	$S_{N\text{-}1}$, $S_{N\text{-}2}$, $S_{N\text{-}3}$, $S_{N\text{-}4}$, … $S_{N\text{-}TN}$	--------
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). <u>Calculation of Overall 'Performance Rating' ($\mathbf{R_{BHEL}}$) in case at least 6 evaluation scores for 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment'</u>:

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	0.4
3	> 65 and ≤ 70	0.35
4	> 70 and ≤ 75	0.25
5	> 75 and < 80	0.2
6	≥ 80	NA

3 'Assessment of Capacity of Bidder':

'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'

iii). For R_{BHEL} ≥ 80, there will be no upper limit on P_{Max}

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

4 **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 ii). Pile and Pile Caps iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney	i). Electrical ii). C&I iii). Others (Elect. and C&I)	i). Boiler & Aux (All types including CW Piping if applicable) ii). Power Cycle Piping/Critical Piping iii). ESP iv). LP Piping

vi). Cooling Tower vii). Others (Civil)		v). Steam Turbine Generator set & Aux vi). Gas Turbine Generator set & Aux 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 minimum no. of bidders required for conducting RA as per extant RA Guidelines, 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 minimum no. of bidders required for conducting RA as per extant RA Guidelines, 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 minimum no. of bidders required for conducting RA as per extant RA Guidelines, 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 minimum no. of bidders required for conducting RA as per extant RA Guidelines, 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 25th of Evaluation Month or 3 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, 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 Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
2.	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com

(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: (1) P R Chiwarkar/ AGM (Purchase) 2) VivekaNand Jha / Dy Manager (Purchase)
Dept.: Purchase Department
Address: Floor No. 5 & 6, Shreemohini Complex, 345 Kingsway, Nagpur-440001
Phone: (LL/ Mobile) (1) 0712-2858600 0712-2858600
Email: prchiwarkar@bhel.in vivekjha@bhel.in
Fax: 0712-2858699

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:** **NOT Applicable** "BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com on "**supplier registration page**".) for this tender. RA shall be conducted among all the techno-commercially qualified bidders.

Price Bids of all the techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in 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.

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~~
~~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

(Addl. General Manager - Purchase)

Enclosure:

1) Annexure-1: Pre Qualifying Requirements.
2) Annexure-2: Check List.
3) ~~Annexure-3: Certificate by Chartered Accountant~~
4) ~~Annexure-4: Reverse Auction Process Compliance Form~~
5) ~~Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process~~
6) ~~Annexure-6: RA Price Confirmation and Breakup~~
7) ~~Annexure-7: Integrity Pact~~
8) Annexure-8: Undertaking as per PQR C4 of Annexure-1 i.e. PQR
9) Annexure-9: Declaration reg. Related Firms & their areas of Activities
10) Annexure-10 Declaration regarding minimum local content
11) Annexure-11: Declaration regarding compliance to restrictions under rule 144 (xi) of GFR 2017
12) Annexure 12: Important information.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

E-Tender Specification Number: BHE/PW/PUR/MAUDT- AUX BLR/2379	
JOB	Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site Erection, Testing and assistance for commissioning & Trial Operation including application of Insulation, Refractory, supply & application of final painting and Electrical and C&I works etc. of Auxiliary Boiler at 2X500 MW NTPC Mouda Project.

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)	Not Applicable	
B	**B1 : TECHNICAL PQR** B.1.1: Bidder must have Executed Erection & Commissioning of At least One Boiler (Consisting of "Pressure Parts" / "Structure") or Power Cycle piping of a Unit of any rating in the last seven (7) years as on latest date of offer submission. **OR** B.1.2: Bidder must have completed Renovation & Modernization of At least One Boiler (Consisting of Pressure Parts) a Unit any rating in the last seven (7) years as on latest date of offer submission. **OR** B.1.3) Bidder must have successfully executed Overhauling/E&C of (Boiler Pressure parts or "Boiler Pressure Parts and 'Structure/Non Pressure Parts/ESP/Rotary Machines/Insulation/ Piping/Auxiliaries/ Ducting / any combination of these parts") of any rating, in the last seven (7) years as on latest date of offer submission.	Applicable	

	as per the criteria below B.1.3.1) Executed One similar work of value not less than 79.2 Lakhs or 320 Ton against single work order. OR B.1.3.2) Executed two similar works of value not less than 49.5 Lakhs or 200 Ton against maximum two work orders each. OR B.1.3.3) Executed Three similar works each of value not less than 39.6 Lakhs or 160 Ton against maximum three work orders each **Note for B.1.3: 'EXECUTED' means the bidder should have achieved the criteria specified in the Technical criteria of PQR (as in 'B.1.3' above)**		
C-1	**Financial TURNOVER** Bidders must have achieved an average annual financial turnover (audited) of **Rs. 29.7 Lakhs** or more over last three Financial Years (FY) i.e '2017-18, 2018-19 & 2019-20'	**Applicable**	
C-2	**NETWORTH** (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	**PROFIT** 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)** The "Assessment of Capacity of Bidders" for this Tender shall be carried out by considering the identified similar package as "**BOILER**".	Applicable	BY BHEL
E	**Approval of Customer (if applicable)**	Applicable	BY BHEL

	Note: Names of bidders (including consortium/Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval		
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)

- For the criteria (B.1), actual executed value shall be considered**.**
- 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

- The evaluation currency for this tender shall be INR.

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 / "WORK EXECUTION of the value as defined in PQR" in case of industry.
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 Common QR 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.
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

Not Applicable

Format-2

Not Applicable.

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/~~Not Applicable~~	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/~~Not Applicable~~	YES/NO
8	Copy of 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	Declaration by Authorized Signatory	Applicable/~~Not Applicable~~	YES/NO
12	No Deviation Certificate	Applicable/~~Not Applicable~~	YES/NO

13	Declaration confirming knowledge about Site Conditions	Applicable/~~Not Applicable~~	YES/NO
14	Declaration for relation in BHEL	Applicable/~~Not Applicable~~	YES/NO
15	Non-Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO
16	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/~~Not Applicable~~	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	~~Applicable~~/Not Applicable	YES/ NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement ~~Power of Attorney of Consortium Partner~~.	Applicable/~~Not Applicable~~	YES/NO
20	Analysis of Unit rates	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/MAUDT- AUX BLR/2379} 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
{Unit Address-}
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/MAUDT- AUX BLR/2379} 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 _____ _____ _____. 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 Independent External Monitor(s), 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. He commits himself to observe the following principles during his 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 will 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 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 from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.~~

~~4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.~~

~~Section 5 - Previous Transgression~~

~~5.1 The Bidder declares that no previous transgressions occurred in the last 3 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.~~

~~Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors~~

~~6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.~~

~~6.2 The Principal will disqualify from the tender process all bidders who do not sign this 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 Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is 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 Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.

8.4 The Principal will provide to the Monitor 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 Monitor the option to participate in such meetings.

8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending 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, the matter should be examined by the full panel of IEMs jointly as far as possible, 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 CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.

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

8.9 IEM 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 organization should be looked into by the CVO of the concerned organisation.

8.10 If the Monitor has 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 Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

.....

8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

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

Section 9 - Pact Duration

9.1 This Pact shall be operative from the date IP 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. Issues like warranty / guarantee etc. should be outside the purview of IEMs.

9.2 If any claim is made/ lodged during currency of IP, 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 agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement 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 agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On behalf of the Principal For & On behalf of the Bidder/ Contractor

(Office Seal) (Office Seal)

Place----------

Date----------

Witness: _____ Witness: _____

(Name & Address) _____ (Name & Address) _____

_____ _____

.....

ANNEXURE – 8

UNDERTAKING

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

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir/Madam,

Sub: DECLARATION REGARDING INSOLVENCY/ LIQUIDATION/ BANKRUPTCY PROCEEDINGS

Ref: NIT/Tender Specification No: BHE/PW/PUR/MAUDT- AUX BLR/2379

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 _____
BHEL, _____
_____
_____
_____
Email: _____

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,

(Write Name & Address of Officer of BHEL inviting the Tender)

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 Specification No: ……,
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.

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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,

(*Write Name & Address of Officer of BHEL inviting the Tender*)

Dear Sir,

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

Ref : 1) NIT/Tender Specification No: ……,
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)*, is not from such a country / 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 fulfil 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.

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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:
AGM /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:

AGM Purchase, Email: prchiwarkar@bhel.in. Ph: +91 – 712 – 2858 – 633
Dy Manager Purchase, Email: vivekjha@bhel.in Ph: +91-9429198214
Dy Manager Purchase, Email: svm@bhel.in Ph: +91 – 712 – 2858 –715/9049590486
Asst. Engineer Purchase, Email: baijnath@bhel.in , Ph: +91 – 712 –2858 - 652

1. **Refer Chapter XII of Volume IB Special Conditions of Contract regarding Suspension of Business Dealings: The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' has now been uploaded on www.bhel.com on "supplier registration page" at the following link:** http://www.bhel.com/vender_registration/pdf/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**

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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. 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"

6. **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 work as certified by Engineer-in-Charge.

7. 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.

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* **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.

8. **The following paragraph has been added in clause 2.7.1 under clause 2.7 "Rights of BHEL" of General Conditions of Contract (Volume-IC GCC)**
   In case of inadequate manpower deployed by contractor, BHEL reserves the right to deploy additional manpower through any other agency for expediting activities in the interest of the project. Supplied manpower shall be put on job by the contractor and payments and other statutory compliances related to manpower shall be the contractor's responsibly. In case of contractor's failure to fulfil his obligations in respect of such manpower, BHEL reserves the right to take necessary action as per contract conditions

9. **Delay in 1st submission of SDBG/ PBBG**: SDBG/ PBG is to be furnished by the vendor before start of work. No payment will be released till SDBG/PBG is submitted by the vendor.

   However if requested by the vendor, cash recovery equivalent to SDBG/ PBG value to be made from the running bills submitted by the vendor. In such case, recovery of interest calculated @SBI PLR +2% on amount equivalent to SDBG/ PBG value to be made for the gap period (difference between date of start of work and date of submission of BG/ cash recovery).

10. **Compensation in case of Death/ Permanent Incapacitation of Person:** BHEL shall recover the amount of compensation paid to victim (s) by BHEL towards loss of life/ permanent disability due to an accident which is attributable to the negligence of contractor, agency or firm or any of its employee as detailed below:

    a) Victim: Any person who suffers permanent disablement of dies in an accident as defined below.

    b) Accident: Any death or permanent disability resulting solely and directly from any unintended and unforeseen injurious occurrence caused during the manufacturing/ operation and works incidental thereto at BHEL factories/ offices and precincts thereof, project execution, erection and commissioning, services, repairs and maintenance, trouble shooting, serving, overhaul, renovation and retrofitting, trial operation, performance guarantee testing undertaken by the company or during any works/ during working at BHEL Units/ Offices/ townships and premises/ Project sites.

    c) Compensation in respect of each of the victims:
    (ii) In the event of death or **permanent disability** resulting from **Loss of both limbs**: Rs 10,00,000/- (**Rs Ten Lakh**)
    (iii) In the event of **other permanent disability**: Rs 7,00,000/- (**Rs Seven Lakh**)

    d) Permanent Disablement: A disablement that is classified as a permanent total disablement under the proviso to Section 2(I) of the Employee's Compensation Act, 1923.

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11. 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".

12. Broad Terms & Conditions of Reverse Auction: **NOT Applicable**

~~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) (http://www.bhel.com/vender_registration/pdf/Guidelines%20for%20Reverse%20Auction-2020.pdf) for this tender. RA shall be conducted among all the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in 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."~~

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~~***Note-01:-*** *In case the tender is an e-tender and bids are submitted on e-procurement portal of BHEL →*~~ *https://eprocurebhel.co.in, the sealed electronic price bid (e-bid) is to be treated as sealed envelope price bid.*

~~***Note-02:*** *No benefits to MSE bidders w.r.t Reverse Auction Guidelines as available on www.bhel.com.*~~

13. Bidder to strictly follow all the necessary guidelines issued by Customer, District Magistrate, State Government and Central government to control Covid-19 outbreak.

14. Overrun compensation clause no. 2.12 of standard GCC shall not be applicable

15. Price Variation Compensation Clause no 2.17 of standard GCC shall not be applicable

16. 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

17. Cl 1.2.1 of '1.2 Submission of Tenders' of Chapter -1 of VOL IC- GCC (General Conditions of Contract) is amendment as below:

Existing	Amended/To be read as
1.2.1) The tenderers must submit their tenders to Officer inviting tender (**Or upload on E portal website https://eprocurebhel.co.in in case of E tender**) **as per instructions in the NIT**.	1.2.1) The tenderers must submit their tenders to Officer inviting tender (**Or upload on E portal website https://eprocurebhel.co.in in case of E tender**) **as per instructions in the NIT**.

NOTE / New:
E procurement portal for E tendering is: E portal website -
https://eprocurebhel.co.in All relevant clauses shall be read accordingly.

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

Sl No	DESCRIPTION	Chapter
Volume-IA	**Part-I: Contract specific details**	
1	Project Information	Chapter-I
2	Scope of Works	Chapter-II
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III
4	T&Ps and MMEs to be deployed by Contractor	Chapter-IV
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V
6	Time Schedule	Chapter-VI
7	Terms of Payment	Chapter-VII
8	Taxes and other Duties	Chapter-VIII
9	Estimated Weight for various systems in scope of work (BOQ)	Chapter-IX
10	General	Chapter-X
11	Progress of work	Chapter-XI
12	Foundation & Grouting	Chapter-XII
13	Material Handling, Transportation and Site Storage	Chapter-XIII
14	Erection	Chapter-XIV
15	Welding, heat treatment & Radiopgraphy and Nondestructive testing	Chapter-XV
16	Hydraulic test	Chapter-XVI
17	Testing & Commissioning	Chapter-XVII
18	Painting	Chapter-XVIII
19	Lining & Insulation	Chapter-XIX
20	Preservation & Protection Of Components	Chapter-XX
21	ELECTRICAL AND C&I WORKS	Chapter-XXI
22	Not Used	Chapter-XXII
23	Weightages / Factor	Chapter-XXIII

Project Information

1. Purchaser / Owner :**M/s National Thermal Power Corporation Limited. (NTPC)**
2. Project Title :**2X500 MW NTPC Mauda**

LOCATION AND APPROACH :

1. Location : Village-Mauda, Dist- Nagpur State–Maharashtra, India.
2. Address Details : 2X500 MW NTPC Mouda.
   Village – Mouda
   Taluka – Mouda
   Dist.- Nagpur
   Maharashtra State, India"
3. Nearest Port : Mumbai
4. Nearest Air Port : Nagpur/ 50 KM from Mauda town
5. Approach Road : Mauda site is connected to Mauda town by 04 KM long all weather roads. Mauda town is 40 KM from Nagpur on NH-6.
6. Railway Approach : Nearest Railway Station Chacher 8 Kms away from site on Nagpur-Kolkata Broad Gauge section of South Eastern Railway (main line)
7. Data of Seismic Design : As per IS 1893
8. Ambient air temperature (Average) :
   a) Maximum : 50 degree centigrade
   b) Minimum : 6 degree centigrade

09: Average Relative Humidity: 60 %

10: Wind speed : 44 m/s at ten meters above the ground level as per IS 875 (Part-3).

11. Geographical condition: Latitude- 21-10-50 N

Longitude -79-23-52 E

Above information furnished are for general guidance of Contractor. The Bidder shall visit site and get acquainted himself with the conditions prevailing at site before submission of the bid. The information's given here in under are for general guidance and shall not be contractually binding on BHEL/ Owner. All relevant site data's/information's as may be necessary shall have to be obtained/ collected by the Bidder.

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.)

Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site Erection, Testing and assistance for commissioning & Trial Operation including application of Insulation, Refractory, supply & application of final painting and Electrical & C&I works etc. of Auxillary boiler and its auxillaries.

2.1 The work to be carried out under the scope of these specifications is broadly as under:

Handling of Materials at BHEL / Client's Stores / Storage Yard and transportation to site of Erection, Testing & Assistance for commissioning and Trial Operation including supply and application of final Painting and Insulation including Electrical & C&I works related to Aux. Boiler and auxillaries etc.,

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 leveling of foundations, providing packers and shims/pre-assembling of equipments at the preassembly yard, inspection, minor rectification, preservation, erection, leveling, 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, 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 the auxiliary boiler including supply and application of final painting.

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 PG wise breakup 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 of Vol I are approximate and these are subject to change as per site conditions.

2.6 During the course of execution of work, certain rework / modification / rectification / repairs / fabrication etc will be necessary on account of feedback from various relevant sources, and also on account of design discrepancies/ alterations, manufacturing defects, site operations/ maintenance requirements. 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. Claims of contractor, if any, for such works will be dealt as per conditions of contract and payments will be released as per the agreed rates.

2.7 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.

2.8 It shall be specially noted that the contractor's labour and staff may have to work round the clock to meet the completion schedules / plans, which may involve payment of considerable overtime. The contractor's quoted rates should be inclusive of all such contingencies.

2.9 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.

2.10 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.

2.11 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.

2.12 The work covered under this specification is of highly sophisticated nature requiring the best quality of workmanship, engineering and construction management. The contractor should ensure timely completion of the work. The contractor must have the adequate quantity of tools, construction aids, equipments, etc., in this possession. He must also on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel.

2.13 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.

2.14 Contractor has to work in close co-ordination with other erection 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 aux boiler light up, steam blowing, SV Floating etc., are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

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

2.16 The storage yard is located within the plant boundary. All materials have to be transported from storage yard to construction area by the contractor at his own cost.

2.17 Electrical & C&I works

Contractor may tie up with separate suitable agency/agencies for carrying out Electrical and C&I works. However before deploying such agencies on job, the Contractor shall obtain approval of BHEL Construction Manager in writing.

Works for electrical & C&I includes erection & Commissioning of HT/LT Drives and valve/ damper actuator, Cabling package, C&I Package and associated Instruments/Transmitters, equipments & Associated Auxiliaries for the following: -

1. Cable tray & Accessories.
2. LT power cables (generally arm/unarmoured), LT control cables, instrument cable (generally arm/unarmoured, screened or unscreened).
3. Juction boxes for electrical, Control & Instrument system and push button.
4. Structural steel.
5. Switchgears / MCC
6. Starter panel/Local starter boxes/Power distribution boxes /marshalling boxes. DCS panels, control & instrument panel, lie, lir etc.
7. Erection and commissioning of Earthing & Lightening Protection system.
8. Erection and commissioning of DDCMIS Control panels.
9. Aux Boiler system trial run, resolving any deficiencies observed and handing over the Aux. Boiler system to customer M/s NTPC.
14. Only testing & commissioning.
15. Others equipments.

Note: FOR FURTHER DETAILED SCOPE OF WORKS REFER RELEVANT CHAPTERS IN THIS BOOK

Sl. No	Description PART I	Scope / to be taken care by		*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	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)		**Yes**	Agency has to make his own arrangement at his own cost.
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2	**ELECTRICITY**			
3.2.1	Electricity For construction purposes only of Voltage 415/440 V, 3 phase, 50Hz	Yes		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.)

Sl. No	Description **PART I**	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Single point source	Yes		At a distance of 500 M from site (Distance is only tentative, it may vary upto an extent depending on site condition)
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 the office, stores, canteen etc of the bidder	**Yes**		
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
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		**Yes**	Agency has to make his own arrangement at his own cost.
a	Single point source		Yes	
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**			
3.3.1	For construction purposes:			

Sl. No	Description **PART I**	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Making the water available at single point		**Yes**	Agency has Agency has to make his own arrangement at his own cost.
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.			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	Water supply for Living Purpose			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
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	
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	

Sl. No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
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	

Sl. No	Description **PART II** **3.9 ERECTION FACILITIES**	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	Engineering works for construction:	Yes		
a	Providing the erection drawings for all the equipments covered under this scope	Yes		

Sl. No	Description PART II 3.9 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	Bidder	
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
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
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 this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
~~k~~	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	Not Applicable
L	Arranging the materials required for preassembly		Yes	

3.10 ELECTRICITY:

3.10.1 The construction power (415V) will be provided at a single point for construction purpose only at free of any charges and the further distribution is to be arranged by the bidder at his cost. Construction power shall be provided from the nearest Substation / tapping point.

3.10.2 Any duty, deposit involved in getting the Electricity shall be borne by the bidder. As regards to contractor's office shed also, all such expenditure shall be borne by the contractor.

3.10.3 Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

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

3.10.5 Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.8 shall be provided by the contractor at his cost. Penalty if any levied by customer on this account will be recovered from contractor's bills.

Although the Electricity is free for construction, the same shall be used sparingly. Details of Electricity units consumed shall be submitted to BHEL office every month for records.

3.11 CONSTRUCTION WATER

Water shall not be provided by BHEL and bidder has to make their own arrangement.

3.12 DRINKING WATER

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

3.13 CONSUMABLES:

3.13.1 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.

3.13.2 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.

3.13.3 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.

3.13.4 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 / othercleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding and pre-assembly materials, hardware items etc required for temporary works such as supports, scaffoldings, bed are to be arranged by him. Sealing compounds, 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.

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

3.14 MATERIAL SUPPLY:

BHEL will supply the materials / equipments indicated in the weight schedule from their respective manufacturing units which are to be executed / incorporated in the permanent system. In addition the material such as lube

oil, grease required for commissioning the erected equipments and chemicals required for chemical cleaning of equipments will be supplied free of cost by BHEL.

3.15 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.

3.16 GASES:

3.16.1 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.

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

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

3.17 ELECTRODES SUPPLY AND STORAGE

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

3.17.2 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.

3.17.3 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.

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

3.17.5 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.

3.17.6 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.

3.17.7 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.

4.1 The following minimum major Tools & Plants (T&P) shall be arranged by the Contractor for execution of items mentioned in Chapter IX of Technical Conditions of Contract of this tender within the quoted rate.

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
1	Crawler crane/Tyre mounted crane	75 MT	01 No	To be deployed as per Instruction of BHEL Engineer
2	Tyre mounted mobile crane/Farana	18/20 MT	02 Nos.	As required
3	Trailer with prime mover	20/40 MT	01 No	As required
4	Tractor with Trolley	As required	As required	As required
5	Ultrasonic hardness testing machine (Ultrasonic contact impedance (UCI)) - 1 no		As required	GE or Kraut Kramer or Microdur make or reputed branded ultrasonic hardness testing machine.
6	DG SET – 250 KVA	As required	As required	For continuos/ uninterrupted back up power during welding & post weld heat treatment of HP joints.
7	Tube expander	As required	As required	As required
8	Air compressor (electric/diesel operated)	210 CFM, 7 KG/CM2	As required	As required
9	Tig welding set	As required	As required	As required
10	Submerged ARC WELDING M/C		Adequate nos.	
11	Oxy Acetelyne Gas cutting Machine		Adequate nos.	
12	DC arc welding machine		As required.	
13	3-phase distribution board with complete set up for drawl of construction power	As required	As required	
14	Power cable for drawl of construction power	As required	As required	

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
15	Pre heating / stress relieving set (heating control panel, cables, heating elements, thermometers etc.)	As required	As required	As required
16	Radiography arrangement with radioactive isotope source	Iridium-192	As required	As required
17	Radiography arrangement with radioactive isotope source	Cobalt-60	As required	
18	Theodolite of required accuracy	To ensure verticality of structural columns.	As required.	As required
19	Self drilling cum tapping machine for screws of boiler roof sheets	As required	As required	
20	Arrangement for UT of higher thickness joints with recording facility & required calibration blocks.	Type USN 50 or equivalent/ up graded type	As required	As required
21	Electro-hydraulic pipe bending machine	Up to 2” nb and 12 mm thick pipes	As required	As required
22	Welding generator (electrical)	300 ampere rating	As required	As required
31	Welding generator (diesel operated)	300 ampere rating	As required	
32	Radiography film viewer	As required	As required	As required
33	Hydraulic pipe bending machine (manual)	For bending of pipes up to 50 mm nb size	As required	As required

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
34	Pipe chamfering machine /Tube Cutting	4-14”	As required	As required
35	Pipe chamfering machine /Tube Cutting	14-20”	As required	As required
36	Pipe cutting & beveling machines		Adequate nos.	As required
37	Chain pulley blocks of various & Suitable capacities		As Required (as per the instructions of BHEL Engineer)	As required
38	Baking oven with thermostat and temperature gauge for welding electrodes	As required	As Required	As required
39	Holding oven with thermostat and temperature gauge for welding electrodes	As required	As Required	As required
40	Portable oven for welding electrodes	As required	As Required	As required
41	Electric winch	2/3/5/10/15 ton capacity	As per requirement	
42	Chemical Cleaning Pumps with Motors and electrical panel for Chemical cleaning/EDTA	As required	As required	As required
~~43~~	~~Furnace maintenance platform (sky climber)~~	~~Adequate capacity~~	~~2 nos.~~	~~to cover one length and one width of furnace~~
44	Hand winch	0.5 ton capacity	As required	
43	Scaffolding materials with clamps.	Suitable for working at various heights	As required	As required

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
44	Profile making m/c	For aluminium sheet cladding work	as required	
45	Nibbling m/c	For refractory and other required activities	as required	
46	Shearing m/c		as required	
47	Water pump to lift water to top of boiler		As required	Before start of refrectory erection.
48	Portable grinding m/c	As required	as required	Since Boiler erection start
49	Portable drilling m/c	As required	as required	
50	Hoisting and pulley devices/pulleys	Assorted capacities	As required	Since Boiler erection start
51	Fire retardant tarpaulins	As required	As required	Since Boiler erection start
52	Fire extinguisher	As required	as required	
53	Electric operated Bolt tightening machines		as required	
53	Hydraulic Jacks	10/20/50/100 MT	as required	
54	Dewatering pumps		as required	
55	Various sizes of clamps/ fixtures for assembling		as required	
~~56~~	~~Portable hardness tester~~		~~as required~~	

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
~~57~~	~~Hardness testing equipment (Equotip or Microdur make) 33 Stress relieving equipment with temperature~~		~~(min 2 nos)~~	
58	Magnetic particle testing equipment-DRY & WET Type		as required	
59	Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable		as required	Since Boiler erection start
60	Spectrometer for metal testing		as required	
61	Alco meter for paint thickness checking		as required	
62	Hand Operated Megger 500 / 1000 V		as required	
63	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy		as required	
64	Digital and Analogue Multimetres		as required	
65	U Tube Manometer 0-2000 mm Water Column		as required	
66	Inclined Manometer 0-50 mm Water Column		as required	
67	Calibrated Pneumatic Torque wrench		as required	
68	Bolt Tension Calibrator		as required	
69	Air Leak Test equipment with all auxiliaries.	01 Set	For leakage test of Boiler and ducts.	
70	Hydraulic Pressure Testing Pump with accessories	As required		

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, testing related activities.

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 procure/hire the equipment/T&P and get the work done and charge the contractor as per current market rate/hiring rate + 5% BHEL overhead.

2. This above list of T&Ps 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.

3. BHEL may utilise Crane mentioned in Sr no 1 (75 MT Capacity) for its own use for works other than mentioned in the Scope of work of this tender, in same premises. Fuel for the same will be provided by BHEL.

4. 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.

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

6. Contractor has to submit the Calibration certificates of all the precision Equipement to BHEL. BHEL may ask for recalibration of the MME‟s /precision equipments for ensuring quality of work. Contractor must reascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.

7. Any T&P‟s, Cranes, Slings, D-shackles and other lifting tackles, Trailers required for shifting of material from store to site shall be arranged by contractor over and above T&P‟s/ crane provided by BHEL.

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 of adequate Capacity	As decided by BHEL	All cranes (except Contractor scope) required for mentioned work will be arranged by BHEL as per requirement.

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 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.

5.4 These cranes are owned or hired by BHEL. Operator for BHEL owned crane will be arranged by BHEL. Operators for hired crane will be provided by the hiring agency.

5.5 Contractor shall make necessary arrangements like laying of special sleeper beds and steel plates (**all arranged by contractor**), assembly and dismantling of heavy lift 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. Contractor shall also make necessary arrangements like laying of special sleeper beds and steel pates (all arranged by contractor) for movement and operation of the crane. Levelled area in boiler area will be provided by BHEL/customer for the cranes. Consolidation of the ground, if required, 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 contractor within quoted rates. Required numbers of mild steel plates of 40/45/50 mm thick and 12 metre length x 3 metre width (around 6 numbers) for the above purpose is to be arranged by contractor within his quoted rate.

5.6 Contractor shall provide the fuel, lubricants and consumables for BHEL provided cranes (hired/owned) for his use.

5.7 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.

5.8 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.

5.9 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.

5.10 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.

5.11 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.

6.1. TIME SCHEDULE

6.1.1 The entire work of Auxiliary Boiler and auxiliaries including Supply & Application of Final Painting and Electrical and C&I wroks as detailed in the Tender Specification shall be completed within **10 (Ten)** months from the date of "Start of Contract period" at site.

6.1.2 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

6.1.3 The erection work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

6.1.4 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 or start of fabrication. 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.

6.2 INITIAL MOBILIZATION

After receipt of LOI, Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall reach site, make his site establishment and be ready to commence the erection work within two weeks from the date of issue of Letter of Intent or as per the directions of Construction Manager/ Project Manager of BHEL. Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

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 condition.

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:

SL No.	Milestones	Period in months
1	Erection Start	1st Month
2	Hydro Test- d	7th Month
3	Light Up (BLU) & Chemical cleaning completion	8th Month
4	Steam Blowing activity	9th Month
5	Safety Valve floating	10th Month
6	Final Connection to Main Boiler	10th Month

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.

6.3 CONTRACT PERIOD

The contract period for completion of entire work under scope for each of the packages shall be **10 (Ten) months** from the "COMMENCEMENT OF CONTRACT PERIOD" as specified earlier for completion of the entire work.

6.4 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	Hydro Test- drainable	7th Month
M2	Steam Blowing activity	9th Month

Note 1: Refer clause no 12.0 of ANNEXURE-4 IMPORTANT INFORMATION of the NIT regarding modalities against provision of penalty in case of slippage of Intermediate Milestones.

Note 2:

1. 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. In case the activities in the schedule are to be advanced, the related structural 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 area-wise L3 schedule within 7 days in consultation with BHEL. 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, fabrication & erection activities. This schedule shall also clearly indicate the interface facilities / inputs applicable in each package.

6.5 PERFORMANCE GUARANTEE FOR WORKMANSHIP

The guarantee period of **Twelve months** shall commence from the date of Completion of Work as certified by BHEL Engineer.

7. Terms of payment

The progressive payment for erection, testing 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 Cl no 7.1.1 to 7.1.17 of the following table.

SL NO	Contract (Main Package) Identitification ---->						Insulation
	Rate schedule Identification ------->	**Structure**	**Pressure Parts**	**Non Pressure Parts**	**Rotary Machine**	**CS/SS Piping**	**1) Castable & Pourable 2) Iron Components 3) Wool mattresses 4) Aluminium sheeting**
	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%	--
7.1.2	PLACEMENT IN POSITION	15%	10%	10%	20%	20%	50%
7.1.3	ALIGNMENT	25%	15%	15%	20%	15%	15%
7.1.4	WELDING/BOLTING/FIXING	20%	20%	20%	20%	20%	20%

7.1.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be paid along with welding)	5%	10%	--	--	10%	--
7.1.6	COMPLETION OF ATTACHMENT WELDING, FIN WELDING, SUPPORTS	--	5%	--	--	--	--
7.1.7	COMPLETION OF ROOF SKIN CASING	--	5%	--	--	--	--
7.1.8	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	--	--	15%	--	5%	--
7.1.9	EQUIPMENT TRIAL OPERATION	--	--	--	10%	--	--
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**

7.2) Further 15 % payment on pro-rata basis common to all PGs of AUX. Boiler shall be released on achievement of the following stage / milestones events (as per Cl no 7.2.1 to 7.2.12 of the following table) for the tonnage erected.

	Rate schedule Identification ------->	**Structure**	**Pressure Parts**	**Non Pressure Parts**	**Rotary Machine**	**CS/SS Piping**	**1) Castable & Pourable 2) Iron Components 3) Wool mattresses 4) Aluminium sheeting**
II	**STAGE/MILESTONE PAYMENTS (15%)**						
7.2.1	DUCT/FURNACE AIR & GAS TIGHTNESS TEST	--	2%	5%	--	--	--
7.2.2	AUX. BOILER HYDRAULIC TEST	--	4%	--	--	--	--
7.2.3	BOILER LIGHT UP	--	1%	--	3%	2%	2%
7.2.4	ABO/CHEMICAL CLAENING	--	1%	1%	2%	--	2%
7.2.5	STEAM BLOWING	--	1%	2%	2%	4%	2%
7.2.6	SAFETY VALVE FLOATING	--	2%	1%	2%	3%	2%
7.2.7	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	3%	--	--	--	--	--
7.2.8	Painting	6%	--	1%	2%	1%	--
7.2.9	Area cleaning, temporary structures cutting/removal and return of scrap	1%	1%	1%	1%	2%	3%
7.2.10	Punch List points/pending points liquidation	2%	1%	2%	1%	1%	1%
7.2.11	Material Reconciliation	2%	1%	1%	1%	1%	2%
7.2.12	Completion of Contractual Obligation	1%	1%	1%	1%	1%	1%
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**

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

Summary of Weight of BOQ for Aux Boiler and its auxiliraies is as follows :-

Aux.Boiler Weight details

S.NO	UNIT	Design WT
1	BHEL Trichy	273106.246
2	BHEL Ranipet	58942.528
3	BHEL PC Chennai	62403.416
4	BHEL EDN Bangalore	5000.000
	Total WT in KG	**399452.190**
	Total WT in MT	**399.452**

S No	Discription	Tonnage (Kg)	Tonnage (MT)
1	Pressure Parts	76175.783	76.176
2	Non-Pressure Parts	105830.389	105.830
3	Structure	82298.167	82.298
4	Rotating Machine	10205.26	10.205
5	Insulation	78266.401	78.266
6	CS Piping	21849.928	21.850
7	SS Piping	1000	1
8	Electrical & C&I	24473.266	24.473
TOTAL		399099.194	399.099

AUX BOILER PGMA LIST			
PGMA	**DESCRIPTION**	**DESIGN WT**	**AREA**
04-114	UPPER DRUM + INTERNAL ID 49-60	18988.812	PP
04-144	UPPER DRUM SUSPENSION ID 49-60	437.260	PP
04-210	LOWER DRUM + INTER NAL ID UP TO 36	8748.768	PP
06-609	CORNER WW PNL	2306.800	PP
06-614	D' PNL WW PNL	6436.800	PP
06-616	BAFFLE WW PNL	3685.500	PP
06-657	SIDE BOILER WW PNL	4103.880	PP
07-211	BOILER BANK TUBES	15336.480	PP
07-214	BOILER SIDE WALL SHIELD TUBE	1652.084	PP
07-601	PRESSURE SEALS	2728.400	PP
07-989	TOOLS FOR TUBE EXPANSION	69.700	PP
07-992	IMPORTED ELECTRODES	1.700	PP
07-993	CONSUMABLES & ERECTION MATERIALS	279.440	PP
09-001	SEAL BOXES FOR FURNACE OPENINGS	282.156	NPP
09-002	SEAL BOXES FOR INSTRUMENT INSERTS	111.604	NPP
09-003	MATERIAL FOR INSTRUMENT INSERTS	286.225	NPP
10-170	VERTICAL SH INLET HDR	438.740	PP
10-270	VERTICAL SH OUTLET HDR	437.540	PP
11-170	SH VERTICAL COIL ELEMENTS	727.500	PP
12-850	SH CONN PIPES - SATURATED	1798.850	PP
12-900	SH DESH	686.570	PP
12-901	SH HANGR, SUPPORTS,GUIDES & TIES	314.912	PP
12-992	IMPORTED ELECTRODES	1.100	PP
12-993	CONSUMABLES & ERECTION MATERIALS	253.268	PP
19-850	ECO FEED PIPE	120.510	PP
19-992	IMPORTED ELECTRODES	0.500	PP
20-301	ROTARY SBD5E-ERECTI0M	264.480	NPP
20-304	WALL. BOX NPR FOR RB-ERECTION	80.340	NPP
20-621	BLOWING ELEMENT RB-ERECTION	48.300	NPP
20-801	LONG RET SOOT BLOWER-CZECH-ERECTIQM	317.558	NPP
20-804	WALL BOX ASSY-LRSIE-ERECTION	44.882	NPP
20-988	SB COMMG SPARES-ERECTION	0.622	NPP
20-998	SPL TOOLS FOR SB-ERECTION	8.340	NPP
21-600	SOOT BLOWER PIPINGS & FITTINGS	323.685	PP
21-601	SOOT BLOWER PIPINGS SUPPORTS	616.620	PP
21-700	BULKED BPS COMPONENTS FOR SB PIPING	5.227	PP
21-800	SB VALVES(BHEL)	127.100	PP
21-992	IMPORTED ELECTRODES	1.890	PP
24-600	BOILER TRIM PIPING & FITTINGS	965.295	PP

24-601	BOILER TRIM PIPING SUPPORTS	672.204	PP
24-620	SAFETY VALVES ESC PIPE & DRAIN- PACK BLR	1308.422	NPP
24-625	SILENCER SUPPORTS -SAFETY VALVES	994.376	NPP
24-640	SAMPLE COOLER & SUPPORTS	356.891	PP
24-660	VALVES (BHEL) PACK BLR	762.800	PP
24-665	VALVES & FITTINGS(SD)- PACK BAR	164.800	PP
24-680	ERV & SAFETY VALVES(BHEL)	171.150	PP
24-685	SAFETY VALVES/ERV SILENCER(BHEL)	1096.000	NPP
24-700	BULKED BPS COMPONENTS FOR TRIM PIPING	50.745	PP
24-987	BHEL-SV/ERV COMGSPAR ERECTION	0.340	NPP
24-988	COM MG SPARE S/SO- ERECTION	7.000	NPP
24-989	BHEL VALVE COMG SPAR-ERECTION	3.985	NPP
24-992	IMPORTED ELECTRODES	4.900	PP
24-993	CONSUMABLES & ERECTION MATERIALS	1.380	PP
24-994	NAME PLATES	58.707	PP
28-220	DOORS	1526.856	NPP
30-215	MAIN BOILER ENCLOS	581.835	STR
31-010	SKIN CASING COMPONENTS WELDED TO PR PARTS	392.233	NPP
31-301	MISC. CASING	1633.903	NPP
32-010	FIXING COMP FOR BLR PR PARTS INSULATION	2918.610	INS
33-021	BLR PR PARTS MINERAL WOOL	6477.500	INS
33-201	MAIN BLR FORMED REFRACTORT IS8	7759.000	INS
33-212	MAIN BOILER CASTABLE REFRACTORY GR C	55000.000	INS
35-010	FOUNDATION MATERIAL BOILER	3520.374	STR
35-110	MAIN COLUMNS LEFT	17048.000	STR
35-410	COLUMN FRAME-FRONT FRAME	12595.590	STR
35-510	COLUMN BRACINGS-FRONT BRACINGS	13287.665	STR
35-610	BOILER ROOF STRUCTURE	3238.706	STR
35-611	BOILER ROOF SHEETING	945.690	STR
35-810	TEMPORY STRUCTURE FOR DRUM ERECTION	4000.911	STR
36-310	MAIN MBL FLOOR 11TH LEVEL	7995.541	STR
36-811	FLOOR GRILLS & GUARD PLATES LOWER	9024.605	STR
36-820	STAIRS & LADDERS	1208.599	STR
36-850	HAND RAIL & HAND RAIL POSTS	2576.276	STR
37-010	BLR OUTER CASING COMPONENTS	519.606	INS
37-810	BOILER OUTER CASING	1045.398	INS
41-200	SV BURNER ASSY WITH OIL GUN	2100.294	NPP
41-500	HIGH ENERGY ARC IGNITER	37.155	NPP
42-001	PNEUMAIC FITTINGS	0.173	NPP
42-002	STEAM BLOW MATERIALS	110.386	NPP
42-005	INSTRUMENT FITTINGS	46.260	NPP
42-010	LFO PUMP SET	2512.800	NPP
42-152	PIPING, OPR'G FLOOR LFO	327.331	NPP

42-200	SUBDELIVERY FUEL OIL SYSTEM	47.068	NPP
42-300	BHEL VALVE F O SYSTEM	76.500	NPP
42-700	BPS FASTNERS	34.710	NPP
48-082	SQ DUCT, COLD AIR FD FAN BOILER	5820.968	NPP
48-084	EXPN PCS , COLD AIR FD FAN BOILER	231.810	NPP
48-085	SUPPORTSETS COLD AIR DUCT SUPPORT	1234.874	NPP
48-200	INSTRUMENT TAPPING ON DUCTS	161.824	NPP
48-207	FLOWMETERS FOR SECONDRY AIR FLOW	691.766	NPP
48-332	SQ DUCT BOILER TO CHIMNEY	5316.560	NPP
48-334	EXPAN PCS BOILER TO CHIMNEY	533.154	NPP
48-335	SUPPORTS FLUE GAS SYSTEM	649.135	NPP
48-700	BULKED BPS COMPONENTS	40.650	NPP
48-993	ERECTION MATERIALS	706.526	NPP
95-088	FSSS FLAME SCANER	41.750	C&I
95-091	FSSS FIELD INTERCONNECTING EQUIPMENTS	763.970	C&I
96-191	LT MOTOR CONTROL CENER	7055.000	C&I
97-282	FLOWMETERS	10.000	SGP
97-284	PRESSURE SWITCHES	27.000	C&I
97-285	FIELD SWITCHES	34.000	C&I
97-451	POWER & CONTROL CABLE	10659.960	C&I
97-590	ERECTION MATERIALS	220.500	C&I
97-592	PNEU TUB&FIT.AIRSET-ERECTION	41.086	C&I
97-599	PNEU.ACTUR A&FG SYS-ERECTION	200.000	NPP
		271723.246	
80-300	MS FROM SUPERHEATER TO BOILER STOP VALVE	899.409	SGP
80-345	AUX STEAM TO DEAREATING HEATER	4279.785	SGP
80-366	IBD TANK VENT TO ATMOSHPARE	834.221	SGP
80-417	BOILER FEED DISCHARGE PIPING	795.883	SGP
80-418	ERECTION MATERIAL FOR INSTRUMENTS	173.990	SGP
80-420	BOILER FEED PUMP SUCTION	894.520	SGP
80-421	BOILER FEED PUMP RECIRCULATION	224.400	SGP
80-446	DEARATING HEATER OVER FLOW & DRAIN	531.462	SGP
80-450	CBD & EMERGENCY DRUM DRAIN	314.640	SGP
80-451	BOILER INTEGRAL PIPING DRAINS	359.360	SGP
80-453	LP PIPING DRAINS SG	204.960	SGP
80-460	SG AUX COOLING WATER UNIT SYSTEM	552.220	SGP
80-473	DEMINERLISED WATER SYSTEM	558.060	SGP
80-600	HIGH PRESSURE DOSING PIPE	151.755	SGP
80-601	LOW PRESSURE DOSING PIPE	89.950	SGP
80-612	SERVICE AIR FOR INDIVISUAL UNIT	227.750	SGP
80-616	INSTRUMENT AIR FOR INDIVISUAL UNIT	391.020	SGP
80-650	FUEL OIL SUPPLY & RETURN PIPING	459.270	SGP
80-901	SUB DELIVERY VALVES FOR LIGHT UP	904.000	SGP

80-905	BHEL VALVES REQUIRED FOR LIGHTUP	6510.500	SGP
80-920	H & S FOR HYDRO TEST	2678.092	STR
80-921	H & S FOR LIGHTUP STEAM LINE	3596.283	STR
80-922	H & S FOR LIGHTUP NON STEAM LINE	1078.165	SGP
80-992	IMPORTED ELECTRODES	21.608	SGP
81-005	IBD EXPANDER DIA 1500 MM	2337.275	PP
81-026	TRAY TYPE DEARATOR BELOW 100 CUM/HR	22494.335	NPP
81-034	PLATFORMS & STAIRS FOR FEED TANK	2771.220	NPP
81-104	BOILER FEED PUMP	540.000	NPP
81-127	LP DOSING SYSTEM	1000.000	NPP
81-128	HP DOSING SYSTEM	1000.000	NPP
81-300	FIX COMP FOR MAIN STEAM PPG INSUL	793.286	INS
81-325	MINERAL WOOL MATTRESSES	2177.000	INS
81-341	SEALING COMPOUND FOR INSULATION	40.000	INS
81-350	ALUMINIUM CLADDING FOR INSULATION	1536.001	INS
81-411	DIRECT GAUGES FOR STEAM LINES	145.000	SGP
81-412	DIRECT GAUGES FOR NON STEAM LINES	174.000	SGP
81-414	LOCAL CONTROL EQUIP NON STEAM LINE	290.000	SGP
81-421	SENSING ELEMENT IN STEAM LINE	243.000	SGP
81-422	SENSING ELEMENT IN NONSTEAM LINE	62.000	SGP
81-435	FIELD JUNCTION BOX	469.000	SGP
		62803.420	
56-000	RADFAN TOOLS FIXTU-ERECTION	184.860	RTM
56-011	RAD FD FAN FDN EMBDMN-ERECTION	387.596	RTM
56-017	FD FAN C&l ITEMS-ERECTION	37.000	RTM
56-113	FD FAN BC1S1251-1600-ERECTIQN	6444.794	RTM
56-610	RADL FD FAN MOTOR-ERECTION	1786.836	RTM
56-810	COUPLING PB 180	45.224	RTM
56-911	FD FAN SILENCER-ERECTION	1318.950	RTM
57-083	DAMPER COLD AIR FD FAN-BOILER-ERECTION	1397.742	NPP
57-577	DAMELECT ACTUATOR FOR	136.000	NPP
87-010	FOUNDATION MATERIALS	2970.835	NPP
87-100	CHIMNEY SHELL-ERECTION	26803.260	NPP
87-150	CHIMNEY STRAKES-ERECTION	2626.634	NPP
87-200	PAINT TROLLY-CHIMNEY-ERECTION	577.922	NPP
87-300	PLATFORMS & LADDER ERECTION	5190.698	NPP
87-930	AVIATION LAPS-ERECT!ON	685.875	NPP
87-950	CHIMNEY INSULATION-ERECTION	6572.000	NPP
87-960	CHIMNEY INSULATION FIX-ERECTION	1776.302	NPP
		58942.528	
	C & I ITEMS	5630.000	C&I
		5630.000	
	Total WT in KG	**399099.194**	

	Total WT in MT	**399.099**	

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 Book II).
2. Besides PG / PGMA indicated in the weight schedule, there is likely hood of addition product groups integral to Boiler and its aux. The quoted rate shall be applicable for such product groups also.
3. The erection & dismantling of temporary piping, pumps, tanks, dummy plates & other miscellaneous equipment etc. 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 for **Non-pressure parts** (1C) for items. 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.

   Payment terms for temporary piping:

- 50% on completion of installation of temporary piping.
- 40% on dismantling and return of temporary piping to BHEL stores.
- 10% on Material reconciliation

4. 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.
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. Welding of ESP Inlet funnel with ESP Inlet Duct is the scope of Boiler Vendor.
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 contract and shall be carried out within the quoted rate.
9. For aux. boiler, tube expansion as per the drawing is in the scope of contract. Modification / rectification of tubes before tube expansion shall be carried out by the contractor with in the quoted rate.

10. **Extra work rates for welding:**

The quantum of welding joints indicated in Welding schedule 'Chapter XXI' of Vol-I of Technical Conditions of Contract is approximate and is liable for variation in PG, description, size, materials, NDT requirements etc., The indicated joints will be grouped into category of carbon steel (inclusive of SA106GrC or equivalent) and Alloy steel (inclusive of T91/P91) 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 equivated joints in each category exceeds 25% of the total equivated joints in that category contractor will be paid extra as per the rate indicated below:

a) One extra Equivated joints of Carbon Steel (CS) = Rs 254/-
b) One extra Equivated Joints of Alloy Steel (AS) = Rs 561/-
Non Destructive Testing (NDT) and Stress Relieving (SR) if applicable shall be carried out by the contractor within these rates.

BOQ for Electrical & C&I

SL. NO.	DESCRIPTION	UOM	Total Qty
I1	**Cable tray and Accessories**		
I1.0.1	Galvanised Perforated type cable tray, W=100mm	Mtr	50
I1.0.2	Galvanised Perforated type cable tray, W=50mm	Mtr	12.5
I1.0.3	Galvanised Ladder type cable tray, W=150mm	Mtr	625
I1.0.4	Galvanised Perforated type cable tray, W=150mm	Mtr	300
I2	**Cable laying including earthing wires**		
I2.0.1	3C X2.5 SQ MM	Mtr	1400
I2.0.2	3 C X240 SQ MM	Mtr	500
I2.0.3	3 C X150 SQ MM	Mtr	500
I2.0.4	3C X6 SQ MM	Mtr	700
I2.0.5	3 C X16 SQ MM	Mtr	500
I2.0.6	3 C X50 SQ MM	Mtr	250
I2.0.7	2C X2.5 SQ MM	Mtr	800
I2.0.8	5Cx1.5 sq mm	Mtr	1415
I2.0.9	7Cx1.5 sq mm		200

I2.0.10	GI Wire	Mtr	3469
I2.0.11	GI Strip	No.	40
I2.0.12	2Px0.5 sq mm Screened Control Cable	Mtr	100
I2.0.13	4Px0.5 sq mm Screened Control Cable	Mtr	1600
I4	**Junction Box/Push button station**		
I4.0.1	Junction Box Upto 24 way	No.	12
I4.0.2	Junction Box Upto 48 way	No.	4
I4.0.3	Start Stop push button station	No.	11
I5	**Conduits/Impulse pipe/tubes**		
I5.0.1	ASTM A106 Gr.C Size:3/4" Sch 80	Mtr	75
I5.0.2	Pneumatic/Copper Tube	Mtr	101
I6	**Miscellaneous Structural steel including frames for Panels/Racks/Instruments, supports for cable tray/pipes/tubes, Canopies etc**		
I6.0.1	Structural steel	MT	0.5
I6.0.2	Aluminium Strip	No.	50
I7	**Panels/Cubicles/Racks/Enclosures/Monitors/Computer/Computer peripheral/PLCs/UPS/Batteries**		
I7.0.1	Control Panel for HP & LP Dosing System (Weight: 400kg)	No.	1
I7.0.2	LT Motor Control Centre Panel, weight:7000 kg (MCC) (Total panels will be supplied in different shipping section)	No.	1
I8	**Instruments/Devices including sensors/Cells/Probes etc**		
I8.0.1	Temperature Gauge Gas Filled Type/Temp. gauge/Temp. gauge MIST (Mercury in Steel thermometer)	No.	10
I8.0.2	Pressure/Differential Pressure Gauges	No.	19
I8.0.3	Flow Element (Pitot Tube)/Flow indictor/Flow gauge/Orifice	No.	9
I8.0.4	Flame Scanner Assembly including control amplifier unit, power supply unit, half rack, cable, hose assembly, junction box, mounting flange, bolt, nut & washers etc	Set	1
I8.0.5	Temp/ Pressure/ DP switches	No.	27
I8.0.6	Level switch/Level switch(Conductivity type)/ Level switch(Float type) / Level Instruments/ Field Switches (RF Type)	No.	9
I8.0.7	Level transmitter/Level gauge/Level indicator	No.	10

E9	**Commissioning and Testing activities for Equipments erected by other agencies, like control valves, on/off valves, electrical/pneumatic valves, actuators, solenoid valves, valves, limit switches, ERV controllers, power cylinders, Pressure & Temperature Guages/Transmitters,etc**		
E9.0.1	Open/Close type pneumatic gates / dampers / valves	No.	11

10.1 GENERAL

10.1.1 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.

10.1.2 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.

10.1.3 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 scaffolding works or as bed for pre-assembly works. Contractor shall arrange himself all such materials. 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.

10.1.4 All the works such as cleaning, leveling, 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.

10.1.5 The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely operation of equipment installed. 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.

10.1.6 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.

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

10.1.8 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 donewithout specific prior approval of BHEL Engineer.

10.1.9 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies / personnel on ISO 9001 – 2008 Standards.

10.1.10 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.

10.1.11 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.

10.1.12 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.

10.1.13 If applicable, 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 pipe line to be started. Inspection fee and registration fee as mentioned in Chapter VIII of Special Conditions of contract (Volume-IB in Volume-I Book-II) shall be paid by BHEL.

10.1.14 Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping 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.

10.1.15 Contractor shall arrange the necessary clearance from statutory authorities like IBR, Electrical Inspectorate, etc. as required for installation of the plant and equipment and render all assistance, service required in this regard.

10.1.16 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.

10.1.17 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.

10.1.18 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

10.1.19 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.

10.1.20 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.

10.1.21 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.

10.1.22 On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled 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.

10.1.23 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.

10.1.24 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.

10.1.25 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.

10.1.26 All necessary certificates and licenses, permits & clearances required including IBR certificates/license/clearances to carry out this work from the respective statutory/ local authorities are to be arranged by the Contractor at his cost in time to ensure smooth progress of work.

10.1.27 The Aux boiler shall be erected as per relevant provisions of latest Indian Boiler Regulations (IBR) and amendments/addendums thereof, if any.

10.1.28 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.

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

10.1.30 All necessary certificates and licenses required for carrying out this work are to be arranged by the Contractor expeditiously.

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

10.1.32 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.

10.1.33 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.

10.1.34 During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc may become necessary on account of feed back / 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'.

10.1.35 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.

10.1.36 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 for such usage.

10.1.37 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.

10.1.38 The distance between storage area and erection site is approx 2 KM. 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.

10.1.39 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.

10.1.40 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.

10.1.41 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.

10.1.42 Layout of field routed/ small bore piping shall be done as per 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 pipe lines even after completion of erection.

10.1.43 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.

10.1.44 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.

10.1.45 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.

10.1.46 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.

10.1.47 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.

10.1.48 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.

10.1.49 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.

10.1.50 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.

10.1.51 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.

10.1.52 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 relevent drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.

10.1.53 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.

10.1.54 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.

10.1.55 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.

10.1.56 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.

10.1.57 Nitrogen gas, if required, for preservation of Aux 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.

10.1.58 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.

10.1.59 UTILITY POINTS

10.1.59.1 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.

10.1.59.2 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.

10.1.60 DOCUMENTATION

10.1.60.1 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.

10.1.60.2 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.

10.1.60.3 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.

10.1.60.4 Other documents as specified in of Chapter – XI of Technical Conditions of Contract (VOLUME-IA PART- II)

10.1.61 SITE INSPECTION

10.1.61.1 The contractor shall maintain at site a joint protocol for recording actual measurement of work carried out at site, inspection and witnessing of various tests conducted by the contractor.

10.1.61.2 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 for such duplication of inspection of work be entertained.

10.1.62 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. Canopies shall be provided for all outdoor pumps and motors. 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

(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 Book-II. 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, gascutters, 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 Aux. 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.

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 upto **20 mm** for achieving proper levels will be within the scope of work/specification.

12.2 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-inforcement 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.

12.3 Neutralisation pit for EDTA 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.
Effluent has to be disposed off safely from neutralising pit to a safe area as per instruction of BHEL Engineer.

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.

12.4 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 contaractor.

12.5 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 gp1/gp2), 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.

12.6 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.

12.7 Foundation for the equipments to be erected shall be provided by BHEL/ clients of BHEL. The dimensions of the foundations and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. All adjustments of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipments / plants shall be carried out by the contractor.

12.8 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., dewatering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form / shuttering work are within the scope this Work.

12.9 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. Also minor chipping, dressing of foundations up to 30 mm for obtaining proper face for packer plates / shims, as may be required for the erection of the equipment / plants will have to be carried out by the contractor without extra cost

12.10 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.

12.11 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.

12.12 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.

12.13 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 GPI / Conbextra GP II / 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.

12.14 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange, a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous expenditure for this activity. BHEL will not pay any service and incidental charges for arranging the supplier representative. The contractor to take note of this aspect and quote accordingly.

12.15 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.

12.16 The certificates of the grout is 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.

12.17 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.

12.18 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.

12.19 **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, fabrication yard, 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 4 KM from the erection site.

13.3 Some consignments like ODC consignments may be unloaded near to erection site as per space availability.

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 insequence 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 Sometimes it may become necessary for the contractor to handle certain unrequired 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.

13.8 Materials shall be stacked neatly, preserved and stored in the contractor's shed / work area in an orderly manner. 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.

13.9 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.

13.10 The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered.

13.11 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.

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 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.

14.1.3 Sometimes it may become necessary for the contractor to handle certain unrequired 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.

14.1.4 Materials shall be stacked neatly, preserved and stored in the contractor's shed/work area in an orderly manner. 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.

14.1.5 All pipe and tube ends shall be covered with plastic caps or shall be closed with wooden plugs as the case may be.

14.1.6 Contractor has to arrange required fire proof tarpaulins to protect the machined components / assembled parts drawn from BHEL before and after erection at their cost.

14.1.7 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.

14.1.8 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.

14.1.9 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.

14.1.10 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.

14.1.11 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.

14.1.12 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.

14.1.13 All welded joints should be painted with anti-corrosive paint, once NDE works are over.

14.1.14 All welded joints shall be subjected to acceptance by BHEL Engineer.

14.1.15 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.

14.1.16 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.

14.1.17 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.

14.1.18 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.

14.1.19 Wherever elbows of 45 deg. or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used. No extra cost shall be paid.

14.1.20 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.

14.1.21 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.

14.1.22 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.

14.1.23 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.

14.1.24 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. The same shall be removed and returned to BHEL store after erection of permanent supports.

14.1.25 No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc.,

14.1.26 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.

14.1.27 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.

14.1.28 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.

14.1.29 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.

14.1.30 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.

14.1.31 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.

14.1.32 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.

14.2 ERECTION OF AUX. 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˚ 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 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.

14.2.7 Suitable crane to be used for handling / lifting the ceiling girder will be provided by BHEL. Levelled 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 contractor within quoted rates. Positioning of the crane is to be decided in consultation with BHEL.

14.2.8 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.

14.2.9 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.

14.2.10 Some platform materials in PG 35 & 36, 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.

14.2.11 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.

14.2.12 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.

14.2.13 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.

14.2.14 Normally, 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. The valves will have to be checked, cleaned or overhauled in full or in part before erection, after chemical cleaning and during commissioning. Edge preparation becomes the part of erection work. However, payment for new edge preparation reconditioning beyond reasonable limits will be considered as per man day rates.

14.2.15 The contractor should get the formal approval from the Boiler inspectorate to take up the boiler erection work (mainly pressure parts, piping etc.). Necessary assistance will be extended by BHEL for the same.

14.2.16 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.

14.2.17 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).

14.2.18 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over. Daily welding reports in the format suggested by BHEL should be submitted by next morning without fail.

14.2.19 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.

14.2.20 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.

14.2.21 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.

14.2.22 The contractor shall carry out necessary preservative painting, periodic application of preservations on pressure parts and other equipments during erection / after erection until completion of work. Necessary preservatives / paints, thinner are to be arranged by the contractor at his cost. Contractor shall provide necessary crew with all items like wire brushes, paint brushes, emery paper, cotton waste, scaffolding materials etc., at his cost.

14.2.23 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.

14.2.24 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.

14.2.25 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).

14.2.26 The following measuring and test equipment with proper calibration certificates are to be made by the contractor before taking up the structural and other pressure parts erection. Steel tapes minimum 5M,30M in sufficient numbers, torque wrench minimum 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.

14.2.27 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. The valves will have to be checked, cleaned or overhauled in full or in part before erection, after chemical cleaning and during commissioning. Edge preparation becomes the part of erection work. However, payment for new edge preparation reconditioning beyond reasonable limits will be considered as per man day rates. All the valves, after chemical cleaning, have to be checked, cleaned or over hauled in full or part before erection if called for as part of scope.

14.2.28 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.,

14.2.29 Suspension for piping, pressure parts, ducting etc., will be supplied in running lengths which shall be cut to suitable sizes and adjusted as required within the quoted cost.

14.2.30 Fabricated 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.

14.2.31 The applicable welding schedules will be issued during erection of work at site.

14.2.32 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. Normally, the machine profile will be cut out for the structural members but the contractor will have to carry out suitable alteration / adjustments at site, without any extra payment in case it becomes necessary.

14.2.33 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.

14.2.34 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.,

14.2.35 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.

14.2.36 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.

14.2.37 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.

14.2.38 Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before and after installation.

14.2.39 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.

14.2.40 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. 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.

14.2.41 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 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.

14.2.42 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.

14.2.43 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.

14.2.44 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.

14.2.45 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.

14.2.46 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.

14.2.47 For all the site routed piping under PG-21, 24 & 42 as built drawings are to be submitted by the contractor immediately after erection. The Number of site welds indicated for PG21, 24 the 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.

14.2.48 Seal box to be painted with bituminous paint of IS158 by the bidder. The required paint shall be supplied by the bidder within the quoted rate.

14.2.49 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.

14.2.49.1 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.

14.2.49.2 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.

14.2.49.3 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.

14.2.49.4 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.

14.2.49.5 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.

14.2.49.6 Preassembly of end bars with crown plates including stress relieving for coil assemblies.

14.2.49.7 Pump case / volute is welded with suction manifold in line with procedures available with site office.

14.2.49.8 The required accuracy level to be ensured before welding as per drawing. Necessary radiography/NDT along with heat treatment to be done.

14.2.49.9 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.

14.2.49.10 Erection of Platen Coils,SH Coils & 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 Platen Coils,SH Coils & Economizer coils erection.

14.2.49.11 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.

14.2.49.12 Check for the inner space between eco coils and SH coils as per drawing

14.2.49.13 Ensure proper completion of steam cooled spacers. Check for clearances for soot blower lance tubes. Radiant roof skin casing sheets are to be welded after application of castable refractory.

14.2.49.14 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.

14.2.49.15 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.

14.2.49.16 Ensure removal of drains plugs provided in the silencers, the gap between exhaust pipe and roof is sealed properly.

14.2.49.17 DWLGs to be erected as per drawing. Joint protocol to be made for its correct erection with supports.

14.2.49.18 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.

14.2.49.19 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.

14.2.49.20 All the drain lines should have sufficient slope towards drain. Provide expansion loops in all the vents and drains as per the drawings. Electromatic 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.

14.2.49.21 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.

14.2.49.22 Transport binders on all coils are to be removed.

14.2.49.23 Gas distribution baffles and vibration snubbers, mechanical spacer bars etc. are to be erected as per drawings.

14.2.49.24 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.

14.2.49.25 All the furnace guides to be erected as per drawing keeping gap of about 3 mm for free boiler expansion.

14.2.49.26 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.

14.2.49.27 Sagging of roof tubes results in condensate stagnation during shut down. Hence ensure that radiant roof and back pass roof tubes are erected without sag.

14.2.49.28 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.

14.2.49.29 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**

14.2.50 **Erection of Boiler structures and points to be taken care of for achieving verticality of Boiler columns.**

- The column pieces are pre-assembled and site match marks to be provided.
- Pre assembly checks to detect and deviations in the columns like

length, camber sweep, twist etc.

- Checking of foundations for its levels distance, diagonal, distance etc.
- Proper tightening of the foundation bolts.
- Erection of columns tier by tier and box by box. Grouting to be done immediately after 1st tier erection.
- Ensuring the availability of guy ropes, etc. during column erection and removal of guy ropes after ensuring the verticality of columns.
- Using calibrated theodolite for verticality measurement of columns.
- Tightening of HSFG bolts to be done by turn of nut method only after ensuring the verticality of the columns.
- Measuring adjacent diagonals of the ceiling girders after its erection.
- Ensuring the verticality of the columns before and after the steam separator erection.

14.2.51 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.

14.2.52 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.

14.2.53 Vital clearance of mill should be checked at site and adjusted if required.

14.2.54 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.

14.2.55 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 hydraulic test of oil coolers, etc.

14.2.56 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.

14.2.57 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.

14.2.58 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. If the contractor does not do this job satisfactory, BHEL will arrange for the same and the expenses incurred with overhead will be recovered from the contractors. Periodical payments to the contractor for the work done will be considered only if the housekeeping is certified as satisfactory by the customer.

14.2.59 Scrap disposing chutes are to be erected by the contractor with in the quoted rate at different areas like Boiler main column, duct supporting structures. Materials for the scrap chute will be provided by BHEL.

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.

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 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.

15.10 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He 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.

15.11 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.

15.12 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.

15.13 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.

15.14 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.

15.15 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.

15.16 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.

15.17 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 carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).

15.18 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.

15.19 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.

15.20 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.

15.21 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.

15.22 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.

15.23 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.

15.24 The contractor shall have a dark 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.

15.25 In case of radiography of less than 100%, the joints identified by BHEL at random shall be radiographed.

15.26 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.

15.27 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.

15.28 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.

15.29 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.

15.30 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.

15.31 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.

15.32 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 for the work as per directions of BHEL.

15.33 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.

15.34 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.

15.35 All welded joints shall be subjected to acceptance by BHEL Engineer.

15.36 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.

15.37 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.

15.38 The field joints are to be radiographed and preheating and post weld heat treatment to be done as per BHEL procedure and manuals.

15.39 The percentage of Radiography are tentative, which may be increased depending upon the quality of joints at the discretion of BHEL.

15.40 Penetrometor as per ASME/ISO shall be used for all exposures.

15.41 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

15.42 The weld joint is to be marked with permanent mark A, B, C, etc. to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the downstream side of the weld. For multiple exposures on pipes, an overlap of about 25 mm of film shall be provided.

15.43 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.

15.44 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.

15.45 All the radiographs shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.

15.46 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

high pressure welders. If the performance of the welder is unsatisfactory, he shall be replaced immediately.

15.47 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.

15.48 Wherever radiographs are not accepted on account of poor exposure, joints shall be re-radiographed and new film submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defect persists after first repair as per radiograph, carrying out 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.

15.49 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.

15.50 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.

15.51 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.

15.52 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.

15.53 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.

15.54 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.

15.55 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.

15.56 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.

15.57 **For uniform heating and better closed loop control, pre heating, post heating, controlled rate of heating & cooling and post weld heat treatment cycles should be carried out using flexible ceramic pads with suitable heating machine**.

15.58 **MPI must be done on joints, those are undergone ultrasonic testing**.

15.59 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.

Where ever technically required BHEL will provide the Induction Heating Equipment set for SA 335 P-91 materials piping only. At present BHEL is having two types of Induction Heating Equipment i.e. Old Model and Compact Induction Heating Equipment. Type of equipment to be provided shall depend on the availability of equipment at the time of requirement. The set will comprise of following:

(A) In case of Old model Induction Heating Equipment

(i) Main panel
(ii) Capacitor panel
(iii) Interconnection power (185 sq mm) & control cables between above panels
(iv) Output connecting cable (185 sq mm) from capacitor panel output – 5m length.
(v) Junction Box

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.

(B) In case of Compact Induction Heating Equipment

(i) Main panel
(ii) Output connecting cable (160 sq mm) from main panel output – 5m length.
(iii) Input Power Cable with male plug
(iv) Junction Box

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).

15.60 Guidelines for NDE and Heat Treatment provided in **Vol-1 E Technical Specifications**

15.61 **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	200 per incident

	welding electrodes(Doc.)	
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)	100 per incident & welder to be sent home
6	Unauthorized welder on job	500 per incident & welder to be sent home
7	Delay in NDT Agency deployment w.r.t jointly agreed Ere. Prog	500 per incident & welder to be sent home
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 & customer acceptance Log sheets esp. for Billed qty. from dt. of Billing (Vendor)	10,000 per week
12	Lack of safe approach Scaffolds/Platform for inspection & non-availability of calibrated MMDs –	100 per incident.

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 some of the Low Pressure parts 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, testing 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 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, testing 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 Raw materials for all temporary piping necessary for conducting Hydraulic test, Chemical cleaning, Steam blowing, Flushing, effluent disposal, etc. will be provided by BHEL free of cost. However, fabrication, servicing, erection and dismantling the same and return of the temporary piping, flanges, valves etc. to BHEL stores is the responsibility of the contractor without any extra charges.

16.12 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 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.

16.13 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.

16.14 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.

16.15 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.

16.16 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.

16.17 During hydraulic test, the pipes being tested shall be isolated from the equipments to which they are connected.

16.18 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.

16.19 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.

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, land flow test, clean air flow test, Gas Distribution Test, chemical cleaning of piping and boiler, water washing, oil flushing of oil system 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 thoughsome 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 stack.

17.4 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall do all the repairs for site-welded joints arising out of the failure during testing.

17.5 Raw materials for all temporary piping necessary for conducting Hydraulic test, Chemical cleaning, Steam blowing, Flushing, effluent disposal, etc. will be provided by BHEL free of cost. However, fabrication, servicing, erection and dismantling the same and return of the temporary piping, flanges, valves etc. to BHEL stores is the responsibility of the contractor without any extra charges.

17.6 The scope of pre-commissioning activities cover installation of all necessary equipment including temporary piping, supports, valves, blanking, pumps, tanks, with access platforms valves, along with accessories required for hydro test, chemical cleaning, steam blowing or for any other tests. The scope also covers the offsite disposal of effluents.

17.7 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 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.

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. ~~The contractor may note that **no separate payment shall be released** for any temporary works that are to be carried out for conducting pre-commissioning and commissioning tests. Bidders are advised to include expenses on temporary works along with the rates being quoted by them.~~ 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 and GD 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 by all the parties.

17.9 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.

17.10 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.

17.11 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.

17.12 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.

17.13 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.

17.14 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.

17.15 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.

17.16 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.

17.17 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.

17.18 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.

17.19 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.

17.20 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.

17.21 At the time of each inspection, the contractor shall take note of the decisions/ changes proposed by the Engineer and incorporate the same at no additional cost.

17.22 Hydraulic testing pump for Boiler shall be provided by BHEL free of hire charges. The testing pump will be issued to the contractor in working conditions. Installation, electrical connection, erection, testing 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.

17.23 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.

17.24 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.

17.25 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.

17.26 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.

17.27 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.

17.28 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.

17.29 Replacing / cleaning of filters of the erected equipments, piping system etc. during pre-commissioning / commissioning stage are within the scope of work.

17.30 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. 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.

17.31 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.

17.32 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.

17.33 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.

17.34 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.

17.35 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.

17.36 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.

17.37 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces.

17.38 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.

17.39 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.

17.40 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.

17.41 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.

17.42 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.

17.43 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.

17.44 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.

17.45 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.

17.46 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.

17.47 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.

17.48 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 andtrial 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.

17.49 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.

17.50 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.

17.51 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.

17.52 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.

17.53 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.

17.54 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 for dismantling, cleaning, lubricating and refitting are to be carried out by contractor at his cost.

17.55 Boroscopic examination of headers etc. to be conducted after steam blowing. This requires cutting of 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.

18 PAINTING

BHEL/Customer Specification for Shop & Field Painting with regard to surface preparation and final painting with colour codes / scheme for surface preparation and finish paints coating including primer coating for shop and field painting will be given at site at the time of painting work.

Contractor shall carry out surface preparation and final painting works as per BHEL/Customer specification and instruction of BHEL engineer at site.

18.1 Scope of Contractor/BHEL regarding Supply of Paint & Paint application

S No	DESCRIPTION	BIDDER	BHEL	REMARKS
a)	Surface preparation	Yes		
b)	Preservation painting	Yes		Wherever applicable
c)	Touch up painting	Yes		Wherever applicable
d	Intermediate Coat application	Yes		Wherever applicable
e)	Finish Painting	Yes		
f)	Painting of Insulation cladding sheet	Yes		Wherever applicable
g)	Painting of welded surface	Yes		Wherever applicable
h)	Supply of Thinner	Yes		
i)	Supply of Primer	Yes		
j)	Supply of Paint (intermediate/Finish) including bituminous paint	Yes		
k)	Supply of Preservative/anticorrosive paint/protective paint	Yes		
l)	Supply of scaffoldings, platforms, structures & ropes etc	Yes		
m)	Supply of tools e.g wire brush, paint brush, Spray M/c, cleaning agents etc	Yes		
n)	Supply of Other Consumables	Yes		

18.2

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.

18.3 Primer 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.

18.4 Finish 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.

f) Work of painting of condenser surfaces in various areas and at various stages of work are specified elsewhere in these specifications.

18.5

All exposed metal parts of the equipment including piping, structures, railings etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or sand blasting, and the same being inspected and approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with two coats of alloyed resin machinery enamel paints.

18.6
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.

18.7
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.
(a.)

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.

18.8
The scope of work includes painting (including supply) of 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.

18.9
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.

18.10
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.

18.11
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.

18.12
Specified drying time shall be permitted from one to another coat.

18.13
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.

18.14
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.

18.15
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.

18.16
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

18.17
Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

18.18
Acceptance of Final Painting for required thickness shall be as per the thickness measured by Alcometer by NTPC/BHEL Engineer. Contractor shall have to carry out painting till the required thickness is achieved.

18.19 Contractor shall carry out preservation painting on all items taken from stores. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. This facility shall be provided by the contractor till the commissioning and handing over of the equipment to the customer. Preservative and touch up painting on equipments covered under this specification stored at stores/storage yard shall also be carried out by the contractor

18.20 Prior to application of refractory bituminous painting on the pressure parts and other area is under Contractor scope.

18.25 Painting two coats of bituminous paint on Insulation cladding sheet inner surface.

18.26 PRESERVATIVE PAINTING

18.26.1

Two coats of steam washable paints shall be applied on steam side of LP turbine and condenser components, as advised by BHEL. The steam washable paints, primer and thinner will be provided by contractor as part of scope of work along with other like arrangements for surface preparation and paint application like sand/shot-blasting, consumables like surface cleaning agents, paint brush, brush cleanser, labour and necessary tools and plants as required for completion of work.

18.26.2
The water boxes shall be sandblasted to remove all traces of primer applied at the works. Thereafter apply two coats of primer paint followed by two/three coats of alloyed resin machinery enamel paints as approved by BHEL. Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL approved laboratory for the primers and paints. Prior approval of BHEL for each and every batch of the primer & paints shall be mandatory. In order to achieve a desired minimum paint dry film

thickness (DFT) as specified in BHEL drawing, number of coats may be applied and method of application shall be as recommended by the paint manufacturer.

18.26.3
All site weld joints falling in steam side shall be painted with two coats of steam washable paint.

18.26.4
All water side surfaces of water chambers including tube plate shall be thoroughly surface prepared and painted.

18.26.5
After the successful completion of hydraulic testing, the interior surfaces of the water boxes, main tube plates shall be painted with suitable anticorrosive paints as per special procedures laid down by BHEL.

18.26.6
Prior to hydraulic testing of water side of condenser, interior surfaces of water boxes shall be painted.

18.26.7
After completion of tubing and tube side hydro test, all water side surfaces of water chambers including tube plate shall be painted.

18.26.8
Preservation of all components/equipments during various stages of erection, commissioning till handing over is in the scope of work. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor.

18.26.9
Condenser internal components/parts/surfaces have to be surface protected with steam washable paint as per BHEL standards.

PAINTING SCHEME: Provided in Vol-1 E Technical Specifications

Eletctrical & C&I Painitng

18.27 FINAL PAINTING

A. The contractor shall provide all the primer, paint, and other consumables like brush, cleaning agents etc. All T&P, manpower, supervision is in contractor's scope.

Painting shall be carried out as per colour scheme approved by BHEL/ BHEL customer (NTPC).

B. All metal parts of the equipment including supports, structures, etc., as applicable shall be painted after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc, by wire brush, scrapping, shot Blasting (as applicable) etc; as specified in relevant erection documents. The above parts shall then be painted with specified two coats of specified paint over the shop primer/paint. Also, where the shop primer/paint has peeled off, the affected area shall be cleaned thoroughly by the specified method and then primer coat applied. Similarly, certain components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications, coated with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification. The color, shade etc. shall be as per specification. Painting schedule will be furnished at site. The scope of painting work is for the following areas. Primer and paint shall be sourced only from the manufacturers, approved by BHEL .In order to have consistency in painting system, it is preferable that all the supplies are sourced from one single manufacturer.

C. All the fabricated frames, racks, supports, panel base frame etc. wherever applicable shall be painted with two coats of primer and followed by two coats of paint as specified earlier herein. In case of G I Structure, The cold galvanizing paint to be applied as touch up where ever needed. This is to be done as per instruction of BHEL engineer. The Paint required for this purpose is in scope of Contractor

D. Touch-up painting of LT MCC \ Control Panels or any other equipment /devices wherever necessary.

E. The primer shall be compatible with the final coat paint schedule.

F. Full (Spray) painting of transformers, bus ducts with two coats of paint as per specification

G. Supply of paint, primers, other consumables etc for above and any other scope in these specifications shall be in Contractor’s scope.
Irrespective to scopes of painting & supply of paint mentioned elsewhere it is to be noted that supply of paint, primers, other consumables etc for all primer/painting works to be done by the contractor, shall be in Contractor’s scope. No dispute shall be entertained on the above matter.

H. Colour Banding, Legend and Identification Marking, Direction marking etc. shall be in scope of the contractor.

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., 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 under this contract including but are not limited to the following. Insulation of main and Aux. boiler portion, boiler Drum / steam separator, ceiling heat recovery area, air and flue gas ducts, and connected ducts, HP & LP piping, temporary acid cleaning and steam blowing piping connected tubes, oil and coal burners, oil and steam tracing lines complete and fuel and draft plants, all drain lines, traps, flanges, fine fittings, sampling lines, Fans and other equipment like Vessels, Flash tanks, Heaters, 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 to be arranged by subcontractor.

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.

19.9 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.

19.10 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

19.11 The contractor shall provide the required quantity of wire, nails and other materials for centering works at their cost.

19.12 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.

19.13 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.

19.14 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.

19.15 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.

19.16 Dressing of insulation bricks to suit site conditions curing the refractory concrete applied, sheet cladding over insulations, form the part of this work

19.17 Removal type of insulation to be provided for valves fittings, expansion joints etc., as per the drawings or as directed by BHEL Engineer.

19.18 All piping insulations shall be carried out in such a manner as to facilitate removal of bolts nuts and washers from the flanges.

19.19 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.

19.20 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.

19.21 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.

19.22 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.

19.23 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.

19.24 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.

19.25 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.

19.26 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.

19.27 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%

19.28 Making structural supporting works for pourable insulation, laying pourable insulation, adhering to all specifications and instructions shall be the responsibility of the contractor

19.29 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.

19.30 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.

19.31 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.

19.32 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.

19.33 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.

19.34 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.

19.35 Contractor has to arrange required fire retardant covering material at their cost to protect the insulation materials drawn from BHEL before and after erection.

19.36 The contractor shall provide any fixtures, concrete blocks / wooden sleepers, etc., which are required for temporary supporting of the insulation materials at site.

19.37 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.

19.38 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

19.39 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

19.40 Welding of iron components directly on pressure parts and HP piping is are to be carried out by certified IBR high pressure welders.

19.41 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.

19.42 Dressing of insulation to suit site conditions, sheet cladding over insulations, form the part of this work.

19.43 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.

19.44 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.

19.45 All rectification including painting of Employer’s structure which are damaged by contractor during his work.

19.46 Special type of insulation wool used in penthouse shall not be cut. Indiscriminately. All chicken mesh, cut bits shall be accounted for.

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 CABLE TRAYS/ CABLE DUCTS WITH SUPPORTS AND ACCESSORIES

21.1.1 Various types of sheet metal, galvanized cable tray, i.e. Perforated, ladder type, sheet metal duct, solid bottom tray, pre-fabricated structural trays etc. shall be provided in standard lengths along with accessories like hardware, bends, reducers, coupler plate, tray covers and tray clamps etc. Tightening/fastening of tray clamp shall be under contractor's scope .

21.1.2 Installation of cable tray/ cable duct shall include cutting, laying, jointing, supporting, drilling holes in the support, fixing tees/ reducers/ bends/ clamps as per tray route layout, fabrication of bends/ tees/ reducers from straight length, fixing of tray covers, welding of tray on support, cleaning and application of cold galvanizing paint on weld joints. Installation of tray/ duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable.

21.1.3 Fabrication of bends/ tee/ reducers from straight length of tray is within the scope of work and rate quoted shall be inclusive in unit rate (in running meters). All site welds of cable trays shall be painted with approved primer and cold galvanizing paint, which shall be arranged by the contractor.

21.1.4 Before start of work support structure/ cable tray work in cable vault, the existing cables of fire alarm system, power and control cables are to be protected to avoid the damage from fire, cutting welds and etc.

21.1.5 "Structural steels for support" materials are supplied to make supports for cable trays (in the buried RCC trenches, overhead tray arrangement on pipe racks and cable tray arrangement in cellars & other arrangements as applicable for the project. These are also required for making of frames for PB stations, junction boxes as per the project requirements. Drilling of holes in ISA for bolting of cable trays shall be done by Erection Agency. The holes in the cable trays shall be provided by the cable tray vendor, however in case of requirement of additional holes to be drilled for Cable Trays for the purpose of Cable Tray erection, same shall be done by the Erection Agency. Erection Agency shall ensure that all steel structure used for Electrical installation shall be painted with one coat of Red Oxide Zinc Chromate Primer of approved shade for indoor installations. Supply of Red Oxide Zinc Chromate Primer for site painting of all structural steels (required for cable tray supports) shall be in the Erection Agency's scope. Erection Agency shall ensure that after welding and drilling (if any) of the steels bracket, above mentioned paint of approved shade shall be applied. The structural steel work shall be carried out in line with the customer's/ consultant's technical specifications.

21.1.6 In case cable trays are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instance.

21.1.7 Cable trays/ ducts etc. may have to be routed underground in cable trench, over head on structure, along the walls, floors etc. for various applications such as cable laying, conduits, thermocouple, temperature gauge etc.

21.1.8 Cutting and rerouting shall be carried out within the quoted rates for completion of

work.

21.1.9 The cable trays shall be supported in general at a span of 1.5m horizontally and at a distance of 1m vertically.

21.1.10 All sharp edges and burr shall be removed.

21.1.11 Cable tray on the top tier shall have cover whenever running below pipes.

21.1.12 Cable trays shall be numbered as per layout drawing before laying of cables.

21.2 NEW CABLE LAYING(POWER/ CONTROL/ INSTRUMENTATION: SHIELDED/ UNSHIELDED/ PLUG-IN/ COAXIAL/ UTP/ STP/ DATA HIGHWAY, ARMOURED/ UN-ARMOURED, SINGLE/ MULTI-CORE, PVC/ HR PVC/ FRLS/ TEFLON/ PTFE/ XLPE INSULATION, OPTICAL FIBER, ETC.)

21.2.1 Cable laying includes cutting to the required length, laying in overhead cable racks/ underground cable trench/ pipes/ flexible conduits, dressing/ clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JBs, providing PVC numerical/ alphabetical/ printed ferrules, termination by using crimp type copper tinned/ aluminium lugs, insulated/ un-insulated, termination (crimp, soldering, etc.), plug-in connections with insert type crimping, providing identification PVC/ aluminium cable tags continuity checking, insulation resistance checking, high voltage test on HT cables. Contractor to arrange adequate numbers of his own ferrule printing machines.

21.2.2 All cables shall be provided with minimum of 2mm thick aluminium sheets as cable identification tags indicating cable designation in accordance with the cable schedule. The cable tags shall be provided at the ends, every 20m and when the cable changes direction/ elevation. The cable tags shall be of aluminium with the number punched on it and securely attached to the cable by not less than two turns of 20 SWG GI wire conforming to IS:280. Alternatively, cable may also provide cable tags made of nylon, cable marking ties with cable number heat stamped on the cable tags.

21.2.3 For buried cable, the marker shall project at least 150 mm above ground and shall be spaced at an internal of 20m and at every change of direction.

21.2.4 All the cables shall be clamped to the cable trays/ support structure with the help of clamps. Cables to be strapped to tray at interval not greater than 300mm. All power cables shall be clamped individually and control cables shall be clamped in groups of 3 or 4 cables. Clamps for multicore cables shall be fabricated out of 25x3mm aluminium flats. Single core power cables shall be laid in trefoil formation and suitably clamped with Al cast/ Glass Fiber Clamp. All sharp edges and burr shall be removed. Erection Agency shall carry out the plant cabling works in line with customer/ consultant's Technical Specification.

21.2.5 Cables to be strapped to tray at interval not greater than 300mm.

21.2.6 Laying of Power, Control, DC supply Cable and Signal Cables are to be laid as per identified cable tray. In case of non-availability of cable tray, cable shall be laid with permission of BHEL.

21.2.7 Laying, etc. of Optical fibre cables on cable trays/ cable trench shall necessarily

be done using flexible conduit.

21.2.8 Damaged cable drums also to be used within the quoted rates. No extra compensation for difficulty in cable laying due to damaged drums shall be made.

21.2.9 Entry to the panels and JBs may be at top, sides or bottom. All cables are required to be properly supported and clamped near to the JB/ Panel.

21.2.10 Spare holes in the panels/ Instruments/ Actuators/ Motors/ JBs/ etc. shall be sealed by the contractor using suitable method (The cost of work and Materials such as aluminium sheet or Adhesive tape/ Plugs etc. shall be within the quoted rates for laying of cables).

21.2.11 Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, plug-in cables, etc., for such cases cables may have to be lifted inside the panel by either making cut-out in gland plate and providing rubber profile for sharp edge protection or alternatively, providing 4" or 6" PVC pipe coupling gland and these pipe coupling gland shall be supplied by contractor within the quoted rate of cable laying.

21.2.12 Copper tinned lugs of various types (pin, ring, fork, snap-on) up to 4 sqmm conforming to IS: 694, PVC cable ties, PVC ferrules, PVC button and tapes, cable identification tag of PVC/ metallic as per site requirement, clamping and dressing material such as suitable cable ties/ clamps (25 x 3 mm Aluminium Flat) etc. with hardware, PVC sleeves etc. shall be supplied by the contractor within the quoted rates for cable laying. Single core power cable shall be laid in trefoil formation. The quality of material shall be approved by BHEL engineer prior to their use on the job.

21.2.13 All care should be taken to avoid abrasion, tension, twisting, kinking, stretching of cables during installation.

21.2.14 Cable shielding – all signal cables are supplied with bare shielded copper wire/ with braided wire shield. Generally, shield wire is kept isolated at instrument/ field device end and continuity is maintained through JBs and grounded at panel end only. While terminating the shield wire either in panel or JBs, PVC sleeves are to be used to avoid two-point earthing.

21.2.15 Wherever cables run through ducts, conduits, valves, etc., they shall be sealed using fire/ weather proof compound. In addition to this, cable entry in panels, MCCs, instruments, electrical actuators etc., are also required to be sealed. The required material for doing so shall be included by contractor in the cabling scope.

21.2.16 Many of the cable trays and cables have to be laid in cable trenches. For this purpose, the covers of the trenches have to be opened for working at site and whenever the cables are to be laid in existing cable tray, all safety precautions have to be observed.

21.2.17 After completing the work, the trenches have to be cleaned and covers put back into position. Contractor shall also carry out de-watering from the trenches if required and arrange pumps etc., at his cost.

21.2.18 Looping wire at terminal block of panels and electrical actuator as shown in the inter-connection diagrams or as required, is to be done by contractor at no extra cost.

21.2.19 Contractor shall carefully plan the cutting schedule of each cable drum in

consultation with site engineer such that wastages are minimized. In any case, the wastage shall not exceed the limits mentioned in this contract. Recovery will be made in case the wastages are exceeding the wastage allowances fixed in this contract.

21.2.20 In case of HT cable, cutting schedule is to be followed as provided by BHEL.

21.2.21 The HT/ LT Power and control cabling work shall be carried out in advance so that same can be terminated at panel end as the clearance is ready from the panel E&C side.

21.2.22 The termination and connection of cables shall be carried out strictly in accordance with manufacturer's instruction, drawings, and/ or as directed by the BHEL. The work shall include all clamping, fitting, fixing, soldering, tapping, compound filling, cable jointing, crimping, shorting, and grounding as required for the complete job. Cables shall be checked for insulation resistance before and after jointing. All erection consumables shall be in Erection Agency's scope. Termination and connection shall be carried out in such a manner as to avoid strain on the terminals. Cables shall be marked with cable numbers as per applicable drawing.

21.2.23 Control cable cores entering control panel/ switchgear/ MCC etc. shall be neatly bunched and served with PVC perforated tape to keep it in position at the terminal block.

21.2.24 Cable glands and lugs are being supplied along with corresponding equipment like Motors, LT Switchgear, Junction Boxes, PB stations, and transformers etc.

21.2.25 Termination and connection shall be carried out in such a manner as to avoid strain on the terminals. Cables shall be marked with cable numbers as per applicable drawing.

21.2.26 All cable entry points shall be properly sealed and made vermin proof and dustproof. Unusual opening, if any, shall be effectively closed. Sealing work shall be carried out with approved sealing compound having fire withstand capability for at least 03 hours.

21.2.27 The rate of laying for LT power, control and signal cable is inclusive of glanding and termination at both ends.

21.2.28 The LT Power, Control and Signal Cable straight through Jointing Kits (if required) shall be in Contractor's scope of supply. The rate of supply, and erection of these kits will be part of laying rates. No separate rate is applicable on this account.

21.2.29 The unit rates for the HT cable termination are exclusive of unit rates for laying of HT cables. Glands & termination kits for HT cables (3.3kV and above) shall be supplied by BHEL.

21.2.30 Ferrules shall be installed on all control cables cores in all junction boxes and at all terminations. The ferruling shall be cross ferruling. The ferrules shall carry terminal numbers as per drawings. All ferrules shall be coloured, plastic & interlocked type. Spare cores shall also be similarly ferrules, crimped with lug and aped on the ends. Spare cores shall be ferruled with individual cable number, crimped with lug and aped on the ends.

21.2.31 Terminal Connections: The types of cable terminations are generally as detailed below:

a. All JBs are both side screw type.
b. All console tiles wiring: screwed or plug-in type to be fabricated at site.

21.2.32 For removal of existing Cables, Cable Induction meter of applicable Voltage is mandatory to confirm that the cable is charged or not.

21.2.33 Unit rate quoted for cable lying shall include the activities as defined above

21.3 JUNCTION BOXES/ PUSH BUTTONS

Different types of junction boxes are to be erected by the contractor like junction boxes below 48 ways and above 48 ways. The junction boxes are to be located at the locations jointly decided at site during erection. The junction boxes are to be erected on the frames fabricated at site. Brief work will include:

a. Checking of installation for correctness.
b. Functional checking/ adjustment of JB/ PB for their system.
c. Hardware for erection (Like Nuts, Bolts and Washers etc.) where ever is required shall be in the scope of the contractor.

21.4 LAYING OF PIPES AND TUBES (IMPULSE PIPE & INSTRUMENT AIR PIPE)

21.4.1 Root valves are generally provided on process pipe line by other agencies. Prior to starting impulse pipe, contractor to identify the process point with respect to PIDs.

21.4.2 Installation of impulse pipe of CS/AS/ SS material shall include cleaning, air flushing, cutting to length from running meter, edge preparation, cold bending, welding of sockets/ reducers/ tee/ cross/ isolating valves/ union, nut and tail pieces/ nipples, condensing and other pots, etc., mounting of SS/CS valve manifolds and compression fittings, providing supports, clamping, conducting leak test/ hydraulic pressure test, conducting RT/ UT and painting (refer clause no. 2.6 of TCC for details) .

21.4.3 Piping works shall involve either arc or TIG welding. Contractor to follow the BHEL supplied welding schedule and welding procedures. The decision of BHEL engineer will be final in this regard.

21.4.4 IBR certified welders shall be deployed for welding of impulse pipe and contractor shall take approval for welder and welding consumables from BHEL site engineer.

21.4.5 Laying of GI pipe for instrument airline shall include air blowing, cutting from the running meter length, threading, installation of elbows/ tee/ reducer/ moisture traps/ auto drain pot/ check valves/ isolating valves, supporting clamping, conducting leak test and also seal welding of threaded joints, if required.

21.4.6 Threaded joints of airline shall be made leak proof by using Teflon tapes or sealing compound. All consumables (for leak proof) shall be in the scope of contractor.

21.4.7 All fittings and accessories for impulse pipe and airline shall be provided by BHEL. Quoted rate for piping shall include cost of installation of such fittings and no separate rates are envisaged.

21.4.8 Contractor shall provide GI "U" clamps for impulse pipe and GI pipes within the quoted rates for installation of the same.

21.4.9 Impulse pipes shall be painted.

21.4.10 Installation of Copper tubes/ SS tubes/ copper pipes shall include cutting into required length, laying, bending, cleaning, brazing wherever required, fixing of brass fittings like compression fittings/ tees/ end connectors/ straight connectors/ bulk heads/ valves etc., supporting clamping including supply of clamps and hardware, flushing and conducting leak test.

21.5 STRUCTURAL STEEL FABRICATION AND INSTALLATION

21.5.1 Instrument/ Junction Box Frame/ Panel Base Frame/ Cable Tray & Misc. Structures Fabrication

21.5.1.1 Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and the same shall be used for misc. fabrication if required and for fabrication of Local Instrument Racks, panel base frame, cable tray supports, Canopies for instruments/ panels/ drives/ JBs/ Push Buttons etc., Instrument/ Junction box frames, Impulse Pipe/ Instrument Air Pipe supports and instruments etc.

21.5.1.2 This shall include cutting to size, contouring of ends for connections if required, welding, grinding of excess weld deposits/ burrs, drilling of holes for mounting of device/ instrument, installation at location, levelling, alignment, providing bracings and painting etc. No gas cut holes will be permitted. Contractor to follow the BHEL supplied welding schedule and welding procedures.

21.5.1.3 In case, structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.

21.5.1.4 Frame installation/ cable tray accessories' installation at site may involve mounting either on concrete floor by grouting/ using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, contractor shall arrange all the required material including cement/ grout mix, shuttering etc., necessary labour and meet all other requirements as part of work.

21.5.1.5 In certain packages, galvanized members of junction box frames and instrument racks shall be supplied in cut to sizes and frame assemblies are required to be done as per drawing by bolting/ welding. The installation rate as quoted shall include the assembling of the frames.

21.5.1.6 In certain packages, members of frames/ rack for mounting of junction boxes/ instruments may be supplied readymade. These have to be assembled prior to installation. The installation rate as quoted shall include assembly of the frames.

21.5.1.7 Gas cutting of tray/ impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted.

21.5.1.8 All the fabricated supports/ frames for instruments, brackets/ racks, support steel work for tubing impulse lines/ instruments trays, pipes, electrical equipment, etc., shall be epoxy painted after shot blasting (as applicable) and surface preparation as per painting specifications. Paints and other associated items are in the scope of the contractor.

21.5.1.9 Hardware for erection (Like Nuts, Bolts and Washers, etc.) where ever is required shall be in the scope of the contractor.

21.6 INSTALLATION OF PANELS (STARTER PANEL/ LOCAL STARTER BOX/ POWER DISTRIBUTION BOX/ MARSHALLING BOX/ CONTROL PANELS/)

21.6.1 Electrical control panels, electronic control panels, 415-volt LT MCCs etc., are normally supplied in suite of either one/ two/ three or loose shipping sections with integral base frame or loose base frame. These panels may have to be installed as stand-alone or in-group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

21.6.2 The panels shall be transported from stores to the place of installation in vertical position. Care shall be taken such that the switches, lamps, instruments etc. mounted on the panel do not get damaged during transit.

21.6.3 Installation of panel shall include fixing of base frame, levelling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubical interconnection hardware, interconnection of bus bar/ bus bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates, sealing of panels/ cable entries. Where the base frame is not supplied as part of panel supply, the contractor shall fabricate the base frame from structural items at site. Payment for such fabrication will be effected on measured quantity at the rate applicable for structural steel fabrication and installation. Proper sealing of all the holes and cable entries (even if the cable has been laid by others) in the panel is in the contractor's scope.

21.6.4 Minor civil works like drilling, chipping, punching holes and opening in concrete floors, slabs and brick walls, grouting, related to Rack, support installation, minor civil works required for installation of control panels, Junction boxes etc., shall be included in the erection cost of such items. Also all miscellaneous civil works like chipping away and making good as necessary in floor slab/ wall for cabling/ earthing etc., as required are included in the scope for which no separate payment is applicable. The scope also includes supply of grouting material, if any.

21.6.5 Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. This shall be a part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panels have to be erected at different locations and elevation in depending on the detailed engineering.

21.6.6 Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/ moisture and rainy water. This will have to be periodically cleaned and surroundings have to be kept tidy.

21.6.7 Whenever the panels are to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, structural steel fabrication & installation rate shall be applicable.

21.6.8 Normally the panels shall be supplied with instruments, relays, meters, electronic modules, contactors, push buttons, etc. mounted and pre-wired. However, if these are supplied loose/ separately for safety in transit, contractor shall mount and wire such devices as part of the panel installation work and no separate rates shall be applicable unless otherwise specially listed in the rate schedule.

21.6.9 Supplier's instruction manuals, packing slips, door keys etc. received along with the panels will be handed over to BHEL's engineer on opening of the panels and record of receipt of such things shall be maintained by contractor.

21.6.10 Regular cleaning of the panels as per the instruction of BHEL engineer till handing over of the set to customer is to be carried out by the contractor free of cost.

21.6.11 No separate payment shall be made for replacement of any devices like electronic modules, relays, conductors, terminal block, push buttons etc. which are found defective during pre-commissioning/ post-commissioning of any equipment/ item.

21.6.12 For the panels erected by other agencies, commissioning/ calibration work and troubleshooting has to be carried out by the contractor as part of testing and commissioning work as per the quoted rates.

21.6.13 Interposing Relays (24/ 48 Volt DC) along with mounting base if supplied shall be supplied separately for mounting in the various feeders of 11kV/ 3.3kV HT switchgear boards and 415 Volt MCC Board for unidirectional/ bi-directional drives, solenoid valves.

21.7 CONTROL PANELS

Station C&I system panels are based on maxDNA/ metso DNA distributed digital control philosophy. MaxDNA/ Metso DNA system is having communication through UTP cables amongst themselves. The system consists of computer network with servers and workstations and various peripherals like printers, etc. Optical fiber cables are also used for communication, especially for larger distances. The various components/ devices are generally located in control room/ computer room/ diagnostic and shift in charge room. Some panels (viz. network panels) are also located in outdoor plants and other units.

The entire work of erection, testing, commissioning of the connected devices/ equipment as listed in rate schedule is to be carried out including laying of peripherals cables (either plug-in or plugs to be fabricated at site), placement of computer furniture in computer room as per lay out. The computer furniture shall be supplied either assembled or in knocked down condition, which have to be assembled at site. The quoted rate shall be inclusive of transportation,cable laying, termination, E&C and placement of furniture(Computer tables, Computer Chairs & Printer table) against each device as given in the rate schedule.

21.8 FIELD INSTRUMENTATION

21.8.1 Various type of primary/ secondary indicating/ recording instrument for pressure, temperature, flow, level and analytical measurement shall be supplied either loose or mounted along with the equipment.

21.8.2 Scope of work under erection/ calibration/ testing/ commissioning shall include calibration, setting, adjustment, writing instrument tag number with paint, report making, installation, servicing, minor repairs/ servicing, putting instrument into service, signal checking from field up to the functional group panels and remote indicating instrument, functional checks, interlock and protection/ alarm checks by simulating the field devices, troubleshooting during pre-commissioning/ post-commissioning till system is handed over to the customer.

21.8.3 It is the responsibility of contractor to make erection, calibration/ testing protocols for various C&I equipment/ devices and they should get duly certified by Customer/ BHEL engineer and should be submitted to BHEL engineer regularly. However, sample formats will be given by BHEL and have to be printed by contractor in adequate numbers.

21.8.4 Contractor shall establish calibration laboratory with adequate facilities and they should arrange standard test instruments duly calibrated from recognized agencies and calibration report of the same to be submitted prior to start of calibration of the field instruments/ devices.

21.8.5 Installation of instrument shall also include drilling of holes and tapping for mounting of instrument and local instrument frames/ panels and supply of hardware for mounting of the instrument.

21.8.6 Some devices like solenoid valves, position feedback transmitters, limit switches, air filter regulators etc., are supplied assembled along with mechanical equipment like pneumatic control valves, trip valves, dampers, motorized actuators, etc. These will need removal, calibration/ testing, re-fixing, adjustment, etc., and commissioning. Separate payment shall not be made for this. The rates quoted for the commissioning of these equipment (viz., pneumatic control valves, trip valves, dampers, etc.) should take care of the above. Also, the contractor shall remove such devices prior to erection either at site or at store to avoid damages/ pilferages and keeping in safe custody and the same shall be installed prior to commissioning of such equipment.

21.8.7 Transmitter enclosure/ open racks (LIE/ LIR) for various packages which are to be erected and commissioned at various locations of the turbine and outdoors, shall be supplied with internal tubing, air filter regulators, rotameters, provision of continuous or intermittent purging arrangements wherever required, etc. The quoted rates for these racks/ enclosures shall include the erection and commissioning of all such items inside these racks/ enclosures.

21.8.8 Sometimes recalibration of equipment may become necessary due to reasons not attributable to the contractor, e.g. Lapse of Time after first calibration, Need for change in range/ parameter, etc. If re-calibration is required due to no fault of the contractor, the rates payable for re-calibration shall be as under:

Recalibration Charges = 60% of the Percentage Stage Payment for Calibration as per split-up defined in Terms of Payment

The contractor shall keep record of such instrument with the reason for re-calibration and certified by the BHEL Engineer.

Note: For recalibration of skid mounted items or other systems where lump sum rates are quoted, the recalibration charges, if admissible, will be calculated from the relevant unit rates quoted for same/ similar items elsewhere in the rate schedule. The decision of BHEL Engineer shall be final and binding on the contractor.

21.8.9 For the very few cases where required, the contractor shall carry out re-orientation of bottom/ top entry arrangement for process connection if needed due to site condition in existing instrument rack/ enclosure/JB and re-location of existing instrument including removing of the existing tubing and re-installation of the same at appropriate location due to any change in grouping of the instrument and no extra payment shall be applicable.

21.8.10 In certain cases, instruments/ devices are supplied on equipment or drawn by other agencies as part of mechanical package. The same are to be received or to be collected from other agencies for keeping in safe custody to avoid damages. The same are to be erected back after calibration for which unit rate shall be applicable for erection and calibration. Contractor shall maintain record of such instrument duly certified by BHEL engineer. However, for removal of such instrument, no separate rate/ payment shall be applicable.

21.9 MISC. OTHER INSTRUMENT/ EQUIPMENT ERECTION, CALIBRATION AND COMMISSIONING.

21.9.1 Wherever panels & control valves have been erected by the mechanical contractor, calibration/ commissioning has to be carried out by the contractor.

21.9.2 Dimension and weight as mentioned against control panels, MCCs, etc. in rate schedule are only approximate and there may be changes in dimension and weight in actual supply of the equipment and no rate variation shall be applicable on this account.

21.9.3 Wherever brief description of the system is given under various sub-heads, it is only for the understanding system requirements. It does not indicate the total specification of work. For such system, other clauses are also applicable wherein work details are specified.

21.9.4 Normally, cable glands on junction boxes side are received in mounted condition. While terminating the cables as per drawings, the cable glands are to be removed and fixed. Wherever cable glands are not received along with junction boxes, the cable glands as per the requirement will be provided by BHEL and the contractor has to make necessary holes/ adjust the available holes in the JB for fixing these. No separate payment will be made for drilling of holes and fixing the cable glands to the junction boxes. Nameplates for JBs will be supplied separately. These are

to be suitably written and fixed onto the JBs. Wherever nameplates for JBs are not supplied, the JB no. are to be written with paint on JBs for identification. Separate payment will not be made for this.

21.9.5 The push buttons and indicators in C&I systems are provided as loose with different type of connectors. The fixing of connectors and their wiring from push buttons to indicators shall be the responsibility of contractor. No separate payment will be made for fixing of connectors. The cable laying and termination charges will be paid as per applicable rate schedule.

21.10 GUIDELINES FOR ERECTION

21.10.1 Impulse Pipelines

a. All impulse lines, air lines shall be thoroughly cleaned by removing the dust, burrs etc., and any foreign matter inside the pipe/ airline is to be cleaned by compressed air or any other suitable means before installation.

b. The routing of pipe lines shall include sufficient flexibility near tap off points to allow for thermal expansion of process equipment.

c. The pipes shall be cold bent using hydraulic bending machines only.

d. The horizontal impulse lines shall be laid with proper slopes towards the tapping point. Two root valves are to be used wherever pressure is more than 40 kg/cm2 or Temp>280 °C .

e. Supports for piping and tubing shall be adequate and in no case exceed limits shown below: -

1	1/2” NB pipe/ tube	5 ft.
2	3/4” NB pipe/ tube	5 ft.

f. All CS impulse line welding shall be done through welding generator/ rectifier and only structural welding may be done with welding transformer.

g. Impulse pipes of alloy steel/ SS/ carbon steel etc. shall be TIG welded. Contractor shall arrange for necessary TIG welding sets, electrodes etc.

h. Minimum number of fittings shall be used on all lines wherever possible, to keep threaded joints to a minimum wherever threaded connections are to be made.

i. Testing

j. On completion of pipeline installation, the pipelines shall be hydraulically tested. Contractor shall arrange for water filling pump, hydraulic test pump and standard gauges and conduct the test satisfactorily.

k. The impulse lines shall be isolated from instruments and tested at 2 times the maximum working pressure. The fall in pressure shall not be more than 1 kg/cm^2 or 1% of the working pressures whichever is less, in 30 minutes and there shall be no leaks at any of joints/ welds when isolated from source of pressure.

l. All weld joint in CS, SS, AS (High Pressure) line are subject to 100% radiography test with minimum two shots per joint.

21.10.2 Air Piping

All instrument air pipelines shall be isolated from the instruments and pressurized pneumatically to maximum work pressure. They shall then be isolated from the source of pressure and fall shall be less than 1 psi in 20 minutes.

21.10.3 Pneumatic Signal Lines

All pneumatic signal lines shall be disconnected and blown through with instrument air. The line shall be blanked off and pressurized pneumatically 20 psi and checked with soap solution for leaks and attended accordingly.

21.10.4 Instruments and Equipment

a. All field mounted instruments are to be located in such a way as not to obstruct walk-ways or plant equipment access but shall be easily accessible for maintenance. Hand rails shall not be used for mounting or supporting instruments.
b. Racks/ stands and supports for instruments and transmitters shall be fixed on RCC column/ floor by chipping and grouting or by welding to steel structure. In no case these shall be welded to floor grills.
c. When installing flow and pressure transmitters/ switches for Liquid/ steam/ condensate vapour services, the instrument is to be mounted below its primary element or tapping point. For gas service applications, the instrument is to be mounted above Primary element tapping point.
d. During erection and commissioning stage, the site mounted instrument shall be protected suitably. Contractor shall provide suitable security arrangement in main control room, and other areas where equipment are positioned, at no extra cost.
e. Contractor shall arrange for own firefighting equipment for the materials stored under contractor's custody.

21.10.5 Sub-assemblies

a. All subassemblies should be kept in a separate place where it is easily accessible.
b. Subassemblies should have a protective cover in case it is stored without wooden packing/ case to prevent accumulation of dust. Silica gel packets should also be kept along with it.
c. Subassemblies should not be stacked one above the other.

21.10.6 Loose items

The loose items supplied for the main equipment falls into various categories like tools, cables, prefabricated cables, console inserts, recorders, VDU/CRT, other display units, printers, sensors and transducers, cable glands, cable ducts, frames, racks, etc. These are to be categorized and stored separately.

21.10.7 Guidelines for handling of electronic modules

a. All the electronic modules shall be handled by qualified persons only.
b. Electronic modules should only be touched when it is absolutely essential to do so.
c. Before touching any electronic module, the operator should discharge the static electricity by earthing himself or better still, ensure constant discharge by wearing an earthed wrist strap.
d. The operator should not wear clothing made entirely from synthetic fibres, but a mixture containing at least 65% cotton.
e. The PCB should always be held by front panel or by module frame and electronic components/ connectors should never be touched.
f. The electronic modules should not be placed close to television sets or CRT units.
g. Soldering irons and any other tools used must be grounded.
h. All modules using CMOS components are packed in antistatic bags when transported loose to avoid ESD failures. The antistatic bags must always be used to transport modules at site from one place to the other.

21.10.8 Welding, Non-destructive testing etc.

a. Installation of equipment involves good quality welding, NDE checks etc.
b. Welder deployed for aluminium welding shall have experienced and approved by BHEL and BHEL's Customer after due qualification process/ testing.
c. Welding of all structural steel & aluminium shall be done only by the qualified and approved welders.
d. All the welders shall be tested and approved by BHEL engineer/ Customer's quality engineer before they are actually engaged on work though they may possess IBR/ other certificate. BHEL reserves the right to reject any welder without assigning any reason.
e. The welded surface shall be cleaned of slag and painted with primer paint to prevent corrosion. For this paint will be supplied by the contractor.
f. Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.
g. Certain types of coated welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the coated welding electrodes have to be carried in portable ovens.

21.11 ELECTRICAL CABLING, EARTHING AND ABOVE GROUND EARTHING

21.11.1 ELECTRICAL CABLING/ WIRING

21.11.1.1 All the cables will be properly laid in cable trays, dressed and clamped with aluminium flats. The cable will be terminated at both ends with suitable lugs and printed ferrules and will be glanded properly. Suitable equipment and consumables for ferrule printing has to be arranged by the contractor at his own cost. For cable identification, the contractor shall provide at his cost aluminium tags at regular intervals (20 m) through each run of cable.

21.11.1.2 All electrical connections shall be tested for polarity and proper connections.

21.11.1.3 Insulation test of the various circuits shall be done.

21.11.1.4 The checking of operation of individual equipment and instruments to which the cabling/ wiring connected shall also be done by the contractor.

21.11.1.5 Wherever supplied, GI cable trays shall be of bolted construction only with fixing screws and coupler plates.

21.11.1.6 Sharp bends of cable trays shall be avoided in all type of cable trays.

a. Installation of cable racks and supports structure shall be carried out in all the required areas. Steel embedment shall be provided in the cable trenches, ceiling slabs and concrete blocks for installing the cable racks and support structures.
b. Ladder perforated type cable trays shall be used in cable trenches and vertical risers.
c. Perforated cable trays shall be used in higher elevations in Boiler and Generator area.

21.11.1.7 Cable racks in the trenches and control room are to be shared with other contractors installing cables in different areas wherever required. Contractor shall cooperate with the other contractors in sharing the cable trays and proper dressing and clamping the cables.

21.11.1.8 Where power and control cables are to be laid in the same route, suitable barriers to segregate them physically shall be employed.

21.11.1.9 Space equal to the diameter of cable shall be provided between power cables of six over 50 mm in diameter.

21.11.1.10 When cables pass through floors, walls etc., it shall be passed through a pipe for mechanical protection and the pipe ends sealed suitably.

21.11.1.11 Care shall be taken to avoid short bending and kinking of conductor damaging insulation and stressing the cable beyond pulling force recommended by the manufacturer. Cable shall be protected at all times from mechanical damage.

21.11.1.12 The minimum radius of formed bend of an insulated cable shall be 12d for un-armoured cables and 15d for armoured cables where ‘d’ is the overall diameter of the cables.

21.11.1.13 No cable shall be laid in ducts or trenches where other services such as oil pipes, steam or water pipes are laid.

21.11.1.14 Where cabling passes through brickwork or concrete work, the contractor shall provide suitable local protection against mechanical damage wherever necessary.

21.11.1.15 The layout of all cables shall be arranged to give adequate clearance from other services and cables shall be routed to avoid hot zones. No extra cost shall be considered for rework.

21.11.1.16 Jointing of cables shall be avoided as far as practicable. However, jointing if at all necessary shall be done by crimping type cable joints after getting approval of BHEL engineer.

21.11.1.17 The cable schedules indicating cable sizes, tentative cables routing information will be furnished by BHEL at site to the contractor. Required steel inserts on cable trenches, will be provided by BHEL. The contractor shall design number of cable/ racks to accommodate the cables on racks/ trays properly.

21.11.1.18 Detailed specification shall be as per instruction of site engineer.

21.12 EARTHING INSTALLATIONS

21.12.1 All equipment shall be earthed by two separate and distinct connections. Earthing terminals will be available in all equipment supplied by BHEL.

21.12.2 The earthing conductors shall be of mild steel/ GI strip/ wires. All connections from equipment to main earthing conductors shall be made as illustrated in earthing drawing/ as per instruction of BHEL engineer. Suitable “Cu” Lugs are to be supplied for earthing with GI wire by the agency where ever is required.

21.12.3 A continuous earthing conductor shall be installed in all cable trays and securely clamped to each tray section by suitable connectors to form a continuous earthing system. When two or more trays supporting power cables run in parallel, a continuous earthing conductor shall be provided on trays only with tap offs to the control cable trays. All valve and damper motors and rapping motors will be earthed to this conductor.

21.12.4 All joints in the earthing system shall be welded type. Earthing connections to all equipment including motors shall be bolted type.

21.12.5 Earthing connections shall be free from tinning scale paint, enamel, grease, rust or dirt at the time of making joint.

21.12.6 Metallic sheaths, screens/ shields and armour of all multicore cables shall be bonded and earthed.

21.12.7 Earthing conductors along their run on columns, beams, walls etc. shall be supported by suitable cleats at intervals as specified by BHEL site engineer. .

21.12.8 Welded joints on GI earthing conductors shall be painted as mentioned in the Typical Arrangement drg.

21.13 ABOVE GROUND EARTHING

21.13.1 The contractor shall carry out above ground earthing for all Electrical equipment, which may be erected by him, or some other agency. Different type of earthing materials shall be supplied and the contractor shall lay and connect the earthing materials as per site requirement and as detailed in drawings. Unit rate for earthing material shall be paid on running meter basis.

21.13.2 All equipment shall be earthed by two separate and distinct connections. Earthing terminals will be available in all the equipment supplied by BHEL.

21.13.3 Parts of all electrical equipment and machinery not intended to be live shall have two separate and distinct earth connections each to conform to the stipulation of the Indian Electricity Rules and apparatus rated 240V and below may have single earth connections.

21.13.4 Generally, risers are provided near the structure/ equipment foundation, in case risers are not visible and buried below the foundation level, contractor shall carry out necessary earth excavation for connecting the above ground earthing strips. Wherever welding is involved necessary protective coating shall be applied on weld joints.

21.13.5 The earthing conductors shall be mild steel/ G.I. strips/ wires. All connections from

the equipment to the main earthing conductors shall be made as illustrated in earthing drawings. A copy of earthing drawing shall be provided to the successful bidder.

21.13.6 A continuous earthing conductor shall be installed in all cables trays and securely clamped to each tray section by suitable connectors to form a continuous earthing system. When two or more trays supporting power cables run on parallel a continuous earthing conductors shall be provided on one tray only with tap-offs to the control cable trays. All valve and damper motor and rapping motors will be earthed to this conductor.

21.13.7 If the equipment is not available at the time of earthing conductor laying tap connections from the main earthing conductor shall be brought out up to slab equipment foundation level with at least 200mm spare length left for further connections to equipment earthing terminals.

21.13.8 Entire system shall be earthed in accordance with the provisions of the relevant IEC recommendations/ IS code of practice IS 3043-1947 and further amendments thereof and Indian Electricity Rules, so that the values of the step and contact potentials in case of faults are kept within safe permissible limits.

21.13.9 If any outer shops and buildings as well as the electrical sub-stations and electrical rooms are also in contractor's scope, a ring main earthing system will be provided. Ring main earthing systems shall again be interconnected as a network to power plant main earthing mat. Internal earthing ring in the electrical equipment room shall be provided by the contractor irrespective of whether equipment of the area is in their scope or not.

21.13.10 For different floors in a building, localized internal earthing ring shall be formed and connected to the ground earthing through vertical risers. The earthing mat shall be common to both power and lighting installations.

21.13.11 A minimum of two spare earth rings will be provided in each floor of the building for earthing future building.

21.13.12 Each RCC steel column of the building will be interconnected to the floor-earthing grid in basement/ ground floor.

21.13.13 For protective earthing separate conductor shall be used for flow of earth fault current.

21.13.14 Contractor shall carry out minor civil i.e. chipping of floor (where earth strip is to be laid on floor), removal of topsoil for laying earth strip in switchyard area, etc.

21.13.15 It is the responsibility of contractor to provide skilled manpower for periodic maintenance after the initial commissioning till handing over the system to customer. During this period the activities are to be carried out such as checking the electrolyte & specific gravity of individual battery, topping up of electrolyte, cleaning etc.

21.14 ELECTRICAL ACTUATORS

The scope of Testing and Commissioning of electrically operated actuators for valves, dampers, gates, soot blowers etc., will include meggering, providing loop wire on actuator terminal block, adjustments of mechanical/ electrical or electronic position

transmitters, setting of limit/ torque switches, cable checking, internal wiring checking, local/ remote operation from MCC & MMI package (maxDNA system), replacement of limit/ torque switches if required

Chapter-XXII: Not Used

This Chapter consists of Part A & Part B of Volume II "Price bid":

CONTENTS	
Description	Remarks
Part A: Instructions to the Bidders	Instructions
PART B: % weightage for amount of individual items of Schedule of quantity	Refer Latest Chapter-XXIII of Vol-IA TCC (WEIGHTAGES & FACTORS PERTAINING TO SCHEDULE OF QUANTITIES).
PART C: Total Lump Sum Price for entire scope of Work	This part is implemented in the E-Procurement portal entitled as **"VoLIIPrice Bid2379".**

Part A: Instructions to the Bidders

1. **Bidders shall quote Total Lump-sum Price for the entire scope of work at the place implanted in the E-Procurement Portal titled as "VoLIIPriceBid2379".** Price mentioned elsewhere in the offer of the bidder shall be treated as Null and Void.

2. BHEL has fixed the % weightages as in "Part-B" for the amount of individual items of Schedule of Quantity w.r.t. the total price of Price Bid Vol-II.

3. Based on the pre-fixed % weightages, amount of individual items shall be derived by BHEL. This amount shall not be rounded off.

4. Based on the quantities of individual item and the amount arrived in Sl No 3 above, item rate of individual items shall be derived by BHEL. This item rate shall be rounded off up to two decimal places and shall be used to calculate the total amount of an item.

5. For the convenience of bidders, BHEL has issued an excel sheet with all requisite formulae as detailed above. ***However this excel sheet shall not form part of contract document. Further, this sheet should not be uploaded at the e-Portal.***

6. 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 at as per serial no 4 above.

PART B: % weightage for amount of individual items of Schedule of quantity w.r.t. the total price (as quoted by the bidder in **"VoLIIPriceBid2379")**

Note: This Chapter-XXIII is uploaded as file titled **'Chapter XXIII Weightages & Factor pertaining to Schedule of Quantities'**