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TENDER SPECIFICATION

TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878

FOR

“ERECTION, TESTING, COMMISSIONING & HANDING OVER OF BOILER, ESP, ROTATING MACHINES BOILER & POWER CYCLE PIPING, INSULATION, AND STRUCTURAL WORK OF MILL & BUNKER BAY AND FINAL PAINTING INCLUDING SUPPLY OF PAINTS OF UNIT NO. 2 AT 3X660 MW LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR, U.P.”

PART I – TECHNICAL BID



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)



ISO 9001, ISO 14001,
OHSAS 18001 & SA 8000
certified company
SubContract and Purchase
Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120- 2416273 / 2416296
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TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S-----

Rev 01
1st Jun
2012

NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited



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NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES

OR

PURCHASE TENDERS FROM THIS OFFICE ALSO

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To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) 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

SL NO	ISSUE	DESCRIPTION	
i	TENDER NUMBER	BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878	
ii	Broad Scope of job	"ERECTION, TESTING, COMMISSIONING & HANDING OVER OF BOILER, ESP, ROTATING MACHINES BOILER & POWER CYCLE PIPING, INSULATION, AND STRUCTURAL WORK OF MILL & BUNKER BAY AND FINAL PAINTING INCLUDING SUPPLY OF PAINTS OF UNIT NO. 2 AT 3X660 MW LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR, U.P."	
iii	DETAILS OF TENDER DOCUMENT		
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i>	Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i>	Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i>	Applicable
d	Volume-ID	<i>Forms and Procedures</i>	
e	Volume-II	<i>Price Schedule (Absolute value).</i>	Applicable
iv	Issue of Tender Documents	<ol style="list-style-type: none"> <u>Sale from BHEL PS Regional office at :</u> Start 05.06.2012 , Time :09:00 Hrs Closes: 15.06.2012 , Time : 12:00 Hrs From BHEL website (www.bhel.com) Tender documents will be available for downloading from website till due date of submission 	Applicable/ Not applicable
v	DUE DATE & TIME OF OFFER SUBMISSION	Date : 15.06.2012 , Time : 15:00 Hrs Place : BHEL PSNR NOIDA	Applicable
vi	OPENING OF TENDER	Date : 15.06.2012 , Time : 15:30 hRS <i>(Within 2 hours of the latest due date and time of offer submission).</i>	Applicable

		Notes: (1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day. (2) Bidder may depute representative to witness the opening of tender	
vii	EMD AMOUNT	Rs 2,00,000	Applicable
viii	COST OF TENDER	Rs 2000/-	Applicable
ix	LAST DATE FOR SEEKING CLARIFICATION	Date: Along with soft version also, addressing to undersigned & to others as per contact address given below	Applicable
x	SCHEDULE OF Pre Bid Discussion (PBD)		Applicable/Not applicable.
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)	Shri J. M. Lyngdoh , IAS (Retd.) Plot No. 144-145, Pragati Resort, Proddator Village & P.O., Shankarpally Road, Rangareddy Distt. (AP)- 500 033	Applicable/ 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 Corrigendums) 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 & stamped on each page, 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 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Noida issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Noida, Sundays and second/ last Saturdays
- 4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Noida. For other details and for 'One Time EMD' please refer General Conditions of Contract.
- 5.0 **Procedure for Submission of Tenders:** 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/COST of TENDER)' 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)**

Sl no	Description	Remarks
Part-I A		
	<p><u>ENVELOPE – I superscribed as :</u> PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p><u>CONTAINING THE FOLLOWING:-</u></p>	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	<p>Duly filled-in 'No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above.</p> <p><u>Note:</u></p> <p>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.</p> <p>b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.</p> <p>i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL</p> <p>ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender</p>	
iii.	<p>Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria.</p> <p>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.</p>	
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 : <u>Technical</u> 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		
	<p><u>ENVELOPE – II superscribed as:</u> PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p>	

	CONTAINING THE FOLLOWING:-	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender OR Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender	
	2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)	

	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	<ul style="list-style-type: none"> ○ Envelopes I ○ Envelopes II ○ Envelopes III 	

SPECIAL NOTE: All documents/ annexures submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing 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:**
Bidders capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

- I. **LOAD:** Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The 'Load' is the sum of the unit wise identified packages (refer Table-1) for contracts with BHEL Regions. The cut off month for reckoning 'Load' shall be the month, two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if latest bid submission is in Aug 2011, then the 'load' shall be calculated upto and inclusive of June 2011)

- i). Total number of Packages
Total number of Packages in hand = P
Where
- P is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced.
- ii) Weightage "A" assigned to bidders based on Total number of Packages 'P':
- a) If 'P' = 0-9, : "A" will be equal to '4'
 - b) If 'P' = 10-18, : "A" will be equal to '3'
 - c) If 'P' = 19-36, : "A" will be equal to '2'
 - d) If 'P' = 37-60, : "A" will be equal to '1'
 - e) If 'P' is above 60 : "A" will be equal to '0'

- II. **PERFORMANCE:** Here 'Monthly Performance' of the bidder for all the packages (**under execution/** executed during the 'Period of Assessment' in all the 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 the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(**Note:** For example if 'latest date of bid submission' is in Aug 2011, then the 'performance' shall be assessed for a 6 month period upto and inclusive of June 2011, 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:
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) $P_1, P_2, P_3, P_4, P_5, \dots, P_N$ etc be the packages (**under execution/** executed during the 'Period of Assessment' in all Regions) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = P_T (ie $P_T = P_1 + P_2 + P_3 + P_4 + \dots + P_N$)
 - 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 (ie $T_T = T_1 + T_2 + T_3 + T_4 + \dots + T_N$)
 - c) Sum ' S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, S_{1-5}, \dots, S_{1-N}$) for similar package P_1 , for the 'period of assessment' ' T_1 ' (ie $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \dots + S_{1-N}$). 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 (ie ' $S_T = S_1 + S_2 + S_3 + S_4 + S_5 + \dots + S_N$)
 - 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

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

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

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
		(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
1	Similar Packages for all Regions →	P ₁	P ₂	P ₃	P ₄	P ₅	...	P _N	Total No of similar packages for all Regions = P_T ie Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which ‘Monthly Performance Evaluation’ as per relevant formats should have been done in the ‘period of assessment for corresponding similar Package (as in row 1)	T ₁	T ₂	T ₃	T ₄	T ₅	...	T _N	Sum (Σ) of columns (iii) to (ix) = T_T
3	Monthly performance scores for the corresponding period (as in Row 2)	S ₁₋₁ , S ₁₋₂ , S ₁₋₃ , S ₁₋₄ , ... S _{1-T1}	S ₂₋₁ , S ₂₋₂ , S ₂₋₃ , S ₂₋₄ , ... S _{2-T2}	S ₃₋₁ , S ₃₋₂ , S ₃₋₃ , S ₃₋₄ , ... S _{3-T3}	S ₄₋₁ , S ₄₋₂ , S ₄₋₃ , S ₄₋₄ , ... S _{4-T4}	S ₅₋₁ , S ₅₋₂ , S ₅₋₃ , S ₅₋₄ , ... S _{5-T5}	S _{N-1} , S _{N-2} , S _{N-3} , S _{N-4} , ... S _{N-TN}	-----
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S ₁	S ₂	S ₃	S ₄	S ₅	...	S _N	Sum (Σ) of columns (iii) to (ix) = S_T

ii) Weightage “B” assigned to bidders based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions, for the respective Package:

- a) If R_{BHEL} is ≥ 80%, “B” will be equal to ‘6’
- b) If R_{BHEL} is ≥ 75% < 80%, “B” will be equal to ‘5’
- c) If R_{BHEL} is ≥ 70% < 75%, “B” will be equal to ‘4’
- d) If R_{BHEL} is ≥ 65% < 70%, “B” will be equal to ‘3’
- e) If R_{BHEL} is ≥ 60% < 65%, “B” will be equal to ‘2’
- f) If R_{BHEL} is < 60%, “B” will be equal to ‘0’

III. 'Assessment of Capacity of Bidder' to be Qualified for the tender:

Shall be based on the sum of the weightages obtained in 'LOAD' (A) and 'PERFORMANCE' (B) as below:

- a) If the sum (A+B) is 6 or above for each of the applicable Package, then the Bidder is considered 'Qualified' for the tender
- b) If the sum (A+B) is less than 6 for any of the applicable Package, then the Bidder is considered 'NOT Qualified' for the tender

IV. Explanatory note:

- a) Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or CI, 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, CI, 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 Table-1 below), the 'PERFORMANCE' part against sl no II above, needs to be evaluated considering all the identified packages (ie Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above
- b) Identified Packages (Unit wise)

Table-1

	Civil	Electrical & CI	Mechanical
	i). Enabling works ii). Pile and Pile Caps iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower vii). Others (Civil)	i). Electrical ii). CI iii). Others (Elec & CI)	i). Boiler & Aux (All types including CW Piping if applicable) ii). Power Cycle Piping/Critical Piping iii). LP Piping iv). ESP 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 Handling x). Material Management xi). Material Handling & Material Management xii). Others (Mechanical)

- c) Vendors who are first timers to any BHEL Region, may be considered subject to satisfying other tender conditions. Eligibility of the party for the next tender of any package in that Region, shall be subject to the bidder satisfying the 'Assessment of Capacity of Bidder' for a period of first **nine months** after commencement of work or contract duration whatever is lesser.

In case the first timer is executing any other packages in any BHEL Region, then the performance evaluation will be based on the data available for the other packages though not similar, for the 'Period of assessment', for the purpose of 'Assessment of Capacity of Bidder'

- d) Vendors who are not first timers and who have not been executing any package or packages similar to the packages under the tender in the 'Period of assessment', shall be considered qualified subject to them satisfying all other tender conditions.
- e) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders', then BHEL at its discretion,

reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating 'R_{BHEL}'** only.

- f) 'Under execution' shall mean works in progress as per the following:
- i. upto Boiler Steam Blowing in case of Steam Generator and Auxilliarities
 - ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)
 - iii. upto execution of at least 75% of anticipated contract value (unit wise), in case of Enabling works or Civil & Structures.

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

- g) Performance evaluation in CL 9 above 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, 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.**
- 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 authorised 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 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .
- However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDs' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.
- 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 with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.
- 23.2 'Stand alone' 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) shall be as specified in the PQR
- 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. 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 the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.
- 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 two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.
- 23.14 The consortium partner shall submit SD equivalent to 2% 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 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.
- 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 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 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

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03. Annexure-3 Reverse Auction Details
04. Other Tender documents as per this NIT.

ANNEXURE - 1**PRE QUALIFYING REQUIREMENTS**

JOB	"ERECTION, TESTING, COMMISSIONING & HANDING OVER OF BOILER, ESP, ROTATING MACHINES BOILER & POWER CYCLE PIPING, INSULATION, AND STRUCTURAL WORK OF MILL & BUNKER BAY AND FINAL PAINTING INCLUDING SUPPLY OF PAINTS OF UNIT NO. 2 AT 3X660 MW LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR, U.P."
TENDER NO	BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878

A	Submission of Integrity Pact duly signed (if applicable)	APPLICABLE
B	Assessment of Capacity of Bidder to execute the work as per sl no. 9 of NIT (if applicable)	APPLICABLE
C	<u>FINANCIAL CRITERIA</u>	
C1	Tenderers should have an average annual turnover of minimum of Rs 34.5 Crore (Rupees Thirty Four Crores Fifty Lacs only) based on the audited accounts of last three financial years (2008-09, 2009-10 & 2010-11). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.	
C2	NETWORTH Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C1' above should be positive.	
C3	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'C1' above based on latest Audited Accounts.	
D	<u>TECHNICAL CRITERIA</u>	
D1	Bidder who wish to participate should have executed at least one Boiler of a unit of 400 MW or higher.	
E	Approval of Customer (if applicable) Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	APPLICABLE
F	Consortium	NOT APPLICABLE
NOTES:		
(1) Time period for achievement of the Qualification Requirement is in the last 7 years ending on the 'latest date of Bid submission'.		
(2) 'Executed' means "BOILER LIGHT UP" in respect of Boiler & Aux and ESP.		
(3) Similar Works means 'Boiler' works.		
(4) THE PARTY WHO HAVE ALREADY AWARDED THE WORK OF BOILER UNIT#1 & UNIT# 3 OF LALITPUR BOILER SHALL NOT BE CONSIDERED FOR THE SUBJECT TENDER.		

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.

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 (<input type="checkbox"/>) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE	
		APPLICABILITY (BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with PRE QUALIFICATION CRITERIA (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/ Not Applicable	YES/NO
8	Copy of 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 Authorised 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	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)

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this enquiry for the subject item / system with detailed scope of supply as per our tender specification, BHEL-PSNR, NOIDA may resort to "REVERSE AUCTION PROCEDURE" i.e. **ONLINE BIDDING on INTERNET.**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. In case BHEL decides to conduct reverse auction, BHEL's service provider shall contact the vendor directly and impart them the training.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. **Total Price quoted shall be inclusive of all taxes except service tax in line with the NIT conditions for the subject work in Indian Rupees (INR), which is to be worked out as per the BOQ (Rate Schedule) given in tender enquiry and subsequent changes made, if any. EXCEL Sheet shall be provided, if applicable.**
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider after completion of event on the same day preferably.
10. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
11. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.

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

1	NAME & DESIGNATION OF OFFICIAL	
2	POSTAL ADDRESS (COMPLETE)	
3	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

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 IPC/ PC 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 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.

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 Bidder(s)/ Contractor(s) undertake(s) to obtain from all subcontractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20 % of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/ Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).
- 6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.
- 6.3 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 /Sub-contractors

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.
- 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 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
- 8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.
- 8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC 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.

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

8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact begins and shall be binding on and from the submission of bid(s) by bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as 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) _____

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ORIGINAL COPY**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878

FOR

ERECTION, TESTING, COMMISSIONING & HANDING OVER OF BOILER, ESP, ROTATING MACHINES BOILER & POWER CYCLE PIPING, INSULATION, AND STRUCTURAL WORK OF MILL & BUNKER BAY AND FINAL PAINTING INCLUDING SUPPLY OF PAINTS OF UNIT NO. 2 AT 3X660 MW LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR, U.P.

PART- I OF TCC



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301 (INDIA)



**ISO 9001, ISO 14001 and
OHSAS 18001 certified
company
SubContract and
Purchase Deptt.**

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120-2416540 / 2416273
Fax 091-0120-2416528
Email: swapan@bhelsnr.co.in

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S-----

PART-I OF TCC

SI	<u>DESCRIPTION</u>	<u>Chapter No.</u>	<u>PAGES</u>
	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.	Others	Chapter-IX	
10.	Annexure	Chapter-X	
11.	Rate Schedule	Chapter-XI	

Chapter - 1: Project Information

Name of the Owner	:	LALITPUR POWER GEN. CO. LTD. OF BAJAJ HINDUSTAN LTD.
Address	:	3X660MW SUPER CRITICAL TPP at Mirchwara and Buraugaon near Utari river,Lalitpur,U.P.
New Installation	:	3 x 660 MW
Nearest Railway station	:	Lalitpur railway station (37 kms from site) on Jhansi – Bhopal line
Nearest Road	:	Approach to site from NH which about 23 km from Bansi on NH-26 connects Jhansi and Sagar
Nearest City	:	LALITPUR
Nearest Airport	:	GWALIOR AIRPORT (186 km)
Highest Temperature	:	45.1 C ⁰
Lowest Temperature	:	1.9 C ⁰
Relative Humidity	:	87% maximum 22% minimum
Seismic Zone	:	III

Chapter - 2: SCOPE OF WORK

2.0 SCOPE OF WORK

2.1 BHEL has been awarded the work of Design, Engineering, Supply, Erection, Testing & Commissioning & Handing over BTG package and Mill bay structures & bunker of 3X660 MW Super critical Thermal Power plant at Lalitpur, U.P.by **Lalitpur Power Generation Company Ltd.(LPGCL)** of M/s Bajaj Hindustan Ltd.

2.2 **The scope of work under this tender consists of Erection, Testing Commissioning & Handing over of** Boiler, ESP, Rotating Machines, Boiler & Power cycle piping, Insulation and structural work of Mill & Bunker Bay and Final Painting including supply of paints etc

THE PARTY WHO HAVE ALREADY AWARDED THE WORK OF BOILER UNIT#1 & UNIT# 3 OF LALITPUR BOILER SHALL NOT BE CONSIDERED FOR THE SUBJECT TENDER.

2.3 **The scope of the work for Boiler,ESP,RM,PCP and aux. will comprise of but not limited to the following**

1. Taking delivery of the materials to be erected by contractor, loading & transportation from the project storage yard to erection site.**(Approx. distance of stores from erection site is 4 km.)**
2. Their preservation, safe keeping, watch and ward.
3. Checking, dressing, chipping, leveling & grouting of foundations.
4. Pre-assembly, erection, alignment of structures, pressure parts, non-pressure parts, rotating machines ,ESP, trim and integral piping, , pulveriser fuel piping, Power cycle piping etc.
5. Welding, heat treatment, radiography, UT and other non-destructive tests wherever required
6. Hydraulic testing, air leak test, clean air flow test and other pre commissioning tests,
7. Carrying out of Special processes as per clause 4.39
8. Insulation, touchup and finish painting including supply of paints etc.,
9. Assistance during Chemical cleaning, alkali boil out, acid cleaning and passivation ,PG test as per the scope given in the tender
10. Steam blowing and safety valve floating including erection and dismantling of all temporary piping, valves, pumps, tanks etc. required for above operations and other commissioning activities including post commissioning operations and stabilisation of the unit,
- 11. Unit trial operation, resolving any deficiencies observed and handing over of Boiler, ESP, Rotating Machines, PCP & auxiliaries of Unit No. 2 at 3X660 MW LALITPUR Super Critical Thermal Power Plant at LALITPUR.**

The PG wise break up of Boiler, ESP ,Rotating Machines, Insulation, Boiler & Power cycle piping etc. is tentative as indicated under Annexure-IA,IB,IC,ID,IE & IF

Regarding the tonnage indicated the decision of the BHEL Engineer with respect to scope, and keeping the work suitability, quality and time schedule will be final and binding on the contractor. However the work of Boiler shall be broadly as per following:

Boiler scope mainly includes main boiler / furnace, structures, pressure parts, air heaters, associated ducts (including ducts between air heater and FD/PA fans), burners, Pulverised coal piping, oil system, integral piping, elevator structures along with dust proof cladding etc., fans (ID/FD/PA), Ducts from BOF to chimney to ESP, ESP associated ducts, structures, coal mills, feeders, etc. and other equipments not mentioned for completing the system for SG **package**.

Painting and insulation shall be done for Boiler, ESP, associated auxiliaries, piping & structures as per drawings and specifications shall be within the scope.

2.4 Approx. weight to be erected for the Boiler(Structure, Pr. & Non pr. Parts),ESP, Rotating Machines, insulation, Boiler & Power cycle piping & etc. shall be indicated in Annexure-I. Accordingly, Approx. weight to be erected shall be 47526 MT.

The contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above boiler and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted tonnage rates. The contractor undertakes to erect / commission actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually erected at site and payments will also be regulated for the same.

The customer M/s. LPGCL and / or their Consultant may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL .

2.5 SCOPE OF WORKS FOR FABRICATION, ERECTION, TESTING & HANDING OVER OF MILL BAY STRUCTURES & BUNKER

THE WORK TO BE CARRIED OUT UNDER THE SCOPE OF THESE SPECIFICATIONS IS BROADLY AS UNDER:

1. COLLECTION OF MATERIALS FROM BHEL STORE/YARDS/OTHER DESIGNATED PLACES AND TRANSPORTATION TO ERECTION SITE/ FLOOR, THEIR PRESERVATION, SAFE KEEPING, WATCH AND WARD.
2. SUPPLY (EXCEPTING BHEL SUPPLIED MATERIALS), FABRICATION, ERECTION, ALIGNMENT AND WELDING, BOLTING, FASTENING, GROUTING AS APPLICABLE
3. DESTRUCTIVE, NON-DESTRUCTIVE AND ANY OTHER TESTS AS PER REQUIREMNT
4. COMPLETION OF FACILITY AND HANDING OVER
5. THESE SPECIFICATIONS INCLUDE SUPPLY OF MATERIALS FOR VARIOUS ITEMS OF WORK.

HOWEVER, BHEL WILL BE SUPPLYING ONLY FOLLOWING MATERIALS ON FREE-ISSUE-ACCOUNTABLE BASIS AND AS SUCH SUPPLY OF ONLY THESE SPECIFIC ITEMS IS EXCLUDED FROM THE SCOPE OF CONTRACTOR. THE ITEMS ARE:

- (1) ALL ROLLED SECTIONS AS PER SPECIFICATION**
- (2) ALL PLATE SECTIONS AS PER SPECIFICATION FOR FABRICATION OF BUILT-UP STRUCTURES ETC**
- (3) CHEQUERED PLATES AS PER SPECIFICATION**
- (4) 3.15MM THICK STAINLESS STEEL PLATES AS PER SPECIFICATION FOR BUNKER LINER.**

REST ALL OTHER MATERIALS INCLUDING PERMANENT AND TEMPORARY FASTENER WITH ASSOCIATED NUTS, WASHERS, ELECTRO FORGED GRATINGS, PRIMER AND PAINTS ETC ALL AS PER SPECIFICATIONS IS IN THE CONTRACTOR'S SCOPE. THE ITEM RATE OFFERED BY THE CONTRACTOR SHALL BE IN CONSIDERATION OF THE ABOVE.

Note:- Materials which will be supplied by the contractor as per supply Rate Schedule for which separate order shall be issued. Price for supply items as per supply Rate Schedule shall remain firm i. e price variation compensation clause mentioned in clause 2.17 of General Conditions of Contract and the Over-run compensation mentioned in clause 2.12 of General Conditions of Contract shall not be applicable for separate order for supply items as per supply Rate Schedule.

- 2.5.1 **Further detailed of the work to be executed under this specification shall be defined in Chapter X**
- 2.5.2 **The detailed scope of work given in Chapter - XI BOQ cum Rate Schedule for Mill & bunkar bay .**

The technical requirements for work to be executed under this tender shall be as per Specifications PE-TS-999-600(Subsection C16,C017,C018) enclosed with this tender document.

2.6 SITE VISIT

Contractor should visit site and acquire full knowledge & information about site conditions. The bidder must visit site, to acquaint themselves with the conditions prevailing at site and in & around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid.

2.7 The contractor under this contract shall also provide free of cost services of skilled persons for a total period of 396 Man-months exclusively for use by BHEL. This manpower will be required for following services

Qualified computer operator for office work. (66 man- months)

Skilled workers for working in store, office and colony. (132 man-months)

Unskilled workers for working in store, office and colony. (198 man-months)

Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed.

In case contractor fails to provide above-mentioned man-power as desired by BHEL, the latter shall have right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man-months as per above provision, fully or partly, recovery at the rate of the prevailing minimum wages at LALITPUR for the workers categories stated above plus 10% will be made from the final bill of the contractor.

2.8 SITE ORGANISATION

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

1. Overall planning, monitoring & control.
2. Quality control and quality assurance.
3. Materials management.
4. Safety, fire & security.
5. Industrial relations and fulfilment of labour laws and other statutory obligations.

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

2.8.3 On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been

approved by BHEL, will have to be posted at site and deviations in this regard will not generally be permitted.

- 2.8.4 The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.
- 2.8.5 The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the contractor shall ensure providing one qualified supervisor against deployment of 15 workmen.

2.9 ERECTION SCHEDULE

- 2.9.1 **Contractor shall submit within 30 days of LOI date, detailed program (L2 schedule) of construction / erection / commissioning, for approval to Site In-Charge/Project Manager-Noida.** L2 schedule shall be the working level document demonstrating contractor's ability and methods of completing the work within the key milestones identified in the tender specification. These program would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring. The three monthly rolling program with the first month's program being tentative based on the site conditions would be prepared based on these program. The Contractor shall also be involved along with the Customer/BHEL to tie up detailed resource mobilisation plan over the period of time of the contract matching with the performance targets.
- 2.9.2 The program would be jointly finalised by the site in-charge of the contractor with BHEL/Customer's project coordinator as well as the site planning representative. The erection program will also identify the sequential erectable tonnages

2.10 DEWATERING

Contractor shall ensure at all times that his work area & approach/access roads are free from accumulation of water, so that the materials are safe and the erection/progress schedule are not affected. No separate claim in this regard shall be admitted by BHEL. No separate payments for dewatering of subsoil, surface water or catchment water, if required, at any time during execution of the work including monsoon period shall be considered by BHEL

- 2.11 Contractor shall make necessary arrangements to ensure that the atmosphere in working area (under the scope of work in this tender) and on roads is free from particulate matter like dust, sand etc. by keeping the top surface wet for ease in breathing. Provision of required tanker with spraying arrangement has to be ensured by contractor within the quoted rates, at no extra cost to BHEL

Contractor shall ensure following:

1. Contractor has to maintain contact with local hospital having scanning & other ultra modern medical facilities required during emergency including Ambulance.
2. Contractor has to ensure pre employment medical check for all staff & workers.
3. Contractor has to ensure that adequate First Aid facilities with trained nurse & ambulance are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following

- Male nurse (in shifts)
- Oxygen set up

- Breathing apparatus
- Eye wash facility
- Stretcher
- Trauma blanket
- Medicines.

The contractor against this contract is required to arrange and maintain ambulance (for each package) at site for entire contract period.. The above emergency facility set up including ambulance, male nurse etc. will be shared by BHEL and its other contractors working at this project at no extra cost to BHEL and its sub-contractors. In case, under unavoidable circumstances, if the ambulance is not available / being used elsewhere , the contractor will have to arrange for the same as under clause Sl. No. 1 of 2.3.

2.12 The contractor shall comply with following towards Social Accountability;

- a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.
- b) The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.
- c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.
- d) The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimination/ Corporal punishment for failure in meeting with relevant requirements.
- e) The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.
- f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.
- g) The Contractor shall arrange potable drinking water to its employees & workers.

2.13 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least 500 trees or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers.

2.14 Contractor shall ensure daily housekeeping and keep proper cleanliness of work place and do the disposal of wastes to certified area.

Chapter - III: **Facilities in the scope of Contractor/BHEL**

3.0 FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

S.No.	Description	Scope /to be taken care by		Remarks
		BHEL	CONT	
			.	
1.1.0	ESTABLISHMENT			
1.1.1	FOR CONSTRUCTION PURPOSE			
A.	Open space for office	YES		Limited space (free of charge) As and where made available by customer M/s LPGCL
B.	Open space for storage	YES		Limited space(free of charge) As and where made available by customer M/s LPGCL
1.1.2	FOR LABOUR COLONY			
A	Open space	YES		Contractor have to make their own arrangement
1.2.0	ELECTRICITY			
1.2.1.	Electricity for construction purposes (chargeable/free)			

1.2.1.1	Single point source	YES		CHARGEABLE BASIS
1.2.1.2	Further distribution for the work to be done which include supply of materials & execution		YES	
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:			
1.2.2.1	Distribution from single point including supply of materials & service		YES	
1.2.2.2	Supply, Installation & connection of material of energy meter including operation & maintenance		YES	
1.2.2.3	Duties & deposits including statutory clearances for above		YES	
1.2.2.4	Demobilization of the facilities after completion of works		YES	
1.2.2.5	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above lines		YES	<p>Chargeable</p> <p>As per prevailing rates</p> <p>Contractor shall install calibrated energy meter for metering electricity consumption.</p>
1.3.0	WATER SUPPLY			
1.3.1	FOR CONSTRUCTION:			
1.3.1.1	Making the water available at single point	YES		Contractor have to make bore wells it self. wherever approved by

				M/s LPGCL
1.3.1.2	Further distribution as per the requirement of work including supply of materials & execution		YES	
1.3.2	LABOUR COLONY:			
1.3.2.1	Making the water available at single point			Contractor have to arrange on his own.
1.3.2.2	Further distribution as per the requirement of work including supply of materials & execution			
1.4.0	LIGHTING			
1.4.1	For construction work (supply of all materials) 1. At office storage area 2. At preassembly area 3. At construction site/area		YES	
1.4.2	For construction work (execution of lighting work/arrangements) 1. At office storage area 2. At preassembly area 3. At construction site/area		YES	
	Providing the necessary consumables like bulbs, Switches, etc during the course of construction		YES	
1.5.0	Communications facilities for site operations of the bidder			
1.5.1	Telephone, fax , internet ,intranet, email etc.		YES	
1.6.0	COMPRESSED AIR SUPPLY			

1.6.1	Supply of compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage system etc.		YES	
1.6.2	Installation of the above system and operation & maintenance of the same		YES	
1.6.3	Supply of all the consumables for the above system during the contract period.		YES	
	ERECTION FACILITIES			
2.1.1	Providing erection drawings for all the Equipments covered under this scope	YES		
2.1.2	Drawings for construction method	YES	YES	
2.1.3	As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site		YES	
2.1.4	Shipping lists etc for reference & planning the activities	YES	YES	
2.1.5	Preparation of site erection schedules and other input requirements		YES	
2.1.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	YES	YES	
2.1.7	Weekly erection schedule based on Sl. No.2.1.5		YES	
2.1.8	Daily erection/work plan based on Sl. No.2.1.7		YES	
2.1.9	Periodic visit of senior official of 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 month		YES	
2.1.10	Preparation of preassembly bay		YES	

- 3.1** BHEL will not be responsible for any loss or damage to the contractor's equipment as a result of variation in voltage or frequency or interruptions in power supply.
- 3.2** The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.
- 3.3** Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the

targets. **The energy meter to be installed by the contractor & shall be tested and certified by State Electricity Board or any other agency approved by the LPGCL at his cost.**

- 3.4** The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.
- All electrical installations should be as per Indian Electricity rules.
 - All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.
 - Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.
 - All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.
 - Contractor have to make their own earthing arrangement for their equipment / DB earthing.
 - All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
 - Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.
 - Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.
 - For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.
- 3.5** ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.
- 3.6** In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.
- 3.7** On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed, as per instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expenses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.
- 3.8** Compressor required capacity for construction purposes shall be arranged by Contractor.
- 3.9** **The construction and dismantling of the foundations required for the passenger lifts is included in the scope of the contractor. Erection of CONSTRUCTION ELEVATOR / PASSENGER LIFT, including the construction and dismantling of the foundations required for the passenger lifts, is in the scope of the contractor. However BHEL will assist in commissioning of the same. The periodic upkeep and maintenance of the elevator is to be carried out by the contractor. Required spare parts other than rubber items and consumables shall be given by BHEL free of cost.**
- 3.10** **Contractor should install PC ALONG WITH MODEM to connect with our server (LAN) AT SITE.**

Chapter - IV: T&Ps and MMEs to be deployed by Contractor

4.0 T&P AND MMD DEPLOYED BY CONTRACTOR

<i>Sl. No.</i>	<i>Equipment</i>	Capacity	Minimum Qty.	Remarks
1	TYRE MOUNTED / Crawler CRANE	150T	1 No	To be deployed within 30 days from the start of contract period*
2	TYRE MOUNTED / Crawler CRANE	100 T	1No	To be deployed within 30 days from the start of contract period*.
3	TYRE MOUNTED / Crawler CRANE	75 T	1No	To be deployed within 30 days from start of contract period*.
4	TYRE mounted mobile CRANE with Telescopic boom	36 / 40 T	3 No.	1 no. to be deployed within 30 days from the start of contract period & 2 nd crane to be deployed within 60 days from start of contract period*.
5	Tyre mounted mobile crane / Hydra	12/14 / 18T	6 No.	2 nos with in 30 days from start of contract period and another & bal. progressively with in 120 days from start of contract period*.

6	TRAILER WITH PULLING UNIT	20 MT	3 No.	1 no. to be deployed with in 30 days from start of contract period & 2 nd trailer to be deployed within 60 days from start of contract period & bal. progressively with in 120 days from start of contract period*
		40 MT	2 No.	1 no. to be deployed with in 30 days from start of contract period & 2 nd trailer to be deployed within 60 days from start of contract period & bal. progressively with in 120 days from start of contract period*
7	Low Bed Trailer	60 MT	1No.	1 no. to be deployed with in 30 days from start of contract period or APR
8	TRUCK	14 MT	1No.	1 no. to be deployed with in 30 days from start of contract period*
9	Air Compressor	7/8 KG/CM2	2 No.	
10	Gantry for fabrication yard	Suitable capacity	01 No.	
11	DRILLING MACHINES		Adequate nos	
12	GRINDING MACHINES		Adequate nos	
13	SUBMERGED ARC WELDING M/C		Adequate nos	
14	MIG WELDING M/C		Adequate nos	
15	OXY-ACETELYNE GAS CUTTING SET		Adequate nos	

16	PUG CUTTING M/C		Adequate nos	
17	PLASAMA CUTTING M/C		Adequate nos	
18	SAND BLASTING SET WITH AIR COMPRESSOR		Adequate nos	
19	HOISTING & PULLING DEVICES/ PULLEYS ETC		Adequate nos	
20	ELECTRIC WINCH	5/10/15 MT	APR(Min. 30 Nos)	
21	Hydraulic Jacks	10/20/50/100 MT	APR**	
22	Welding sets with accessories and ovens for welding electrodes backing and holding		APR**	
23	Heat treatment and Stress relieving sets		APR**	
24	Hydraulic Pipe Bending Machine (Manual and Motorised) of various sizes		02 no. Each/APR**	
25	Radiography arrangement including source			
	Iridium 192		5 sources	Minimum as per work load
	Cobalt 60		APR**	
26	Pipe chamfering machine /Tube Cutting	4-14"	1 SET	
		14-20"	1 SET	
27	Pipe cutting & beveling machines		Adequate nos.	
28	Chain pulley blocks of various & suitable capacities		APR**	
29	Three phase distribution board with complete setup for drawl & distribution of construction power		APR**	
30	Electric cables for drawl & distribution of construction power, heating machines		APR**	
31	Sleepers of suitable sizes		Min. 400	
32	Various sizes of clamps/ fixtures for assembling		APR**	
33	Dewatering pumps		APR**	
34	Portable hardness tester		APR**	
35	Recordable UT test Equipment suitable to meet the requirements (KRAUTKRAMMER MODEL USN 50 or EQUIVLENT)		(MIN 2 NOS)	
36	Hardness testing equipment (Equotip or Microdur make) 33 Stress relieving equipment with temperature		(MIN 2 NOS)	
37	Magnetic particle testing equipment- DRY & WET Type		APR**	

38	Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable		APR**	
39	Spectrometer for metal testing		APR**	
40	Alco meter for paint thickness checking		APR**	
41	Hand Operated Megger 500 / 1000 V		APR**	
42	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy		APR**	
43	Digital and Analogue Millimetres		APR**	
44	U Tube Manometer 0-2000 mm Water Column		APR**	
45	Inclined Manometer 0-50 mm Water Column		APR**	
46	Calibrated Pneumatic Torque wrench		4	
47	Bolt Tension Calibrator		APR**	
48	Special Slings for Erection of Ceiling Girders & other heavy components		APR**	
49	Scaffolding Pipes		Min .12000 nos/APR**	

****APR- As per requirement (Contractor shall have to deploy the T&P whenever required at site as decided by BHEL ENGINEER)**

***The date of start of contract period shall be the mutually agreed date between the contractor and BHEL engineer to start the work. In case of discrepancy the decision of BHEL engineer is final**

NOTES:

- 1. The above list specifies only major T&P/MMD (may not be complete) to be deployed by the contractor. All additional/ other tools and plants which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate/ price..**
2. If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to get work done at the risk & cost of contractor without prejudice to right of BHEL as in GCC
3. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.
4. Other terms and conditions regarding above items shall be as per T&P clause in SCC

Chapter - V: T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

5.0 T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

LIST OF T&P BEING PROVIDED BY BHEL ON FREE OF HIRE CHARGES AND ON SHARING BASIS				
Sl. No.	Equipment	Capacity	Qty.	Remarks
1	High capacity crane	600 MT	1 No	On sharing basis for limited period during the erection of structures like upper tiers of boilers, ceiling girders, roof top structures, silencers etc for which high capacity crane is required
2	Mid range crawler/ tyre mounted crane	250 MT	1Nos	On sharing basis
3	Crawler/ tyre mounted General Purpose Crane	100/150 MT	1 Nos	On sharing basis
4	Tower Crane		2 nos	On sharing basis
5	Motorized Hydraulic Test Pump	0-600kg/cm2	2 nos	
6	Construction Elevator		1 no.	
7.	Huck Bolting M/c		4 no.	
8.	Induction heating machine with DG set		APR	
9.	Chemical Cleaning Arrangement		1 set	By BHEL agency
10.	Aneometer 0-15 M / Sec		1 No.	
11.	Pitot Tube		1 No.	

NOTES:

- Cl.4.2.2.16 c.) of SCC** shall read as day-to-day upkeep and running maintenance like filling topping up of lubricants, changing filters, etc including repair of self starter, batteries and dynamo of these cranes shall be the responsibility of the contractor. If on checking it is found that the same is not followed, BHEL will exercise its right to get the job/works done at the risk and cost of contractor. BHEL may also provided cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance shall be excluded from scope of contractor.
- Cl.4.2.2.16 e.) of SCC** The **operator for BHEL's cranes 100 MT & above capacity** being provided by BHEL free of cost. **Further, Helpers and fuel for operation of all BHEL cranes, shall be provided by contractor within the final accepted rates.**

TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878	
TECHINICAL CONDITIONS OF CONTRACT (TCC) PART – I & II	PAGE 21 OF 92

- 3. These Cranes (S. No.1,2&3) will be provided on sharing basis on specific instruction of the BHEL Engineer as per the work requirement.**
- 4. The contractor shall make necessary arrangement like lying of steel plates, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of crane.**
- 5. Other T&P mention above contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores.**

Chapter - VI: TIME SCHEDULE

6.0 TIME SCHEDULE

6.1 The contractor is required to commence the work within 15 days from the date of issue of LOI unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilization of manpower and T&Ps by the contractor.

6.2 Entire work as detailed in the tender specifications shall be completed within **33 months** from the Zero date as per programme / milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.3 The various milestones dates to be achieved for BOILER # 1, as per the current status of contract are as below:

MILE STONES	MONTH
Start of Erection	ZERO
Mill Bunker bay ES	3 rd month
Pr. Parts ES	5 th month
Bunker ES	17th month
Hydro Test	19th Month
Completion of Fab., Erection of Mill Bunker bay	21 th month
Completion of Erection of Bunkers	26 th month
Boiler Light up & ABO completion	27th Month
Chemical Cleaning & restoration	28th Month
Steam Blowing completion	30th Month
Synchronisation (Coal)	31th Month
Full Load & Trial Operation	32th Month
PG Test & Handing over	33 rd Month

6.4 The contractor has to ensure that work is completed in all respects leaving no pending points. However the punch list/ pending points, which are possible to be attended at site, shall be fully liquidated within two months from successful trial operation of the unit.

6.5 The work under the scope of this contract is deemed to be complete in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.

Chapter - VII: TERMS OF PAYMENT

7.0 TERMS OF PAYMENT

- 7.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.
- 7.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.
- 7.3 Subject to any deduction, which BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder.

7.3.1 Interest bearing recoverable advance : Applicable as per Clause No. 2.13 of GCC.

7.3.2. PROGRESSIVE PAYMENT ON PRORATA BASIS

I. 85 % of unit rates

(Applicable for ITEM. No. 1 to 6 of Rate Schedule for SERVICE CONTRACT)

SL.No.		FOR ITEM NO.1 (Str. & Non pr. Parts)	FOR ITEM NO.2 (Pr. parts)	FOR ITEM NO.3 (ESP & aux.)	FOR ITEM NO.4 (Rotating M/c)	FOR ITEM NO.5 (Pipin g)	FOR ITEM NO.6 (Insulation)
1.	Completion of pre-assembly, (if not applicable this portion shall be clubbed with Placement in position)	20%	20%	15%	15%	20%	
2.	Placement in position	25 %	10 %	20%	20%	20 %	50 %
3.	Alignment	20 %	15 %	15%	20%	10 %	15 %
4.	welding /bolting/fixing as required	15%	20%	20%	20%	15%	20%
5.	Completion of non destructive examination & stress relieving/ heat treatment, (if not	5 %	10%			10%	

	applicable, then this portion to be paid along with welding)						
6.	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC			5 %			
7.	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC			5 %			
8.	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES			5 %			
9.	COMPLETION OF ATTACHMENT WELDING, FIN WELDING, SUPPORTS		5 %				
10.	COMPLETION OF ROOF SKIN CASING		5%				
11.	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG					5%	
12.	EQUIPMENT TRIAL OPERATION				10%		
13.	HYDRAULIC TEST OR PNEUMATIC TEST					5%	
	TOTAL FOR PRO RATA PAYMENTS	85%	85%	85%	85%	85%	85%

II. PROGRESSIVE PAYMENT (FOR ITEM NO. 7.0 OF RATE SCHEDULE for SERVICE CONTRACT.

Payment to the Contractor shall be limited to 85% of the value of the monthly running bill on item rate basis provided that work has been executed to the satisfaction of the Engineer. **BHEL site in-charge, at his discretion can split this 85 % payment, to facilitate site operations.** The Engineer may after a measured bill allow & certify payment to the contractor on the basis of abstract measurement bill submitted by the contractor. Contractor will also submit the floppy / CD containing abstract & measurement sheets of the bill which will be returned to him after correction for further resubmission of bill. From this amount recovery such as advances, security deposit taxes etc. would be made. The certificate of the Engineer regarding such approval and passing of sums so payable shall be final and conclusive against the contractor

III. PROGRESSIVE PAYMENT for SUPPLY CONTRACT (FOR ITEM NO. 1.0 OF RATE SCHEDULE- SUPPLY)

- 1. 85 % of contract value for Supply will be payable on receipt of material at site and on submission of documents e.g. Original copy of lorry way bill, Invoice in duplicate, Delivery Challan in duplicate as certified by BHEL Engineer**
- 2. Balance 15 % payable on installation of the supplied material as certified by BHEL Engineer.**

IV. STAGE/MILESTONE PAYMENTS (15%) for SERVICE CONTRACT

1.	Completion of Hydro test (drainable and non-drainable)		1%
2.	Completion of air & gas tightness test for Boiler		1%
3.	Completion of gas tightness test for each pass of ESP	4X0.25%	1%
4.	Completion of Charging of all ESP fields		1%
5.	Completion of Boiler light up and ABO/ acid/ EDTA/ chemical cleaning		1%
6.	Trail run of ID/FD /PA Fans	6X0.25%	1.5%
7.	On completion of steam blowing & Safety Valve floating		1%
8.	Coal firing		1%
9.	Full loading		1%
10.	Completion of Painting		2.5%
11.	Area cleaning, temporary structures cutting/removal and return of scrap		1%
12.	Liquidation of pending points		1%
13.	Completion of all contractual Obligation and de mobilization of site office.		1%
	Total		15%

Note:

If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone/ commissioning activity.

Chapter - VIII: TAXES, DUTIES, LEVIES

A. TAXES, DUTIES, LEVIES FOR SERVICE CONTRACT.

8.0 TAXES & DUTIES

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding **Service Tax** and **Value Added Tax (VAT)** on output services and goods shall be as per following clauses.

8.1 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services.

Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract.

For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted :

Contractor shall submit serially numbered Service Tax and Cess Invoices, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely:

The name, address and registration number of the contractor

The name and address of the party receiving taxable service (BHEL)

Description, classification and value of taxable service provided and

The Service Tax payable thereon.

All the four conditions shall be fulfilled in the invoice for payment of Service Tax by BHEL. Where more than one nature of Service under Service Tax Rules is involved, the invoice mentioned above shall contain the break up of all values for each nature of Service.

8.2 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.

8.3 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

B. TAXES, DUTIES, LEVIES FOR SUPPLY CONTRACT.

8.4 TAXES AND DUTIES: Price quoted should be inclusive of all the applicable charges, taxes and duties, including entry tax. However rates of sales tax, excise duty & other statutory levies should be indicated separately. Variation in excise duty, sales tax/ vat or any other statutory levies during contractual delivery period should be to BHEL's account. BHEL shall issue 'C' form against submission of E1 forms by suppliers for supply of material from outside the state and the road permits shall be issued by the customer, as the material shall be consigned to the ultimate customer. In case of material purchased within the state, vat shall be payable extra on submission of vat invoices/ documentary evidence by the vendor.

Chapter - IX: Others

9.0 OTHERS

- 9.1** For reverse auction/ for Price Bid opening, only those bidders will be considered who will be qualified for the subject job on the basis of pre-qualification evaluation/ Techno-commercial bids. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

Chapter - X: Others

10.0 STRUCTURAL STEEL WORK

10.1 MATERIAL

1. Materials such as rolled sections, all plate sections, chequered plates & 3.15mm thick stainless steel plates for bunker liners shall be issued at free of cost by BHEL for use in the work covered in this contract from BHEL Stores/Storage. The contractor shall collect these materials from BHEL stores at specified places at his own cost and store the same at the work site or in his stores as per standard norms. Materials issued will be used only for construction of permanent work.
2. BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.
3. The Contractor shall in no case be entitled for any compensation on account of any delay in supply or non-supply thereof for all or any such materials.
4. No material shall be issued to the contractor except as those indicated above. Contractor will have to make his own arrangement at his own cost for procurement of any other materials, consumables etc. as required for the works and of such quality as acceptable to BHEL.
5. The contractor shall maintain proper store account for all the BHEL issued Materials and shall give three copies of monthly-computerized statement of such account to the BHEL.
6. Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day to day update of materials, issued to contractor, accounting for surplus/scrap material returned etc. These functions shall also be carried out through computerized system utilizing suitable software. Contractor shall engage experienced software personnel to associate on dedicated basis for efficient discharge of the same.
7. The contractor shall solely be responsible for the safety, quality & quantity of material after it is handed over and issued to contractor by the BHEL.
8. BHEL issued materials, shall not be taken out of the project site under any circumstances whatsoever unless otherwise permitted by BHEL.

10.2 FOLLOW UP & HANDLING OF MATERIALS ISSUED BY BHEL

1. BHEL will place purchase order on the manufacturers for procurement of steel structures and successful bidders will provide all necessary supports for follow up/chase up with manufactures/supplies/vendors for speedy delivery of materials at site including posting a man for short duration at manufactures factory within their quoted rates.
2. Consignment of BHEL supplied Material will be issued to the contractor as received by BHEL i.e. on weighment basis/ Linear measurement basis from its supplier, as per the delivery challan of the supplier. It would be the responsibility of the contractor to keep in

constant contact with BHEL site to find out the delivery status, arrival of the consignments and arrange for escort to accompany the trucks/ trailers for transportation of above materials by BHEL'S supplier, if necessary.

3. All materials issued by BHEL shall be stacked, stored above ground level by use of concrete or wooden sleepers. No materials shall remain on ground at any time. All concrete or wooden sleepers required for stacking the materials shall be arranged by contractor (successful bidder of this package) at his own cost within the quoted rates. All other equipments like winches, dshackles, slings of various sizes, max puller, pulley blocks, jacks, trucks, trailers etc. required for such handling of steel from BHEL stores/storage yard etc. shall be arranged by contractor within quoted/accepted rates.
4. The contractor shall take delivery of the materials from the designated place within premises of 3x660 MW Lalitpur STPP at his own cost and store the same at his stores as per standard norms. Open land for such purposes shall be provided by BHEL on free of cost basis. Temporary barbed wire fencing of the open storage yard is to be done by the contractor and is included under the scope of his work. Contractor shall also remove grass, bushes, trees etc wherever required off the land provided to him and shall make proper continuous up keeping of the open yard /land by removing grass, bushes trees etc and same is included under the scope of his work & no extra payment shall be made to the contractor in this regard. The bidder shall make complete arrangement of necessary security personnel's to safeguard all such materials in his custody. Materials issued will be used only for construction of permanent work. The contractor shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering.
5. Excessive rusting of steel in custody of agency/contractor must be avoided. In case, due to any cause attributable to the contractor, such rusting of steel occur rendering the same unusable, then such quantity of steel shall be recovered from the interim payment at the penal rate specified in the tender.
6. No material shall be issued to the contractor except as those indicated above i.e. steel unless otherwise expressly provided for in the contract. Contractor will have to make his own arrangement at his own cost for procurement of any other material as required for the works and of such quality as acceptable to BHEL.

10.3 ISSUE OF BHEL MATERIALS

The steel shall be issued to the contractor on the following basis:

- I. ALL ROLLED SECTIONS AS PER SPECIFICATION: Weight basis**
- II. ALL PLATE SECTIONS AS PER SPECIFICATION FOR FABRICATION OF BUILT-UP STRUCTURES ETC- : Weight basis**
- III. CHEQUERED PLATES AS PER SPECIFICATION: Weight basis**
- IV. 3.15MM THICK STAINLESS STEEL PLATES AS PER SPECIFICATION FOR BUNKER LINER: Weight basis**

1. All these materials issued by the BHEL shall be properly accounted for. The total quantity of steel required for the work will be calculated from the approved fabrication drawings

including laps, chairs and lugs. The measurement for payment as well as for accounting (reconciliation) shall be based on linear measurements as per the sectional unit weights as per relevant IS code/Standard unit weight provided by Manufacturer/supplier.

2. In case any such sectional weights are not available in the above documents, the manufacturer recommendation shall be binding.
3. The material issued to the contractor shall be mainly in standard length and sections as received from the supplier. However, the contractor shall be bound to accept the steel in length as available in the project stores no claims for extra payment because of issue of non-standard length will be entertained.
4. In case MS flats as required in the fabrication of structures are not available, the contractor shall cut such width out of the available MS plates to make flats at no extra cost till such material is available and procured by BHEL.
5. The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores/Storage yard. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores/Storage yard.
6. The contractor shall submit to the engineer, a statement indicating estimated quantity of steel required during a quarter at least two months in advance of the quarter. In addition, the contractor shall also furnish the estimated requirement of steel during a month by the third week of the previous month indicating his requirement.
7. Bidders to ensure that no lamination materials are taken over by them from BHEL stores.
8. Fabrication wastage, if any due to above, shall not be compensated by BHEL. Bidder to note that all the BHEL supplied material etc. shall be supplied by the bidder as per relevant items of BOQ.

10.4 RETURN OF MATERIALS

1. All surplus steel and all wastage materials will be taken back on weight Measurement basis.
2. Surplus, unused and un-tampered steel shall be sorted section-wise and returned separately for a place directed by BHEL/Engineer within the project area, Return of such materials will not be entitled to any handling and incidental charges.
3. All wastage / scrap (including melting scrap, wastage, unusable scrap) shall be returned item wise to the stores and a receipt obtained for material accounting purposes. Return of such material will not be entitled to any additional cost due handling and transportation and incidental charge.
4. All Scrap for structural steel including melting scrap shall be returned separately.

10.5 STEEL CONSUMPTION AND WASTAGE

10.5.1 STRUCTURAL STEEL (ROLLED SECTIONS, MS FLATS ETC.), STAINLESS STEEL LINER CONSUMPTION & WASTAGE

A. CONSUMPTION STRUCTURAL STEEL

- The theoretical consumption of various sections shall be based on approved drawings. Weights shall be calculated considering/based on linear measurements and the sectional weights as per Indian standard. No extra shall be payable to the contractor for any deviation in weights for the two different procedures adopted for issue and calculation of the theoretical consumption.

However, Rolling Margin/variation in standard unit weight w.r.t. actual unit weight (taken at site) shall be considered for reconciliation of steel & no panel recovery shall be done on this account.

- Actual consumption = Issue – Surplus.
- Surplus = Untampered, unused, uncut quantity of steel returned by the contractor to BHEL store.
- Wastage = Actual consumption – Theoretical consumption.

10.5.2 WASTAGE OF STRUCTURAL STEEL

- Allowable wastage: - (+) 5% (Plus five percent) of the theoretical consumption shall be considered. Wastage is further classified as serviceable cut pieces (pieces of rolled steel section length 3M and above) and unserviceable scrap (including pieces of rolled steel section length less than 3m & MS plate less than one sq. M Area width less than 100cm) measured as per actual weighment basis.**
- Invisible wastage (loss of materials due to gas cutting, straightening of edges etc) shall be limited to 0.5% (zero point five percent) of theoretical consumption and shall be considered for reconciliation purposes only. But this invisible wastage shall be considered to be included in allowable wastage (i.e. five percent).**

3. SL. CONSUMPTION OF STRUCTURAL BASIS OF ISSUE

- | | |
|--|------------------------|
| 4. NO. STEEL (ROLLED SECTION, PLATES & SS liner) &
S-1 Theoretical consumption (without
Considering any wastage, scrap or
loss) | PENAL RECOVERY
Free |
| S-2 Wastage limited to plus five percent
(+5%) of the aforesaid theoretical
Consumption (S-1) towards
allowable wastage. | Free |
| S-3 Wastage beyond five percent (5%) | Penal Rate |

of the aforesaid theoretical consumption (S-1).

5. (All wastage steel shall be returned to BHEL).

10.6 RECONCILIATION OF BHEL ISSUED MATERIALS

A) INTERIM RECONCILIATION (Quarterly)

1. The contractor shall submit a interim reconciliation statement of steel issued to them **once in three months** to BHEL engineer. In turn BHEL Engineer shall issue a Certificate indicating the status of materials for processing of further RA bills.

The purpose of quarterly reconciliation of steel is to have a track of status of materials & to control the misuse and over wastage of steel. During the progress of work section wise reconciliation with segregation of serviceable cut piece & un-serviceable scrap/cut-pieces is not required as these cut-pieces shall be used at later stage also for various purposes & hence the same cannot be declared as wastage before completion of job. During the progress of work, following action need to be taken for reconciliation of structural steel:

- (1) Qty. used in permanent job, measured & paid under various RA Bills.
 - (2) Qty. available in full length with agency at site (to be jointly assessed by BHEL engineer & Contractor).
 - (3) Assessment of cut pieces available at site.
- Only Certification of BHEL Engineer for the above is enough for processing the RA bills.

B) FINAL RECONCILIATION

2. On completion of work, contractor shall properly account for the material issued to him as specified herein **clause no. 10.6 to** the satisfaction of BHEL certifying that the balance materials are available with contractor's custody at site.
At the time of submission of final bill by the contractor, if it is noticed by BHEL that the wastage is high and calls recovery at the penal rate, then BHEL will proceed for recovery for the excess wastage as per penal recovery rates as specified.
The approved drawings schedules are to be considered for the purpose of reconciliation of materials.

10.7 RECOVERY OF MATERIAL

1. If wastage exceeds the specified limit, the recovery of excess wastage shall be made from monthly R/A Bill at the Penal Rate.

PENAL RATE OF MATERIALS

A. STRUCTURAL STEEL

- | | |
|--|-----------------------|
| 1. Chqd. Plates/MS PLates | Rs. 50, 000/- per MT. |
| 2. Flats/ Beams/ Channel/
Angles etc. (Rolled sections) | Rs. 50000/- per MT. |

TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878	
TECHNICAL CONDITIONS OF CONTRACT (TCC) PART – I & II	PAGE 34 OF 92

3. Stainless Steel liner

Rs 2,50,000/- per MT

10.8 PROCUREMENT OF MATERIALS BY BIDDER AND TESTING:

1. Material required for the entire job other than issued by BHEL as explained above required for the completion of entire scope such as MS grating, galvanised grating, GI handrail, stop lock gate, stationery screen, fasteners like MS/HT/HSFG bolts/nuts, lock Nuts, washers and foundation bolts other than those supplied by BHEL etc have to be supplied by the contractor. BHEL reserves the right to reject any material not found satisfactory. Contractor shall produce manufacturer's test.

Note:- Materials which will be supplied by the contractor as per supply Rate Schedule for which separate order shall be issued. Price for supply items as per supply Rate Schedule shall remain firm i. e price variation compensation clause mentioned in clause 2.17 of General Conditions of Contract and the Over-run compensation mentioned in clause 2.12 of General Conditions of Contract shall not be applicable for separate order for supply items as per supply Rate Schedule.

10.9 INSPECTION AND STAGE APPROVAL OF THE WORK

1. The owner or his duly authorised representative shall have at all reasonable times access to the contractor's premises or works and shall have the power to inspect drawings or any portion of the work, examine the materials and workmanship and shall have the authority to reject any work. This would be implemented through joint inspection by the representative of the owner and BHEL and in the form of joint protocols without any extra claims and loss of time and amount.
2. All work embracing more than one process shall be subject to examination and approval at each stage thereof and the Contractor shall give due notice in writing to the Engineer when each stage is ready. In default of such notice being received, the Engineer shall be entitled to approve the quality and extent thereof at any time he may choose and in the event of any dispute, the decision of the Engineer thereon shall be final and conclusive

10.10 PROTECTION OF EMBEDMENTS, BOLTS ETC.

1. The contractor shall ensure proper protection to the satisfaction of the Engineer, of all bolts, inserts, embedments etc. from weather etc/ by greasing, rapping them with gunny bags or canvas or by any other means as directed by Engineer. Cost of such protections shall be deemed to be included in the rates quoted for the item.

10.11 COMPLETION OF WORK

1. The works shall be completed to the entire satisfaction of the Engineer and in accordance with the completion schedule as specified in the Contract, and all unused stores and materials, tools, plant, equipment, temporary buildings, site office, labour hutments and other things shall be removed and the site and work cleared of rubbish and all waste materials and delivered up clean and tidy to the satisfaction of the Engineer at the Contractor's expenses.

2. BHEL shall have power to take over from the Contractor from time to time such sections of the work as have been completed to the satisfaction of the Engineer. Such work however shall not be treated as have been completed until the extra works are executed to the satisfaction of Engineer. The Guarantee period shall commence only after handing over of the entire works.
3. The Engineer shall certify to the contractor the date on which the work is completed and the date thereof.

10.12 RECORDS AND MEASUREMENTS

1. All items having a financial value shall be entered in BHEL measurement Book so that a complete record is obtained of all works performed under the Contract. Lump sum omissions will be entered for deduction. Measurement shall be restricted to that required to ascertain the financial liability of BHEL under the contract.
2. Work which fails to be measured in details shall be measured physically without reference to any local custom that may obtain excepting where it may otherwise be directed in the tender documents. The measurements shall be taken jointly by any person duly authorised on the part of BHEL and by the Contractor.
3. The Engineer shall give reasonable notice in writing to the Contractor of appointment for measurement.
4. The Contractor shall, without extra charge, provide assistance with appliances and other things necessary for measurement and shall bear all the cost of measurement of his work.
5. Measurement shall be entered in BHEL Measurement Book and signed and dated by both parties each day at the site on completion of measurement. If the contractor objects to any of the measurements recorded on the behalf of BHEL, a note to that effect will be made in BHEL Measurement Book or against the item or items objected to and such note shall be signed and dated by both the parties engaged in taking the measurement.
6. If, as a result of such objection, it becomes necessary to re-measure the work wholly or in part the expense of such re-measurement shall be borne by the contractor.
7. If the Contractor's representative fails to attend when required, the Engineer shall have power to proceed by himself to take measurements and in that case these measurements shall be accepted by the Contractor as final.
8. The Contractor shall, once in every month, submit to the Engineer details of his claims for the work done by him upto and including the previous month which are not covered by this Contract Agreement in any of the following respects:

- (a) Deviation from the items and Specifications provided in the Contract documents.
- (b) Extra items/new items of work.
- (c) Quantities in excess of those provided in the Contract Schedule.
- (d) Items in respect of which rates have not been settled

10.13 METHOD OF MEASUREMENT

1. Method of measurements shall be as per standard specifications included in the tender. For other items measurements shall be as per relevant IS Codes.

10.14 DEVIATION

1. The Contractor shall not make any alteration in, addition to or omission from the work as described in the tender documents except in pursuance of the written instructions of the Engineer. No such deviation from the work described in the tender documents shall be valid unless the same has been specifically confirmed and accepted by the Engineer in writing and incorporated in the Contract.
2. The Engineer may deviate, either by way of addition or deduction, from the work so described, provided that the Contract sum be not thereby varied on the whole by more than the percentage set out in the tender documents. The value of all additions and deductions shall be added to or deducted from the Contract sum. (Whenever the Engineer intends to exercise such a right his intentions shall specify the deviations which are to be made, the lumpsum assessment or the proposed basis of payment, the extra time allowed, if any, and the date for completion of the entire contract). Any objection by the contractor to any matter concerning the order shall be notified by him in writing to the Engineer within seven days from the date of such order, but under no circumstances shall the work be stopped (unless so ordered by the Engineer) owing to differences or controversy that may arise from such an objection. In the absence of such a notification of objection by the Contractor, he will be deemed to have accepted the order and the conditions stated therein.

10.15 VALUATION OF DEVIATIONS

Rates for deviated items or new items of work shall be as follows :

1. If the rates for the additional, altered or substituted work are specified in the Contract for the work, the Contractor is bound to carry out the additional, altered or substituted work at the same rates as are specified in the Contract for the work.
2. If the rates for the additional, altered or substituted work are not specifically provided in the Contract for the work, the rates will be derived from the rates for a similar class of work as are specified in the Contract for the work.
3. If the rates for the altered, additional or substituted work cannot be determined in the manner specified in above clauses the rate for such part or parts will be determined by the Engineer on the basis of prevailing market rates when the work was done and the decision given in this behalf shall be final and binding on the Contractor. Rate analysis will be worked on CPWD manual of rate analysis as guidance.

- 4 If the rates for the altered, additional or substituted work cannot be determined in the manner specified in above clauses , then the contractor shall within 7 days of the date of receipt of order to carry out the work inform the Engineer of the rate at which it is his intention or charge for such class of work, supported by analysis of the rate or rates claimed, and the Engineer shall determine the rate or rates on the basis of prevailing market rates and pay the Contractor accordingly. However, the Engineer, by notice in writing, will be at liberty to cancel his order to carryout such class of work and arrange to carry it out in such manner as he may consider advisable. But under no circumstance the Contractor shall suspend the work on the plea of non-settlement of rates falling under the clause or claim any compensation on that account. Elements of profit, overheads, supervision and establishment charges will be taken as 15% over direct cost.

10.16 COMPLIANCE TO REGULATIONS AND BYELAWS

- 1 The Contractor shall conform to the provisions of any statute relating to the work and regulations and bylaws of any local authority and of any water and lighting Companies or Undertaking with whose system the work is proposed to be connected. He shall, before making any variation from the drawings or the specifications that may be necessitated for such connections give the Engineer, notice specifying the variation proposed to be made and the reasons therefore and shall not carryout any such variation until he has received instructions from the Engineer in respect thereof. The Contractor shall be bound to give all notices required by statute, regulations or bye-laws as aforesaid and to pay all fees and taxes payable to any authority in respect thereof.

Chapter - XI: ANNEXURES

Annexure – I

TENTATIVE WEIGHT SCHEDULE

AA: SUMMARY OF WEIGHTS

SN	Description	Wt	unit	Annexure
1	Pressure Parts:	8346	MT	IA
2	Structure& Non-Pressure parts:	19635	MT	IB
3	ESP & auxiliaries	9869	MT	IC
4	Rotating Machines:	4177	MT	ID
5	Insulation	3146	MT	IE
6	Power Cycle & Boiler piping	2353	MT	IF
	TOTAL TONNAGE	47526	MT	

Annexure – IA

Product Group (PG) Wise Weight Schedule For a Boiler

SL NO	PRODUCT GROUP	DESCRIPTION OF PG	APPROX WEIGHT (IN MT)
1.0	PRESSURE PARTS		
1.1	04	SEPERATOR&COLLECTOR VESSELS	50
1.2	05	FURNACE WATER WALL HEADERS	190
1.3	06	FURNACE WATER WALL PANELS	830
1.4	07	FURNACE RISERS, SCREEN TUBES ,MIXING SPHERE, SPIRAL WALL	220
1.5	08	BUCKSTAYS & FURNACE GUIDES	1340
1.6	09	SEAL BOXES FOR FURNACE OPENING & INSTRUMENT INSERTS	25
1.7	10	SUPER HEATER HEADERS	304
1.8	11	SUPER HEATER COILS	1325
1.9	12	SH SPACER TUBES, SAT. LINKS, DESH & DESH LINKS, SH HANGERS & SUPPORTS	394
1.10	15	REHEATER HEADERS	130
1.11	16	REHEATER COILS ETC.	908
1.12	17	REHEATER LINKS & SUSPENSIONS	90
1.13	18	FURNACE ROOF SKIN CASING	40
1.14	19	ECONOMISER COILS, HEADERS & PIPES	1857
1.15	20	SOOT BLOWERS	93
1.16	21	SOOT BLOWING STEAM PIPING	31
1.17	22	HP & LP BYPASS	10
1.18	24	BOILER TRIM PIPING, SAFETY VALVES, SILENCERS, NAME PLATES ETC.	491
1.19	28	FURNACE DOORS & FASTENERS	14
1.20	41	OIL & GAS BURNERS, IGNITORS ETC.	4
		SUB TOTAL(IN MT)	8346

Annexure – IB

2.0	STRUCTURE & NON-PRESSURE PARTS		
2.1	30	MAIN BOILER ENCL.	236
2.2	35	MAIN BOILER STRUCTURES	6014
2.3	36	BOILER MAIN FLOORS, STAIRS & LADDERS ETC.	3886
2.4	37	BOILER OUTER CASING	115
2.5	38	INTERCONNECTING STRUCTURES & PLATFORMS	1164
2.6	39	COLUMNS & FRAMES FOR DUCTING, FAN HANDLING STRUCTURES ETC.	2194
2.7	43	IGNITOR, SCANNER & SEAL AIR SYSTEM	85
2.8	45	COAL BURNERS	187
2.9	47	PULVERISED FUEL PIPING & SUPPORTS + CERALIN BENDS	497
2.10	48	AIR DUCTS, FLUE GAS DUCTS, DAMPERS, EXPANSION JOINTS/ NMEJS, DUCT SUPPORTS ETC.	4400
2.11	50	STEAM COIL AIR HEATER	17
2.12	57	DAMPERS & GATES	601
2.13	81	MISC TANKS (PUMPS,CLEAN DRAIN FLASH TANK/ CW STORAGE TANK, MAKE UP STORAGE TANK ETC)	188
2.14	99*	MISC HANDLING EQUIPMENT	51
		SUB TOTAL(IN MT)	19635

Annexure – IC

3.0	ESP & auxiliaries		
S.NO	PGMA	WEIGHT SCHEDULE DESCRIPTION	WT.(In MT)
1	7X-X01	ESP Supports	35.00
2	5	Sub Delivery Items	0.80
3	6	Insulator Housing Assembly	77.00
4	8	Gas Distributor Assembly (With 3rd Screen)	96.70
5	9	GD Rapping System	16.60
6	10	GD Drive Arrangement	1.32
7	11	Gas Screening	44.00
8	13	Emitting System Suspension	26.50
9	14	Support Insulator	11.52
10	15	Emitting Electrode	34.50
11	16	Emitting Electrode Rapping	50.50
12	17	Drive Arrangement For Emitting System	48.00
13	19	Suspension Arrangement For Collecting Electrode	167.00
14	20	Collecting Electrode- 1.25 mm thick	1550.00
15	21	Frame Of Emitting System - Top	146.00
16	22	Frame Of Emitting System - Bottom	185.00
17	23	Inspection Doors	20.00
18	24	Shock Bars	125.00
19	25	Collecting Electrode Rapping Mechanism	120.50
20	26	Drive Arrangement For Collecting Rapping	11.20
21	28	ESP Roof Beam	225.00
22	30	Electrical Sub Delivery Components Of ESP	24.00
23	31	Geared Motors For Rapping Mechanism	40.00
24	7X - X32	Frame Of Emitting System - Middle	252.00
25	37	Junction Box & Push Button Stations	3.00
26	42	Outer Roof	283.00
27	43	Hopper Ridges	93.00
28	44	Hopper Upper Part (6 mm thick)	460.00
29	45	Hopper Lower & Middled Part (6 mm thick)	600.00
30	46	Insulator Support Panels (6 mm thick)	157.00
31	47	Roof Panel Assembly (6 mm thick)	217.00
32	48	Casing (Structure)	548.00
33	49	Casing (Shell, Side Panels, Cables & GD Housing) - 6 mm thick	850.00
34	50	ESP Funnels (5 mm thick)	255.00
35	55	Penthouse	293.00
36	57	Splitter & Guide Vanes	41.00
37	59	Cable Trestle	10.00
38	60	Cables	296.00
39	61	ESP Test Equipments	2.00
40	62	Earthing, Cable Trays, Tray Supports, Channels & Angles	193.00
41	63	Ash Level Indicator	1.06
42	65	Hopper Approach Platform	180.00
43	66	Water Washing System	7.00
44	67	Mineral Wool For ESP Insulation (75 mm thk)	353.00

45	7X - X68	Fixing Components For ESP Insulation (0.71 mm Al)	200.00
46	72	Interlocks	2.70
47	73	Electrically Operated Hoists & Accessories	12.50
48	74	Opacity Monitor & Accessories	1.50
49	77	ESP/LTMSB	40.00
50	78	Micro Processor Based Components For ESP	1.00
51	80	Foundation Materials For ESP	27.00
52	81	Supporting Structures For ESP	1010.00
53	90	Heating Elements & Thermostats	4.00
54	92	Auxiliary Control Panel	40.00
55	93	Rapper Control Panel	1.80
56	94	STATCON Panel	1.80
57	95	IOS Panel	0.00
58	7X-988	Commissioning Spares	1.50
59	7X-996	Tools & Tackles	0.50
60	89 610	Galleries and Railings Of ESP	180.00
61	89 611	ESP Roof Hand Rails	14.50
62		HVR Transformer	180.48
			9869.48

Annexure – ID

4.0	ROTATING MACHINES		
3.1	52	ROTARY REGENERATIVE AIR HEATER	2143
3.2	55 & 56	FD, ID & PA FANS WITH SUB-DELIVERIES	336
	-	MOTORS (ID, FD, PA, MILLS, SA, SC ETC)	
3.3	61	COAL MILLS & SUB-DELIVERIES	1493
3.4	65	COAL FEEDERS	59
3.5	67	MILL PLANT AUXILIARIES	146
		SUBTOTAL	4177

Annexure – IE

5.0		INSULATION	IN MT	
1.	PG-31	SKIN CASING & COMPONENTS	20	
2.	PG-32	FIXING COMPONENTS FOR INSULATION	373	
3.	PG-33	INSULATION WOOL	1938	
4.	PG-37	OUTER CASING	115	
	81325	MINERAL WOOL MATTRESS	60	
	81350	ALUMINIUM CLADDING FOR INSULATION	40	
		PEM (Supply)	600	
		TOTAL (IN MT)	3146	

Annexure-IF

**TENTATIVE WEIGHT SCHEDULE FOR
(PIPING SYSTEMS)**

	PG MA	POWER CYCLE PIPING	WT. (in MT)	
1.	80-300	MS UPTO STOP VALVE	98	P 91
2.	80-301	MS FROM BOILER STOP VALVE TO ESV	263	P 91
3.	80-303	MS HEADER TO AUX PRDS	18	P 22
4.	80-304	MS HEADER TO HPBP VALVE	40	P 91
5.	80-307	HP AND LP BYPASS WARM UP	2	
6.	80-310	HRH FROM REHEATER TO INTERCEPTOR VALVE	290	P 22
7.	80-311	HRH FROM INTERCEPTOR VALVE TO TURBINE	26	P 22
8.	80-312	LPBP VALVE UPSTREAM & DOWNSTREAM	140	P 22
9.	80-320	CRH FROM TURBINE TO REHEATER	136	
10.	80-321	HPBP VALVE TO CRH PIPING	12	P 22
11.	80-322	CRH PIPING TO DEAERATING HEATER	9.6	
12.	80-323	STEAM TO BFP DRIVE TURBINE	3.4	
13.	80-324	CRH HEADER TO AUX.PRDS	2	
14.	80-340	AUX STEAM HEADER	6	
15.	80-341	AUX STEAM HEADER INTERCONN BETWEEN UNITS	75	
16.	80-343	AUX STEAM TO AH SOOT BLOWERS	2.1	
17.	80-345	AUX STEAM TO DEAERATING HEATER	4	
18.	80-351	AUX STEAM TO UNLISTED USERS - SG SCOPE	16	
19.	80-355	STEAM TRACING PIPING	9	
20.	80-368	SCAPH DRAIN TANK VENT/SV EXHAUST TO ATM	2.3	
21.	80-373	AUX STEAM HEADER SV EXHAUST	6	
22.	80-395	AUX STEAM ATOMISING	1.2	
23.	80-399	STEAM BLOWING PIPING-TEMPORARY	61	
24.	80-425	BFD FROM FINAL HPH TO SG TP	224	
25.	80-430	SPRAY WATER TO HPBP	5.6	
26.	80-431	SPRAY WATER TO AUX PRDS	2.2	
27.	80-432	SPRAY WATER TO BOILER DESH UPTO SG TP	21.6	
28.	80-451	BOILER INTEGRAL PIPING DRAINS	14	
29.	80-452	HP PIPING DRAINS - SG SCOPE	25	
30.	80-453	LP PIPING DRAINS - SG SCOPE	7.5	
31.	80-454	SCAPH DRAINS	6.3	
32.	80-455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	10	
33.	80-460	SG AUX COOLING WATER UNIT SYSTEM	46	
34.	80-471	BOILER WATER WASH TO & FROM UNIT	12	
35.	80-473	DEMINERALISED WATER SYSTEM	3.7	
36.	80-477	SERVICE WATER PIPING	15	
37.	80-480	FIRE WATER-OTHER AREAS	11	
38.	80-604	ACID CLEANING PIPING-TEMPORARY	50	
39.	80-612	SERVICE AIR FOR INDIVIDUAL UNITS	13	
40.	80-614	INST AIR COMP SUC & DIS TO RECEIVER	3.7	
41.	80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	11	
42.	80-812	H&S FOR AUXILIARY STEAM PIPING FOR LU	16	
43.	80-816	H&S OF ACID CLEANING PIPING	8	

44.	80-818	AUX STR OF AUXILIARY STEAM PIPING FOR LU	35	
45	80-820	AUX STR OF DRAINS AND VENTS FOR LU	33	
46.	80-830	H&S OF CRITICAL PIPING FOR SB - STEAM LINES	200	
47.	80-840	AUX STR FOR MAIN STEAM PIPING FOR SB	300	
48.	80-901	SUB DELIVERY VALVES FOR LIGHT UP	19	
49.	80-920	H&S FOR HYDRO TEST	15	
50.	80-921	H&S FOR LIGHT UP STEAM LINE	23	
		TOTAL FOR A BOILER(IN MT)	2353	

NOTE:

1. Above details are only to give a general idea to the contractor to quote the rates as per rate schedule. Besides PGs indicated above, there is likelihood of addition of new PGs for release of some items integral to Boiler. Contractor is required to carryout such PGs also within their applicable tonnage rate. The decision of BHEL regarding inclusion of new / additional PG in Boiler will be final & binding on the contractor.
2. Certain items like insulation material, cladding, valves etc. may be supplied by other suppliers / BHEL units like PEM etc. and not included in PGMA applicable for Boiler system mentioned above . Such items that are also to be erected as per tonnage rates for the respective systems as mentioned above & as directed by BHEL. No extra claim shall be entertained on this account.
3. PG for H&S, Valves, auxiliary structure, insulation are common for both Boiler & steam turbine. Erection of above will be done by the respective contractor i.e Boiler & Turbine for that respective pipe line.

ANNEXURE –II

TENTATIVE LIST OF HP ERECTION JOINTS FOR PACKAGE-I,II,III

Location	OD of Tube	Thickn ess	Material *	Quantity per Boiler
Furnace Vertical Wall	34.9	8	SA213T12	4644
Furnace Spiral Wall	38.1	7.4	SA213T12	8256
Back Pass Wall (Front& Rear)	44.5	6.3	SA213T12	1624
Back Pass Wall (side walls)	57	8	SA213T12	1062
Extended Pass side wall	57	8	SA213T12	500
Transition Forging Loose Tube joint	38.1	7.5	SA213T22	6200
Roof tubes	51	7.11	SA213T22	612
Platen SH	44.5	7.11/8.0	T92/T91	3036
Platen SH	51	7.11	T92/TPH347	132
Platen RH	63.5	4	T91/T91	2200
Platen RH	73	4	TP347H/TP347 H	200
Final SH	44.5	8	T91/T91	4040
LTRH	63.5	4	TT / T91	4848
Eco 1&2	44.5	5.6	SA210Grade C	4060
Eco Hangers	63.5	10	SA210Grade C	2000
LTRH hangers	63.5	10		2300
Eco Links	508			32
Ring header	457.2			4
Riser Pipes	219			76
Sep to Roof I/L hdr	368	60		12
Radial Distributor link	457.2	70	P12	18
Distributor to wall	159	25		100
Links common hdr	219.1	35		80
Links to LTSH	457.2	70		14
Link to Platen SH	457.2	65		12
Link to final with desh	508	65		14
link to platen rh	863.6	50		22
Steam Cooled Spacer				100
Total number of HP Joints				46198
For estimation purpose +10%				50818

TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878	
TECHINICAL CONDITIONS OF CONTRACT (TCC) PART – I & II	PAGE 48 OF 92

*** During Contract depending upon the material selection T23 / T24 / T92 / SUPER 304H / TP347HFG may used.**

- THE ABOVE MENTIONED JOINT SCHEDULE IS FURNISHED FOR ESTIMATION PURPOSE AND ACTUAL NO. OF JOINTS MAY VARY TO ANY EXTENT. NO ADDITIONAL PAYMENT SHALL BE MADE DUE TO ANY VARIATION IN NO. OF JOINTS.**

Chapter - XI: RATE SCHEDULE

UNPRICED RATE SCHEDULE

S.No.	Description of Item	Total Amount (in RS.)
1.	TOTAL PRICE FOR (SERVICE) : BOILER & STR. STEEL WORK OF MILL & BUNKER BAY- SERVICE	
2.	TOTAL PRICE FOR (SUPPLY) : STR. STEEL OF MILL & BUNKER BAY – SUPPLY	
3.	GRAND TOTAL PRICE(1+2)	

NOTE: Total price for Unit #2: BOILER & STR. STEEL WORK OF MILL & BUNKER BAY-SERVICE and STR. STEEL OF MILL & BUNKER BAY - SUPPLY should match with total price of their respective schedule.

UNPRICED RATE SCHEDULE FOR UNIT NO.2 OF 3x660 MW (SERVICE): BOILER & STR. STEEL WORK OF MILL & BUNKER BAY (SERVICE)

Sl. No	ST NO.	DESCRIPTION OF WORK	QTY.& UNIT	Unit Rate in Rupees (In figures and words)	Amount in Rupees (In figures and words)
1		Rate in Rupees per MT for erection, testing, commissioning, trial operation and handing over of Pressure parts etc as per tender specifications (Approx. tonnage involved is 8346 MT as per Annexure- IA)	8346 MT		
2		Rate in Rupees per MT for erection, testing, commissioning, trial operation and handing over of Structures & Non pressure parts etc as per tender specifications (Approx. tonnage involved is 19,635MT as per Annexure- IB)	19635 MT		
3.		Rate in Rupees per MT for erection, testing, commissioning, trial operation and handing over of ESP etc as per tender specifications (Approx. tonnage involved is 9869 MT as per Annexure- IC)	9869 MT		
4		Rate in Rupees per MT for erection, testing, commissioning, trial operation and handing over of Rotating Machines etc as per tender specifications (Approx. tonnage involved is 4177 MT as per Annexure- ID)	4177 MT		
5.		RATE in Rupees per MT for complete scope of work as per tender specification for insulation and sheeting, etc.for Boiler, ESP, piping as per specifications. (Approx. tonnage involved is 3146 MT as per Annexure- IE)	3146 MT		
6.		Rate in Rupees per MT for erection, testing, commissioning, trial operation and handing over of Piping systems(including valves, flanges etc) as per tender specifications Annexure -IF			
A		P91 Piping (Approx. 401 MT)	401 MT		
B		P 22 Piping (Approx. 486 MT)	486 MT		
C		Other Piping Material (Approx. 1466 MT)	1466 MT		

7.0		All STRUCTURAL STEEL WORK FOR MILL & BUNKER BAY			
	700	MS EMBEDMENTS			
7.1		Fabrication and erection, installation and alignment of mild steel foundation bolt assembly conforming to IS:2062 and grade 1 of IS:432 in concrete along with nuts, lock nuts (as per IS:1363, 1364 and IS:3138), washers, anchor plates, stiffner plates, protective tape, pipe sleeves, templates etc. including welding, cutting, grinding, threading, drilling etc. all complete.	100 MT		
	800	GROUTING			
7.2	804	Providing & grouting of pocket holes, pipe sleeves and under base plates of structural steel work/ machinery/ pipe supporting structures including roughening of surface, cleaning, ramming, curing etc. all complete with ConbextraGP-1 or equivalent. (Cleaning of the pockets by compressed air shall be in the scope of the contractor).	14 CUM		
7.3	805	Providing & grouting of pocket holes, pipe sleeves and under base plates of structural steel work/ machinery/ pipe supporting structures including roughening of surface, cleaning, ramming, curing, etc. all complete with Conbextra GP-2 or equivalent. (Cost of all material and cleaning of the pockets by compressed air shall be in the scope of the contractor).	1 CUM		
	2300	STRUCTURAL STEEL			
7.4	2301	Fabrication and erection of structural steel with mild steel rolled section / built up section / combination of both conforming to IS:2062, pipes conforming to IS:1161/ IS:1239, chequered plate conforming to IS: 3052, mild steel rounds, monorails, stays, safety chains, ladders, MS grating etc. in columns, beams, gantry girders, bunkers, silos, hoppers, roof trusses, portals, laced purlins, space frames, hangers, struts, monorails, galleries, stiffeners, wall beams, sheeting runners, brackets, stub columns, bracings, cleats, trestles, base plates, splice plates, chequered plate flooring, decking and seal plates, steel frame grid over false ceiling,	5433 MT		

		<p>walkway platforms, ladders, stairs, stringers, treads, landings, hand-rails etc including 2 coats of redoxide zinc-chromate primer (one coat at shop and one coat after erection), connection design & preparation of fabrication drgs, collection of steel from stores, fabrication, straightening, cutting, bending, rolling, grinding, machining, drilling, welding, electrodes and other consumables, alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable),</p>			
		<p>assembly, edge preparation, preheating (min preheat and interpass temperature of 200 C for welding over 20 mm and upto 40 mm & 660 C for welding over 40 mm and upto 63 mm & 1100 C for thickness over 63 mm & use of low hydrogen/ radiogenic electrodes), post heating, testing of welders, inspection of welds, visual inspection, non destructive and special testing, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete. Including appointment of a separate agency, approved by BHEL, for review and approval of fabrication drgs, in consultation with BHEL.</p>			
7.5	2302A	<p>Extra over ST NO. 2301 for blast cleaning of steel structures to near white metal surface (Sa 2 1/2) and applying 2 coats of epoxy polyamide resin based red oxide - zinc phosphate @ 30 micron dry film thickness (DFT)/coat at shop, as per Primer Paint P1 of Specification No: TCE-6071A-C-500-001 Vol. – II Section - C16, instead of primer coat of red oxide zincchromate, including touch-up painting etc all complete.</p>	5433 MT		
7.6	2303A	<p>Extra over ST NO. 2301 for providing & applying single coat of Intermediate Paint with a two pack air drying high build epoxy resin based paint with MIO @100 microns dry film thickness (DFT)/coat at shop, as per Intermediate Paint I1 of Specification No: TCE-</p>	5433 MT		

		6071A-C-500-001 Vol. - II Section - C16, including touch up painting etc. all complete.			
7.7	2305A	Extra over ST NO. 2301 for providing & applying 2 coats of a two pack air drying epoxy polyamide enamel suitably pigmented finish paint with 40 micron dry film thickness (DFT)/coat of approved make and shade to achieve an even shade over steel sections already having Primer and Intermediate Paint coats after erection, as per Finish Paint F1 of Specification No: TCE-6071A-C-500-001Vol. - II Section - C16, including protection and cleaning, scaffolding etc. all complete.	5433 MT		
7.8	2306	Laying and clamping of crane rails over the crane girder at all elevations as per IS 3443 including all fixtures, clamps, testings etc. all complete as per drawing and specification.	1 MT		
7.9	2307	Fabrication, erection and alignment of factory made electroforged galvanised grating units with mild steel (having minimum galvanisation of 610 g/sqm) conforming to IS:2062 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. including fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete.	8 MT		
7.10	2310	Fixing in position of permanent mild steel bolts (class 4.6 as per IS : 1367 and grade `C' as per IS: 1363) and nuts, washers etc. up to and inclusive of 39 mm diameter and upto 300mm long for structural steel work etc all complete.	11 MT		
7.11	2311	Fixing in position of high strength structural bolts (of property class 8.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	11 MT		
7.12	2312	Dismantling of steel structure , lowering of material and carriage of the dismantled material up to field fabrication shop / projects	10 MT		

		storage including temporary dismantling, cutting, re-welding, supporting, and restoring to correct position all temporarily dismantled members, re-alignment of all adjacent connected members to their correct positions (weight of such adjacent members and temporarily dismantled members not payable), scaffolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.			
7.13	2313	Addition to, alterations in and/or modification of "Erection Marks" including cutting of parts, gauging of welds, cutting, grinding, fabrication, welding, drilling holes, straightening, removal of bends, raising to the required level, painting, transportation, return of unutilised steel pieces to the project store, temporarily dismantling, cutting, re-welding, supporting and restoring to correct position of all the temporarily dismantled members, realignment of adjacent connected members (weight of such temporarily dismantled and adjacent members not payable) etc all complete for the following:			
	A	In erected position	5 MT		
	b	In fabrication yard	5 MT		
7.14	2314	Re-erection of dismantled fabricated structural steel members including carriage of modified "Erection Marks" from the field fabrication shop to erection site, lifting to required position, aligning in position, tack welding, final welding and touch up painting including temporary dismantling and re-erection of temporarily dismantled members, cutting, rewelding, supporting and restoring to the correct position of all temporarily dismantled members, re-alignment of adjacent connected members(weight of such temporarily dismantled members and adjacent members not payable), scaffolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	10 MT		
7.15	2316 A	Fabrication and erection of minimum 3.15 mm thick stainless steel liner of grade SS:304M ; Finish Grade 2B (Cold rolled, Annealed & Pickled and Skin passed) on M.S. plate for inside surfaces of hopper & mouth of hopper of bunkers including fixing with stainless steel studs, bolting (including countersunk), welding with	57 MT		

		electrode classification E308L for welding of stainless steel to stainless steel and E309 for stainless steel to mild steel etc. all complete.			
7.16	2318	Providing & fixing flexible open ended bellows strap of neoprene of minimum thickness 2 mm and minimum width 200 mm with aluminium stripped edges as sealing below top of bunker and bottom of tripper floor to avoid the coal dust nuisance all complete.	250 RM		
7.17	2320	Fabrication and fixing of GI pipe hand railing (900 mm high) of 32 mm/40 mm dia (Medium Grade) including transportation, loading/unloading, painting etc. all complete..	5 MT		
7.18	2321	Conducting radiography test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	10 RM		
7.19	2322	Conducting ultrasonic test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	10 RM		
7.20	2323	Conducting ultrasonic test on steel plates as per ASTM-A435 or equivalent wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	10 SQM		
7.21	2324	Conducting magnetic particle test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	5 RM		
7.22	2325	Conducting dye penetration test on welds wherever specified by the engineer including provision of necessary equipments, measuring devices, gauges etc. all complete (over and above the work already specified in the specifications.)	5 RM		
		TOTAL PRICE (IN RS.)			

UNPRICED RATE SCHEDULE FOR UNIT NO.2 OF 3x660 MW :STR. STEEL WORK OF MILL & BUNKER BAY (SUPPLY)

S.no.	ST. NO.		QTY.& UNIT	Unit Rate in Rupees (In figures and words)	Amount in Rupees (In figures and words)
1.		SUPPLY OF MATERAILS FOR MILL & BUNKER BAY STRUCTURES			
	700	MS EMBEDMENTS			
1.1	704	Supply, transportation, delivery at site of mild steel foundation bolt assembly conforming to IS:2062 and grade 1 of IS:432 along with nuts, lock nuts (as per IS:1363, 1364 and IS:3138), washers, anchor plates, stiffner plates, protective tape, pipe sleeves, templates etc.	100 MT		
	2300	STRUCTURAL STEEL			
1.2	2306	Supply, transportation, delivery at site of crane rails over the crane girder at all elevations as per IS 3443 including all fixtures, clamps, testings etc. all complete as per drawing and specification.	1 MT		
1.3	2307	Supply, transportation, delivery at site of factory made electroforged galvanised grating units with mild steel (having minimum galvanisation of 610 g/sqm) conforming to IS:2062 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. including fixing clamps, fittings, fixtures	8 MT		
1.4	2310	Supply, transportation, delivery at site of permanent mild steel bolts (class 4.6 as per IS : 1367 and grade `C' as per IS: 1363) and nuts, washers etc. up to and inclusive of 39 mm diameter and upto 300mm long for structural steel work etc all complete.	11 MT		
1.5	2311	Supply, transportation, delivery at site of high strength structural bolts (of property class 8.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm	11 MT		

		diameter and upto 300 mm long for structural steel work etc all complete.			
1.6	2320	Supply, transportation, delivery at site of GI pipe hand railing (900 mm high) of 32 mm/40 mm dia (Medium Grade) including transportation, loading/unloading, painting etc. all complete.	5 MT		
		TOTAL PRICE (IN RS.)			

NOTES:

1. The quantities indicated above are tentative and are liable to vary depending upon the site requirement. The contractor has to supplied / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work.
2. Separate Order shall be issued for supply of items .
3. Evaluation of bids shall be done on total price (Service + supply) against this Rate Schedule / BOQ.
4. In case of any mismatch in Rate and amount on Price discrepancy, the same will be dealt as per clause No. 1.4 of GCC.

(Seal and Signature of Tenderer)

TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878	
TECHINICAL CONDITIONS OF CONTRACT (TCC) PART – I & II	PAGE 58 OF 92

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878

FOR

ERECTION, TESTING, COMMISSIONING & HANDING OVER OF BOILER, ESP, ROTATING MACHINES BOILER & POWER CYCLE PIPING, INSULATION, AND STRUCTURAL WORK OF MILL & BUNKER BAY AND FINAL PAINTING INCLUDING SUPPLY OF PAINTS OF UNIT NO. 2 AT 3X660 MW LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR, U.P.

PART- II OF TCC

SI	<u>DESCRIPTION</u>	<u>Chapter No.</u>	<u>PAGES</u>
	Part-II: Technical Specifications		
1.	GENERAL	Chapter-I	44-45
2.	CIVIL WORKS, FOUNDATION, GROUTING	Chapter-II	46-47
3.	ERECTION	Chapter-III	48-54
4.	WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT	Chapter-IV	55-63
5.	APPLICATION OF INSULATION	Chapter-V	64-65
6.	PAINTING INCLUDING FINISH PAINTING	Chapter-VI	66
7.	TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING	Chapter-VII	67-70

PART-II

Chapter - 1: GENERAL

1.0 GENERAL

- 1.1** The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / lump sum price shall deem to be inclusive of all such contingencies.
- 1.2** Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices.
- 1.2.1** Provision as required of all types of labour, supervisors, engineers, watch and ward, tools & tackles, calibrated inspection, measuring and test equipments as specified and otherwise required for the work, consumables for erection, testing and commissioning including material handling.
- 1.2.2** Proper out-turn as per BHEL's plan and commitment
- 1.2.3** Completion of work as per BHEL Schedule.
- 1.2.4** Good quality and accurate workmanship for proper performances of equipment.
- 1.2.5** Repair and rectification
- 1.2.6** Preservation / Re-conservation of all components during storage / erection till handing over.
- 1.3** The contractor shall carry out the work in accordance with standard practices / codes / instructions / drawings / documents / specification/manuals supplied by BHEL from time to time.
- 1.4 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. 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.
- 1.5** ALL NECESSARY CERTIFICATES AND LICENSES, PERMITS & CLEARANCES REQUIRED 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.
- 1.6** The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during execution. 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 affected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.

TENDER NO. BHEL/ NR/SCT/ LALITPUR/ BOILER & STR. / UNIT- 2/878	
TECHINICAL CONDITIONS OF CONTRACT (TCC) PART – I & II	PAGE 61 OF 92

- 1.7 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
- 1.8 The terminal points as decided by BHEL shall be final and binding on the contractor
- 1.9 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.
- 1.10 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 boiler light up, steam blowing, SV Floating etc are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.
- 1.11 HOUSE KEEPING-The contractor is supposed to carryout house keeping of the work area on regular basis to keep the work place neat and tidy and available for the SAFE Working. The scrap, generated daily during the Execution activities, is to be dumped at designated area as decided by BHEL/ PPGCL on daily basis. The erection materials issued to the contractor and kept near the work area should also be staged properly at site. Compliance report on above shall be submitted by the contractor to BHEL on Daily basis. In case the contractor fails to do so, BHEL have rights to carryout the same from the other party at the Risk and cost of the contractor. The cost applicable with BHEL overheads shall also be recovered from the monthly running bills of contractor

Chapter - II: **CIVIL WORKS, FOUNDATION, GROUTING**

2.0 CIVIL WORKS, FOUNDATION, GROUTING

- 2.1** BHEL/LPGCL shall provide all equipment foundations. For the correctness of these foundations as per drawings, the contractor shall check the dimensions & locations of the foundations, pockets, anchor-bolt pitch. Further, top elevation of foundations shall be checked with respect to benchmark. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 50 mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.
- 2.2** While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with prussian blue to get the required contact with frames.
- 2.3** The contractor shall ensure perfect matching of packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer. If required the packer plates may have to aligned and fixed on the foundations using special high strength, non-shrinking and quick-setting grouts. The minimum thickness below the packer plate should be 20 mm. The material required for this has to be arranged for by the contractor at his cost.
- 2.4** **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 as applicable (ordinary Portland as well as Quick setting – free flow – non-shrink grout mix (e.g. shrink comp , conbextra etc)), form work, shuttering, and any other requirements is in the contractor's scope. Contractor shall obtain approval of BHEL for applicable cement (ordinary as well as quick setting – free flow – non-shrink grout mix) prior to procurement and use.
- Cleaning of foundation surfaces, pocket holes and anchor bolt pits and de-watering and making them free of oil, grease, sand another foreign materials by soda washing, water washing, compressed air and other approved methods, are within the scope of this specification / work.
- The contractor shall arrange for sand, stone chips, gravels, anti shrink compound, plasticizer, shuttering, grout mixing machine, labors etc at his cost. The contractor shall prepare the required test pieces/test cubes to ensure the strength of grout and get the same tested in laboratory at his cost. Test cube shall also be taken during grouting for testing in the laboratory and shall be tested at his cost. All necessary arrangement along with watering till complete curing has to be arranged by the vendor 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, decoupling 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.

- 2.5** The contractor shall check and verify the alignment of equipment. The Grouting of all the equipments will have to be carried out by the Contractor. The contractor has to arrange for all materials required for carrying out the grouting including supply of the Special Grout as indicated in the drawings and as approved by the Engineer.
- 2.6** The contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor
- 2.7** The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.
- 2.8** Besides grouting as above, any civil works required for safe and efficient operation of tools and tackles like grouting / excavation/ casting of foundation / anchor points for derricks, winches, guy ropes fastening, etc / foundations required for chemical cleaning pumps, tanks and any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement and required facilities will have to be arranged by contractor at his own cost.

Chapter - III: ERECTION

3.0 ERECTION

- 3.1 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,
- Scaffolding and rigging operations,
 - Machine / flame / electric cutting, grinding, welding, radiography and stress relieving
 - Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, as cleaning, checking, leveling, blue matching, aligning and assembly.
 - Machining, surface grinding, drilling, doweling, shaping
 - Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication.
- Insulation and painting
- 3.2 Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost.
- 3.3 No members of any ladder / structure / platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / customer without any additional cost.
- 3.4 The contractor shall erect scaffolding / temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion and removed from work site.
- 3.5 It shall be the responsibility of the contractor to provide ladders on columns for initial work till such time stairways are completed. For this, the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL. In case it is absolutely necessary then the contractor shall cut the temporary structure and rectify the column as directed by the engineer.
- 3.6 The contractor is strictly prohibited in using the Boiler / Auxiliary Components for any temporary supporting or scaffolding works etc. In case of such misuse a sum of determined by Engineer will be recovered from contractor's bills.
- 3.7 Boiler auxiliary columns are plate formed box section and the erection joint is welded type where as the columns are butt type with HSGF bolted flange and partition plates, boiler main column are having flange with splice plates and bolted connections. However, the contractor has to carry out work at site as per drawing.

- 3.8 Certain adjustment in length may be necessary while erecting pipelines / ducts / casings etc. The contractor should remove the extra lengths / add extra lengths to suit the final layout after preparing edges afresh by adopting specified heat treatment procedures.
- 3.9 Economizer, super-heaters, re-heater coils, burner panels may have to be hydraulically tested individually, if required, before erection as instructed by BHEL Engineer within finally accepted rates.
- 3.10 Suspensions for ducting will be supplied in running lengths, which shall be cut to size and adjusted as required. Ducts / expansion bellows are dispatched to site in loose walls plates / pieces and these are to be assembled and welded at site along with stiffeners etc., before erection within the finally accepted rates. All joints connecting duct expansion piece and dampers shall be seal welded on inside as well as on outside.
- 3.11 Assistance in mechanical work associated with the power cylinders, valves, valve actuators etc., coming under various groups shall be provided by contractor within the finally accepted rates.
- 3.12 Hanger rods are shown in the pressure parts arrangement drawings for boiler. Any cutting / welding of these hangers rods will be done by the contractor. The hangers for pressure parts will be tested for even distribution of load with the help of a torque wrench.
- 3.13 The headers are provided with hand holes. The contractor, shall as per requirement, carry out removal and re-fixing of hand hole plates within finally accepted rates.
- 3.14 Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before installation.
- 3.15 Skin casing sheet for covering the boiler roof panels, rear arch tube and other areas will be supplied by BHEL. Any cutting, addition and re-fabrication to suit the site conditions shall be carried out within the finally accepted rates.
- 3.16 The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition. Checking of alignment and re-coupling of the motor to the driven equipment as per instructions of BHEL engineer and to their satisfaction.
- 3.17 The contractor shall fabricate pipe, special bends etc., threading and welding as required for installing lube oil system and carry out the acid cleaning of the fabricated piping. The contractor shall also service the lube oil system, carrying out the hydraulic test of oil coolers etc.
- 3.18 Contractor shall carry out kerosene testing of all bearing housings of various rotating equipment like pumps, fans etc., as per BHEL engineer's instructions. Performance of hydro test of oil coolers of rotating machines and hydro test of SCAPH and other equipment as per BHEL engineer's instructions is included in the scope of work.
Forced lube oil system of motors or rotating equipment form parts of the work under

this specification.

- 3.19 Certain rotating machinery after initial runs and commissioning of the equipment have to be hot aligned as per the instructions of BHEL engineer. Cleaning air pre-heater, fans, boiler ducting etc., free of extraneous steel, scaffolding materials electrodes, all foreign materials etc., before trial run of rotating machinery, and at various stages of pre-commissioning activities as per BHEL engineer's instruction, is within the scope of work.
- 3.20 Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with kerosene or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.
- 3.21 After initial trial of rotating equipment, control and power cabling for motors and other equipment / instrumentation shall have to be disconnected for checking alignment and re-setting / re-alignment / hot alignment. Contractor shall have to arrange for disconnecting control and power cabling as per BHEL engineer's instructions and clearance and reconnect the control and power cabling after realignment. Quoted tonnage rate shall be inclusive of the above.
- 3.22 Packer plates supplied may have to be machined to the correct dimensions. It may also be necessary to blue match the same with each other/ with equipment / with foundations as per BHEL instructions.
- 3.23 Contractor shall arrange changing of preservative oil in the gearboxes, journal and other bearing assemblies of rotating equipment when in storage areas or after erection of equipment as the case may be as per the instructions of BHEL engineer. Necessary lubricants / oil will be supplied by BHEL and the same will be drawn by contractor from BHEL / customer's stores and transporting to site. No additional payment will be made for such works even though supply of lube oil might have been made under regular dispatch-able unit (DU) number against product group main assembly (PGMA) and appearing in the shipping list. Prior to the commissioning of the equipment, oil should be drained and collected in drums provided by BHEL and returned to BHEL / customer's stores.
- 3.24 The air-preheater rotor may be disturbed during the initial operation. This may change the original clearances. It requires rechecking and correction of seal clearances. Contractor shall carry out such checks and resetting of clearances as per the instructions of BHEL engineer. The resetting may have to be repeated till satisfactory results are obtained.
- Checking of air gaps and adjustment of stator / rotor for magnetic center of HT motors shall be carried out as part of erection.
- 3.25 The fans, mills and other rotating machines shall be checked for clearances and other vital tolerances. The IGV unit shall be serviced. Necessary assistance for balancing of

equipment during trial run, if required, shall be provided by the contractor free of cost.

- 3.26 Complete penetration of water wall (Panel to Panel) welding shall be achieved either by one side or both sides welding.
- 3.27 Whenever required the contractor shall arrange for pre-qualification of process task performers.
- 3.28 All attachments welding including those for insulation works coming on pressure parts / non-pressure parts which the contractor has erected shall be done by IBR / BHEL tested welders only.
- 3.29 Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection
- 3.30 Non specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.
- 3.31 Instrument tapping coming on the ESP to be welded/fitted by the contractor within the quoted price
- 3.32 ESP collecting electrode may require straightening and repair due to minor transportation damage before erection and spot heating in position to get correct alignment. Contractor shall carry out this within his quoted rate.
- 3.33 Layer of insulation mattress on roof top of ESP (inner roof) shall be applied before outer roof is placed.
- 3.34 Fixing of deflection plates in the inlet screen sheet of ESP as per flow model report drawing. However, adjustment / re-positioning of the plates may be required to be done by the contractor during gas distribution test within the quoted rate.
- 3.35 All the collecting and emitting electrode suspension frames are to be checked in dimension and pitches before erection. All the readings are to be logged. Straightening of frames distorted during transportation shall be carried out by the contractor within quoted price.
- 3.36 Erection of electrical equipment like high voltage rectifier transformer, heating elements, rapping gear motor, cabling, glanding of control panels, C&I, etc. are included in the scope of the contractor. Filtration of the Transformer oil also need to be done by the vendor within his quoted rate and for carrying out the same, vendor must deploy TWO 500 LPM oil filtration unit as per site requirement
- 3.37 Removal of all temporary supports, foreign materials, scraps, debris etc. from inside of the ESP and other erected components and thorough cleaning to achieve clearance / IR values between collecting and emitting system shall be done by the contractor.
- 3.38 For all plate welding , seal welding from inside and stitch welding from other side is to be followed as per drawing.
- 3.39 Roof top sheeting & side cladding over ESP pent house to be done by the vendor within his quoted price. Required corrugated sheets and fixing hardwares will be supplied by

BHEL under regular supply. Minor consumables like bitumen washers, putty etc. need to be arranged by the vendor within his quoted price.

- 3.40 Minor straightening of plates of inner / outer roof, funnels, GD screen sheets, hopper panels damaged during transportation shall be carried out by the vendor within his quoted rate.
- 3.41 The terminal points decided by BHEL should be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.
- 3.42 Instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal / speed switches of motors etc. which are received in assembled condition as integral part of equipments ,shall be dismantled, calibrated and re-erected by Contractor as per requirement.
- 3.43 Actuators / drives of dampers, gates, powered vanes etc. may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.
- 3.44 Suspensions of ESP are to be tightened by Calibrated torque wrench.
- 3.45 All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary by dismantling and refitting before erection. If, in the opinion of Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.
- 3.46 All the shafts of rotating equipment shall be properly aligned to those of the matching equipment within design tolerances All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.
- 3.47 All the motors and equipment shall be suitably doweled after alignment of shafts with taper / parallel machined dowels as per the direction of the Engineer. Dowel pins required are be machined by the contractor at his own cost. However the materials for dowel pins shall be issued by BHEL free of cost.
- 3.48 The HT motor bearings shall be blue matched at site and checked for bearing clearances. The contractor if required shall carry out scraping of bearing housing. No extra claim for blue matching up to 1mm initial gap will be entertained.
- 3.49 The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.
- 3.50 Certain instruments like pressure gauges, pressure transmitters, temperature gauges, flow switches and indicators, etc., are received in assembled condition as integral part

of equipment. Contractor shall be responsible for safe receipt, installation and custody of these instruments supplied mounted on skids / equipment. The calibration of skid / equipment mounted instruments shall be arranged by BHEL through other agency engaged for C&I. Contractor will be informed by BHEL engineer about the details of C&I agency. The contractor shall coordinate with the C&I agency for removal, calibration and re-installation of the instruments. Though C&I agency will remove and reinstall the instruments after calibration, the contractor for this package will maintain the list of all the instruments removed & reinstalled. Instruments prior to removal and after reinstallation shall be considered in custody of the contractor for this package. All instruments such as pressure gauges / temperature gauges, switches etc. forming part of product group (PG) are under the erection scope of this contract and shall be installed and commissioned by the contractor of this package at no extra cost to BHEL. However the calibration of these instruments shall be done by C&I agency as above

- 3.51 All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR valve, before they are energized. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.
- 3.52 The contractor shall completely erect and test all the piping systems, covered in the specification including sampling lines up to and including sample coolers, hangers & supports, valves and accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning and painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged, screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings.
- 3.53 Pipes sent in standard length shall 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 upto 65-mm nominal bore will have to be fabricated at site. Only cold cutting methods are to be employed for cutting of pipes and tubes irrespective of the size and material . Gas Cutting , if any , will be allowed only in CS LP piping
- 3.54 The contractor shall ensure lowering of pipes in position with adequate precautions as to avoid any damage to either material or men. Only the anchoring points earmarked for the purpose of lowering the pipes are to be used.
- 3.55 It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.
- 3.56 Wherever piping erected by the contractor is connected to equipment / piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor who is erecting the piping under this specifications.

- 3.57 Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes within the scope of the work.
- 3.58 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.
- 3.59 The contractor shall be responsible for correct orientation of all valves so that seats, stems and hand wheels will be in desired location. It is the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.
- 3.60 Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.
- 3.61 The adjustment of all hangers & supports erected in both cold & hot conditions for maintaining the proper slopes towards the drain pots and application of cold pull in the piping wherever required is also included in the scope of the contractor.
- 3.62 No temporary supports should be welded on the pressure parts and piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases the contractor if required, shall carry out heat treatment.
- 3.63 Spring suspensions / constant load hangers have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrests / locks etc., have to be carried out as and when required.
- 3.64 Contractor shall install piping in such a way that no excessive or destructive expansion forces exists in either the cold condition or under conditions of maximum temperature and pressure. All bends, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.
- 3.65 The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Other means shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the pipe and building structure.
- 3.66 Layout of small-bore piping in boiler, oil systems etc. as required 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 pipelines even after completion of erection or from aesthetic point of view. Contractor at no extra cost should carry this out. As built drawing is to be submitted by the contractor after erection completion.

- 3.67 All the valves, including motorized valves, flap valves, dampers, actuators, etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates.
- 3.68 Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermo-wells, valves, battery of first root valves, condensing vessels, flow nozzles and control valves to be provided on, auxiliaries and pipe lines are covered within the scope of this specification. This will be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer. The welding of all the above items will be contractor's responsibility even if the:
- a. Product groups, under which these items are released, are not covered in the scope of this tender.
 - b. Items are supplied by any agency other than BHEL.
- 3.69 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The methods used the tools and the equipment deployed shall be subject to the approval of Engineer. The competent technicians shall carry out the bolting work.
- 3.70 The contractor shall prepare as built piping drawing & submit to BHEL Engineer for approval & verification of material used.
- 3.71 Erection of power cylinders, motorised valves, valve actuators etc. coming under various groups is covered under the scope of this specification. However C&I calibration / commissioning for pneumatic valves & power cylinders shall be arranged by BHEL through C&I agency at no cost to the contractor for this package. The contractor will however be responsible for drawing the materials from the stores and handing over to the agency that is to commission these. Any damage / loss in their custody will be the contractors account. The alignment and any mechanical adjustments including link adjustment, opening & reconnection of links, replacement of valve / actuator or any mechanical part, air filter & regulator cleaning etc. required during calibration and operation, the same shall be carried by the contractor for this package. However, if re-calibration is required till handing over of the equipments the same shall be organised by the contractor for this package as detailed above with in the final accepted rates. The contractor will however be responsible for drawing the materials from the stores and handing over to the agency that is to commission these. Any damage / loss in their custody will be the contractors account.
- 3.72 The erection of all pneumatic power cylinders for the burner-tilt mechanism and SADC is covered within the scope of this specification. BHEL will get these power cylinders for the burner-tilt mechanism and SADC calibrated & commissioned. The contractor for this scope of work shall assist and co-ordinate for the same with the agency engaged by BHEL to calibrate such pneumatic actuators.

- 3.73 The Erection, testing and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.
- 3.74 Welding of P91, T23, T91, T92 materials in Boiler is to be carried out as mentioned in clause nos. 4.39 of this tender.
- 3.75 Scope of Work for Chemical Cleaning for the Boiler system has been covered under clause no. 4.40 of this tender.

ERECTION OF ESP

- 3.76 The details of equipments to be erected under this work are generally as per the weight schedule given in Annexure I-B. 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 erection documents, which will be furnished in the course of erection.
- 3.77 Wherever called for, pre-assembly of supporting structures, casing walls have to be done on ground.
- 3.78 All site welds for casing, inlet & outlet duct connections have to be kerosene tested for establishing leak proof-ness.
- 3.79 Loading of collecting electrodes either from top or bottom, to be decided suiting site conditions, shall be done with due care as per BHEL's instructions.
- 3.80 Straightness of all collecting electrodes has to be checked on ground prior to loading in to the field. Straightening of the collecting electrodes, if necessary, shall be done by the contractor within the quoted price as per instruction of BHEL engineer.
- 3.81 Bundle of collecting electrodes should be handled only with special fixture supplied for the purpose as regular DU.
- 3.82 BHEL will provide huck-bolting m/c with necessary auxiliaries free of charges. However, the contractor shall arrange electrical connections, operation etc. Vendor shall also arrange for minor maintenance of the Huck-bolting machine, including changing of some frequent worn-out spares. Required Jaws, spares and Hydraulic oil of the Machine only will be supplied by BHEL free of any charges.
- 3.83 Clearances as prescribed between collecting electrodes and with casing wall / emitting electrodes have to be maintained. Spot heating of collecting electrodes wherever called for, shall be done as part of work.
- 3.84 Erection, alignment/ fixing in final position, of high voltage rectifiers of ESP is in the scope of work.

- 3.85 Installation of interlocks is in the scope of work.
- 3.86 Complete erection, alignment, testing, pre-commissioning and commissioning etc. for drive motors of collecting electrodes and emitting electrode rapping mechanism is in the scope of work.
- 3.87 Contractor has to fabricate and erect canopies for motors, actuators etc. as per instruction of BHEL if the same is not indicated in the drawings. However, the contractor will be paid for this work on accepted extra work rate for ESP. BHEL will supply the material required for platforms/canopies in random lengths & sizes.
- 3.88 It shall be the responsibility of the contractor to provide temporary ladders on columns for initial works, if required, till permanent ladder/ stairways are completed. Material and fabrication of temporary ladders is in the scope of contractor. All temporary ladders are to be of bolting type and no welding on to permanent members will be permitted.
- 3.89 Following installation jobs are also to be carried out by the contractor within his quoted price.
- A) Matching flanges along with all bolts, nuts, gaskets, and all the expansion joints etc. as required to be connected to the ESPs to the duct wall.
 - B) Flue gas inlet distribution system complete with perforated plates, turning vanes, deflector plates, flow splitters, guide vanes and all necessary gas flow control devices in the inlet and outlet cones and duct warranted by the results of flow model test, complete duct stiffening devices, interior bracings, slide plates, access doors, brackets, supporting structures, hangers, sampling connections, etc.
 - C) Rapping system complete with structural supporting frame, drives, and automatic rapping control, etc.
 - D) Ash hoppers complete with panel type heaters, level monitors and indicators, outlet flanges, jointing material, poke holes, access doors and walkways beneath the hoppers.
 - E) Opacity monitors complete with all accessories at the outlet of each gas stream of each ESP but upstream of the ID Fan i.e four (4) nos. per set of ESP serving one steam generator.
 - F) Safety devices, safety barriers, etc.
 - G) Monorails with electrically operated hoists on the roof for handling transformer rectifiers. Water washing system for the precipitator and hoppers along with all piping, valves and nozzles etc.
- 3.90 BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL, will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting/chiseling / grinding/machining and de-burr the same. However, machining of the packers wherever necessary shall be arranged by the contractor.
- 3.91 All lifting tackles including wire-ropes slings, shackles, used by the contractor, shall be got approved by BHEL Engineer. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damages to

equipment and personnel. Calibration/fitness testing certificates from recognized agency are to be submitted to BHEL site office for equipment/instrument/appliances to be used, as per requirement of BHEL/ISO system. Expenditure on such works forms a part of the scope of work.

- 3.92 The contractor shall erect scaffoldings/Temporary platforms supports etc required during erection before the permanent supports are erected. These should be of adequate capacity and shall never be overloaded. These should be replaced when not found suitable during erection work. All structure materials required for the above shall be arranged by the contractor at his own cost. No such material shall be supplied by BHEL in any case. Welding of temporary supports, cleats etc on the columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. Further, any cutting or alteration of member of the structure or platform or other equipment shall not be done without specific prior approval of BHEL Engineer.
- 3.93 Proper account of the packing wood and steel supports forming part of packing will be kept by the contractor and returned to BHEL / Customer designated stores /areas from time to time.
- 3.94 Temporary blanking of ESP inlet / outlet for commissioning, if required, has to be done by contractor free of cost.
- 3.95 Non-specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.
- 3.96 Instrument tapping coming on the ESP to be welded/fitted by the contractor within the quoted price.
- 3.97 Fixing of deflection plates in the inlet screen sheet of ESP as per flow model report, drawing, to be provided by BHEL. However, adjustment / re-positioning of the plates may be required to be done by the contractor during gas distribution test within the quoted rate.
- 3.98 All the collecting and emitting frames are to be checked in dimension and pitches before erection. All the readings are to be logged.
- 3.99 Erection, testing & commissioning, trial operation and handing over of electrical equipment like high voltage rectifier transformer sets along with cable trays & cabling JB's (filled with non-inflammable silicon fluid having flash point higher than 300 deg centigrade), control panels complete with bus-sections, electronic controllers, grounding switches, controls, leveling wheels etc., drive motors and actuators, couplings and coupling guards for all rotating auxiliaries etc., heating elements, rapping gear motor are included in the scope of the contractor. Erection of Insulators along with heating and ventilation system for insulator compartments, complete with fans, heaters and necessary controls are also in the scope of the contractor.

Chapter - IV: WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

4.0 WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

- 4.1** The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.
- 4.2** Welding of pressure parts, equipment, piping, high tensile structural steel shall be done by certified high pressure welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for high-pressure works.
- 4.3** All welders including tack welders, structural and high pressure welder shall be tested as per ASME section IX / IBR and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid IBR 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 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.
- 4.4** Engineer may stop any welder from the work if his performance is unsatisfactory for any reason or if there is a high percentage of rejection in the joints welded by him. The welder having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.
- 4.5** 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 engineer.
- 4.6** 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. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.
- 4.7** All expenses for testing of contractor's welders including destructive and nondestructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of raw material required for making test pieces will be supplied by BHEL free of cost.
- 4.8** The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.
- 4.9** **Only BHEL/ CUSTOMER approved electrodes and filler wire are to be arranged and used by the contractor, within the finally quoted price. BHEL/ PPGCL reserve the right to test from the certified lab of approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor.** 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.

- 4.10** All butt / fillet welds shall be subject to dye penetration test as per the instructions of the engineer at no additional cost.
- 4.11** 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 other wise of the welds shall be final.
- 4.12** 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.
- 4.13** All welds shall be painted with anticorrosive red oxide paint once radiography and stress relieving works are over. Necessary consumables and scaffolding etc including paints shall be provided by contractor at his own cost.
- 4.14** Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part 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.
- 4.15** Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor 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.

- 4.16** The contractor shall also be equipped for carrying out other NDT like LPI / MPI/UT / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. For UT machine shall be used of recordable type.

- 4.17** The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.
- 4.18** 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).
- 4.19** Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0.
- 4.20** 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.
- 4.21** 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.
- 4.22** Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification.
- 4.23** 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.
- 4.24** For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.
- 4.25** 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.
- 4.26** 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.
- 4.27** The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories.
- 4.28** Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed 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
- 4.29** All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer.
- 4.30** Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC / DRP certificate to be provided before taking up the work.

- 4.31** Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.
- 4.32** Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.
- 4.33** However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.
- 4.34** If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.
- 4.35** Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of progress. The contractor shall make all necessary arrangements including labour, supervisors/ Engineer required for the work as per directions of BHEL.
- 4.36** 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.
- 4.37** The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.
- 4.38** **Check shots as per the requirement of BHEL/ LPGCL will be taken at your cost.**

4.39 Erection Welding Practice for Materials P91

Special care is essential for carrying out the installation of this system and strict quality norms and welding procedure will have to be followed at site. The Contractor is advised to get familiarized with the work procedure. In addition to the general clauses for Welding, RG and NDT given under clause 4.0 of this tender, the following clauses will be applicable. This welding is to carried out strictly under the supervision of BHEL Engineer and all repairs etc will be carried out as per the laid out procedure.

Some of the salient details in regards to T91/P91 material are being indicated in the clauses mentioned below however the erection, welding and NDT process are to be done as per the procedure /specifications to be furnished by BHEL / as per the instructions by site engineer.

-Prior to erection, supplied pipes shall be inspected thoroughly and if any defect like crack, lamination, and deposit noticed, the same shall be confirmed by Liquid Penetrant Inspection (LPI). If confirmed, it shall be referred to BHEL.

-Cutting of T-91/P91 material shall be done by bandsaw / hacksaw /machining / grinding only.

-Edge preparation shall be done only by machining/ by chamfering machine. In extreme cases, edge can be prepared by grinding with prior approval of BHEL.

-During edge preparation care should be taken to avoid excessive pressure to prevent heating up of the pipe edges.

-All edge preparation done at site shall be checked by Liquid Penetration Test. **Weld built-up on edge preparation is prohibited.**

-The **pipe fit-up** for welds shall be carried out properly, as per drawing specifications, by **using temporary pipe clamps** arranged by the contractor to ensure proper alignment and root gap. Use of site manufactured clamps for fit-up is acceptable. **Neither tack welds nor bridge piece shall be used to secure alignment.** Partial root weld of minimum 20mm length by GTAW may be allowed with the prior permission of BHEL engineers.

-Suitable reference punch marks shall be made on both the pipes (at about 200 mm from the EP) at least on four axis to facilitate U. T on weld joint.

-Provide Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations.

-No pre-heating is required for **fixing Thermocouples** (of Ni-Cr / Ni – Al of 0.5 mm gauge size) **with resistance spot welding.**

-Argon gas to be used both for purging as well as shielding shall be of 99.99 purity levels conforming to IS 5760-1998. Dry Argon gas with requisite quality shall be used for purging the root side of weld. The gas flow rate to be maintained during purging is 10 to 25 liters / minute and for shielding during GTAW is 8 to 14 liters / minute

-The purging dam (blank) shall be fixed on either side of the weld bevel prior to Pre-heating. The dam shall be fixed inside the pipe and it shall be located away from the heating zone. Purging is to be done for root welding (GTAW) followed by two filler passes of SMAW in case of butt welds.

-Wherever possible, solid purging gas chambers are to be used which can be removed after welding. If not possible, only water-soluble paper is to be used.

-Wherever possible, solid purging gas chambers are to be used which can be removed after welding. If not possible, only water-soluble paper is to be used.

-Purging is not required in case of nozzle and attachment welds, when they are not full penetration joints.

-Start purging from inside of pipe when root temperature reaches 220 deg. Centigrade. Provide continuous and adequate Argon gas to ensure complete purging in the root area. The minimum preflushing time for purging before start of welding shall be 5 minutes, irrespective of the pipe size.

-Preheating: Prior to start of pre-heating ensure that surfaces are clean and free from grease, oil and dirt. Pre-heating temperature shall be maintained at 220 deg. Centigrade by using induction heating. The temperature shall be ensured by using a calibrated

autographic recorder and two calibrated thermocouples fixed at 0 and 180 degree positions on both pipes 50 mm away from the edge. The thermocouples shall be welded with spot welding machine. The pre-heating arrangement shall be inspected and approved by BHEL engineer. Alternate arrangements shall be made during power failure. Two numbers additional square thermocouple are to be fixed for emergency use. Gas burners shall be employed to maintain the temperature until the power resumes.

-Welding: Root welding shall be done using GTAW process (as per WPS) five minutes after the start of Argon purging. Filler wires shall be clean and free from rust or oil. Argon purging shall be continued minimum two filler passes of SMAW.

-Post Weld Heat Treatment: Heating shall be done by Induction heating only as per the procedure / specifications provided by the BHEL engineers. Generally the PWHT temperatures for T-91/P-91 with T- 91/P-91 material shall be 760 + 10 Deg. C and the soaking time shall be 2.5 minutes per mm of weld thickness, subject to a minimum of two hours. The rate of Heating / Cooling is to be strictly maintained.

-The PWHT temperature shall not deviate from the values specified in the chart range since any deviations to the specified holding temperature range, will adversely affect the mechanical properties of the weldment and may lead to rejection of the weldment. The weld joints should be kept dry. Under no circumstances any water / liquid is allowed to come in contact with weld as well as preheated portion of the pipe

-The recording of time and temperature shall be continuously monitored with a calibrated recorder right from pre-heating. This shall be ensured at every one hour by site-authorized personnel.

-The width of the thermal insulation beyond the heating band shall be at least two times the heating bandwidth on either side of the weldment.

-All equipment like recorder, thermocouple, compensating cable, oven, thermostat etc. should have valid calibration carried at BHEL approved labs. The calibrated reports should be reviewed and accepted by calibration In-charge at site prior to use.

-Same procedures of welding and heat treatments shall be followed for the weld joints repairs. The NDE shall be conducted for the entire weld joint.

-All the NDE i.e. LPI, MPI, UT and hardness shall be performed on the weld joints as per the standards/ specifications / direction of BHEL. The maximum allowable hardness at weld and parent metal shall be 300 HV10. Joints having hardness above 300 HV shall be re-heat treated and hardness shall be checked again.

-Welders qualified as per ASME Section – IX and IBR on T-91/P-91 material shall only be engaged for the welding of T91/P91 materials. Welders shall have to undergo all the training for above. **The welders shall have to be tested and qualified by BHEL site.** Contractor shall arrange for the same and entire expenditure towards this shall be borne by the Contractor.

-Contractor shall deploy exclusive Engineer and Supervisor who will be responsible for the completion of all activities from weld fit-up to final clearance of weld joints after satisfactory NDE and acceptance by BHEL / Customer / IBR.

-No interruption is allowed during preheating, welding and PWHT. Hence all equipment for the purpose of power supply, welding, heating etc. hence all alternative arrangements, (Diesel generator for providing power to the welding and heating equipment, reserve thermocouple connections, gas burner arrangement for maintaining temperature etc.) shall be arranged by the contractor within the normal scope of this contract. All the preventions / procedures to be ensured to avoid abruptness to on going heating / cooling process. Before start of erection, welding and heat treatment process for P 91 materials all the associated persons shall acquire complete knowledge on the subject from BHEL site engineers to avoid metallurgical failures.

-The Induction heating equipment shall be drawn from BHEL stores, transported, installed and commissioned wherever required at site. For routine and breakdown maintenance, Contractor shall have to deploy sufficient Manpower, Tools & Plants within his quoted rate. The contractor shall provide electrical cables and switches required. All the equipment shall be protected by providing covers or sheds at site by the contractor within the quoted rate. Any loss / damage of equipment / tools by the contractor shall be recovered from the contractor.

All the consumables to carry out the work for the T91/P91 materials required for welding and heating process i.e. K type thermocouples fiberglass insulated with heavy duty T/C connector, heating elements (annealing cables), compensating cables, insulating materials (glass fiber cloth temperature rating 1260 o C, glass fiber cord dia 3 mm (twisted) temp rating 1260 o C, ceramic fiber blanket RT grade density 96 kg / cub M- temp rating 1260 o C, ceramic fiber rope fiber glass 12 mm dia.- temp rating 1260 o C), gas burner arrangement, all gases, purging dams, blanks, welding electrodes, filler wires, etc. except those consumables supplied by BHEL units if any shall be **in the scope of contractor**.

Consumables like Welding electrodes and filler wires for T91/P91 materials supplied by BHEL mfg units shall be issued free of cost for erection.

For carrying out the installation , the following items are being provided by BHEL free of cost:

- a) Induction Heating Machine with Outgoing Cables
- b) Suitable Power BackUp (DG Set)
- c) Spot welding Machine for Fixing of Thermocouples
- d) Calibrated Thermocouples
- e) Calibrated temperature Recorder
- f) Contact Type calibrated temperature Gauge.
- g) Electrodes and fillers for the P91/T91 welding

The contractor shall be issued the above in line with the Special Conditions of Contract Clause .

The following will have to be provided by the Contractor:

- a) Qualified operator for Induction Machine and DG Set
- b) All cables for connecting Induction Machine and DG Set to Main Supply along with Changeover System.
- c) Welder Qualified as per ASME IX and IBR for T91/P91 Materials. Site Welder Qualification tests will be conducted also.
- d) Exclusive Trained Welding Engineer for Supervising T91/P91 Welding and Heat

Treatment

- e) Qualified NDE Engineer (Level -II) and welding Supervisor (Level-I)
- f) UT Testing and Hardness testing
- g) Required GTAW and SMAW machines
- h) Welding Machine for Demagnetizing along with cable and Residual Field Indicator
- i) Providing Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations .
- j) Providing of Argon purging for the welding operation (including supply of consumables eg Water Soluble Paper / Aluminium Dam arrangement.)
- k) Providing of Heating by Gas Burner as Standby Arrangement.
- l) Providing of Baking ovens and portable ovens
- m) Providing Band Saw/ hacksaw/ Grinder for Cutting with tools.
- n) Providing machining for Edge preparation
- o) Providing of LPI and MPI Facility as specified in the Welding process, including supply of all consumables.
- p) Providing and applying insulation band as specified in the welding procedure.

The above comprise of the major requirements for the process. The Contractor has to provide all services and consumables for completion of the work.

DG set for backup power supply, provided by BHEL is to be operated by the contractor bi-weekly / as specified by the supplier to ensure its healthiness during excegencies of power failure for heating processes of T91/P91 materials on account of power failures. Cables and switches, required fuels and other consumables & its operations and maintenance shall be in the scope of contractor within the awarded value.

The contractor shall arrange welding Machine for Demagnetizing material along with cable and Residual Field Indicator

4.40 Chemical Cleaning

Chemical Cleaning will carried by a separate agency appointed by BHEL. While the work of installation of tanks , Pumps , Piping and operation of the system is in the scope of that agency, the Contractor has to extend all assistance (including providing of welding power point) and complete interface requirements for the completion of the work.

Chapter - V: APPLICATION OF INSULATION

5.0 APPLICATION OF INSULATION

- 5.1** All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length. Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work.
- 5.2** The mineral wool mattresses (bonded / un-bonded) / LRB mattresses are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.
- 5.3** The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec.
- 5.4** The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing.
- 5.5** The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important.
- 5.6** It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions. Closed / semi closed sheds or any other arrangements required for this will be by him at his cost. If any damage occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.
- 5.7** Aluminum sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets, crowning the sheets if necessary will be carried out by him. Two coats of anti-corrosive black bituminous paint are to be applied on inner surfaces of the cladding. Bitumen sealing compound on the joints if necessary is included in the scope of this work. **Contractor may note that he will also supply anti-corrosive black bituminous paint & bituminous sealing compound required for above works at his cost.**
- 5.8** Aluminum sheet metal cladding over insulation will consist of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractor's responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also be covered within the scope of this contract.
- 5.9** A logbook shall be maintained by the contractor to obtain clearance for application of insulation. If the contractor does the work on his own accord without prior permission the area may have to be redone at his cost.
- 5.10** Contractor is liable for the exact accounting of the material issued to him and he shall make any unaccountable losses good. Wastage allowance for the material issued are as below:

Chapter - VI: PAINTING INCLUDING FINISH PAINTING

6.0 PAINTING INCLUDING FINISH PAINTING

- 6.1** All exposed metal parts of the equipment, structure, auxiliaries, piping, and other items (covered within the scope of this contract) after installations are to be painted. Mostly the equipment / components installed are with one coat each of primer paint and synthetic enamel / heat resistant paint. However, due to aging, the same may have got deteriorated for peeled off. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL. The same will be inspected and approved by the engineer before painting.
- 6.2** After applying the primer paints all structure / equipment / items, shall be finish painted with two coats of alloyed resin machinery enamel paints as specified by BHEL engineer. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish is achieved. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer.
- 6.3** Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job site shall be permitted only at times and locations approved by Engineer.
- 6.4** Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for finish painting. Paint is to be BHEL approved make only and painting should be as per colour scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work. No paint whose shelf life has expired should be used for painting.
- 6.5** The contractor may be required to fill up dents / marks by applying putty before final painting of equipment. All materials and arrangements have to be made within quoted lump sum price/rates.
- 6.6** The contractor shall provide legends with direction of flow on equipment and piping in size specified by Engineer. Letter writing shall be done in Hindi / English or in both languages.
- 6.7** The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work.
- 6.8** The contractor shall ensure availability of
- Ford Cup-4 to measure consistency of paint,
 - Automatic magnetic gauge to measure the dry film thickness and
 - SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.
- 6.9** All paints should be stored in well-ventilated store. The painters and other personnel deployed should use proper protective equipment to avoid inhalation of fumes.
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Chapter - VII: TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING

7.0 TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING

- 7.1 The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would include hydraulic test of boiler, land flow test, clean air flow 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.
- 7.2 All the chemicals required for carrying out these activities will be supplied by BHEL free of cost.
- 7.3 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications.
- 7.4 Specialized test equipment, if any, shall be provided by BHEL / its client free of hire charges. However contractor has to take proper care of the equipment issued to him.
- 7.5 Commissioning of ESP shall involve required tests such as air leak test, gas distribution test, motor no load test, rapping mechanism trial runs, interlock tests, charging of transformer fields, commissioning of all electrical equipment / panels, heaters and their proper tuning etc. The contractor shall provide all consumables, labour, scaffoldings and items required for satisfactory testing
- 7.6 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 FD fan through the steam generator up to stack.
- 7.7 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.
- 7.8 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, applicable steam blowing or for any other tests. The scope also covers the off site disposal of effluents of the tests under the scope of this contract as per instruction of BHEL Engineer.
- 7.9 All items / material required for conducting hydraulic test, Chemical Cleaning (alkali boil out, acid cleaning of Boiler – as applicable) , steam blowing of erected Piping etc., will be supplied by BHEL. 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 divided as under:

Boiler: Erection etc. of all temporary piping along with insulation and supports for steam blowing of the installed piping and effluent disposal are to be carried out as part of Boiler work. The Contractor will be responsible for their operation and any servicing required till completion of commissioning activities.

For Chemical Cleaning : Installation and operation of all equipments, temporary piping, tanks and electrical switchgear along with their accessories shall be carried out by another agency of BHEL. While agency appointed by BHEL will be responsible for the Equipments of Chemical Cleaning Operation, the Boiler Contractor shall make ready main boiler equipments required for chemical cleaning process and they will closely associate themselves with the BHEL's agency during the process for carrying out the other operations required on the Boiler for completing the Process. The Boiler Contractor will carry out the connection / installation and normalizing of terminal connection of the Main Equipment .

Erection etc. of blowers and blanks and putty required for conducting air tightness test shall be carried out as part of Boiler work (Putty to be procured by the contractor without any extra cost to BHEL).

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 on the contractor. Dismantling of the temporary equipment and piping will be done by the contractor. Contractor will also responsible to return these materials to the stores.

- 7.10 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, 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. During this period though the BHEL's customer's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, men, consumables, T&P and IMTE's till such time the commissioned units are taken over by the BHEL's customer.
- 7.11 It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement. Required chemicals , DM Water and other required items etc. required for this purpose will be supplied by BHEL .
- 7.12 It shall be the responsibility of the contractor to provide various category 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&P's, IMTE's 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.
- 7.13 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.

- 7.14 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during precommissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.
- 7.15 During commissioning, opening / closing of valves, changing of gaskets, realignment 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.
- 7.16 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.
- 7.17 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.
- 7.18 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 realignment 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.
- 7.19 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.
- 7.20 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 unserviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats. Cleaning and servicing of all the filters / strainers, toppings of oils coming in the system shall be done by the contractor within the accepted price.
- 7.21 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. The contractor shall carry out any other test as desired by BHEL Engineer/ Manufacturer on erected equipment covered under scope of this contract during testing and commissioning to demonstrate the physical completion of any part or parts of the work performed by the contractor
- 7.22 The scope of pre-commissioning, commissioning and post commissioning activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning (Except for Feed, CEP outlet, Drip lines), steam blowing or for any other tests as the case may be and will carry out above activities

under this scope of work as per instructions of BHEL. The scope also covers the off site disposal of effluents

- 7.23 Commissioning of the ESP will involve trial run of all the equipment erected. The boiler has to be lighted up for refractory drying, alkali boil out, acid 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. During this period though the BHEL's customer's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, men, consumables, T&P and IMTEs till such time the commissioned units are taken over by the BHEL's customer for the entire scope awarded to contractor.
- 7.24 All arrangement required for steam blowing including removal, reinstallation and welding of CRH NRV and installation of steam blowing arrangements including steam blow off piping is included in the scope of work.
- 7.25 It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement.
- 7.26 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 additional cost. The contractor shall carryout the required test on the pipelines such as Hydraulic Test (as per IBR requirement/ instruction of BHEL), of various piping systems, Ultrasonic Test for weld defects and finding thickness, Dye penetrant test, Magnetic particles test for Weld defects and materials defects etc. All facilities (manpower, materials, equipment, consumables etc.) including proper approaches wherever required shall be provided by the contractor for satisfactory conduction of above tests. Special equipment such as magnetic particle tester, Meteloscope for analysis of weld material of T/P-91 pipings, ultrasonic test kit and engineers required for these tests shall be arranged by the contractor along with Qualified technician within finally accepted rates. All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests/ activities may not have been listed in these specifications.
- 7.27 All the above tests should be repeated till all the erected piping satisfy the requirement/obligation of BHEL and Boiler Inspectorate, if required at various stages. All the repair for site welded joints arising out of the failures during testing shall be done by the contractor as part of the work within finally accepted rates.
- 7.28 Contractor shall layout all necessary temporary piping, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, oil flushing, steam blow off or for any other tests as the case may be and will be carried out above activities under the scope of work as per instructions of BHEL. After the test is over, all the temporary piping, etc., will be removed and returned to BHEL store. All these form part of the scope of work. No separate payment shall be made towards erection and dismantling of these temporary works. Chemical cleaning of feed lines, CEP outlet lines, and Drip lines will be carried out by a separate agency. Cleaning of all other lines is in scope of this contract. However the contractor executing this work has to render all assistance to the separate agency including removal of valves , putting loops and restoring back after cleaning .

- 7.29 All items required for conducting hydraulic test, oil flushing, steam blowing etc., will be supplied by BHEL. However, servicing, erection and dismantling and returning of the same to BHEL Store is the responsibility of the contractor
- 7.30 The valves will have to be checked, cleaned or overhauled in full or in part before erection, alkali flushing, steam blowing and during commissioning as may be necessary.
- 7.31 Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable deaeration/ventilation draining points with valves as per BHEL Engineer's instruction, for performing hydro test of piping and other equipments, is within the scope of this specification. Gaskets, valves, fasteners, blank flanges, blanks or steel for blank flanges will be provided free of cost by BHEL. Contractor shall cut out steel blanks from steel provided. After completion of Hydraulic Test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/ scars of cutting weld filled ~, dground as per BHEL Engineer's instruction at no extra cost. NDT & SR if required may have to be carried out.
- 7.32 Hydro test of piping has to be repeated several times in consonance with technical/statutory requirements during stage of erection pre commissioning/ commissioning. Hydro test will have to be done to the satisfaction of Boiler Inspector/ Customer/ BHEL Engineer after attending repairs, Hydro test shall be repeated before Boiler Inspector/customer/ BHEL engineer to their satisfaction.
- 7.33 Soon after conducting: the hydro test of the piping, the same shall be preserved against corrosion either by wet preservation or by dry preservation as per the requirement of BHEL Engineer. Contractor shall carry out all the incidental jobs like filling up of water, dozing of chemicals and pressuring the system to the required pressure and keep a constant watch on the preservation work as per the instruction of BHEL Engineer. The preservation shall be resorted to whenever the boiler is not under trial operation till the completion of commissioning activities.
- 7.34 While conducting hydraulic test of steam lines, water lines, either individually or grouping a few lines or in portions, blanks/ spools may have to be put up at terminal points, strainers, valves, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored. Also interconnecting piping between boiler and turbine, the hydraulic test may have to be done section wise and sometimes piping of other agencies may have to be combined. Contractor shall carry out all such incidental work .to satisfactorily conduct the Hyd. Test. Wherever work is involved in the terminal points, contractor shall carryout the same as per instruction of BHEL Engineer. The decision of BHEL Engineer is final and the same is binding on the contractor.
- 7.35 The contractor shall carry out any other tests as desired by BHEL engineers on erected equipment covered in the scope of this contract during testing and commissioning to demonstrate the satisfactory completion of any part or whole of work performed by the contractor. During Hydraulic Test, the pipes being tested shall be isolated from the equipments to which they are connected.
In certain places blanking has to be resorted prior to Hydraulic test and spool pieces have to be erected in place of control valves, orifices and other fittings and these spool pieces have to be subsequently replaced with the regular valves/ fittings by the contractor at no extra cost.

- 7.36 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 for the complete requirement of supervision, consumables, labour, T&P and IMTEs required till such time the commissioned units are taken over by the BHEL's customer.
- 7.37 It is possible that due to any reason the final supporting may not be completed before conducting Hydraulic Test. The contractor may have to strengthen or install any additional supports as per instruction of BHEL. This work is a part of the work and no additional payment shall be made on this account
- 7.38 Commissioning of the ESP will involve:
1. Gas tightness test of ESP and ducts by kerosene test / soap solution test with own consumables, labour, scaffolding and other items, if any.
 2. Gas distribution test / flow test with own consumables, labour, scaffolding and other items , if any.
 3. Trial run of collecting rapping, emitting rapping and GD rapping mechanism as per instruction of BHEL engineer.
 4. Checking IR value of the ESP fields.
 5. Air load test of ESP along with all fields.
 6. Charging of ESP with flue gas during light-up / synchronization / coal firing.
- 7.39 All the rapping motors, if necessary, shall be stripped open , thoroughly serviced with proper care and re-assembled before erection. During servicing if any deficiency innoticed, the same should be brought to the notice of BHEL without any delay.
- 7.40 All the shafts of the equipment shall have to be properly aligned to that of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid over-heating of bearings or other conditions, which may tend to shorten the life of the equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and lubricated as per recommendations of BHEL engineer.
- 7.41 During commissioning changing of gaskets , tightening of bolts, realigning of rotating and other equipment, attending to leakage and minor adjustments of erected equipment may arise. The quoted rate of contractor shall be inclusive of all such works.
- 7.42 Lubricating oil units of the rotating machines are to be cleaned thoroughly before pouring of final lubricating oil. Topping up of lubricants during running of the set till handing over to be done by the vendor. Required lubricants both for first filling and topping up are to be supplied by BHEL free of cost. The empty containers of the lubricating oils should be returned to BHEL stores/place indicated by BHEL from time to time.
- 7.43 The instruction of the motor manufacturer regarding storage of the motors and re conservation must be strictly followed without any deviation.

- 7.44 All the shaft equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibrations so as to avoid over heating of bearings or other conditions, which may tend to shorten the life of the equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and lubricated as per the recommendations of BHEL Engineer before starting.
- 7.45 All the bearings, gear boxes etc of the equipment and electrical motors to be erected are provided with protective grease only. Contractor shall arrange for cleaning the bearings, gears etc. with kerosene or some agent , as and when required by BHEL Engineer, by dismantling some of the parts of the equipment during erection and shall arrange for re - greasing / lubricating them with recommended lubricants ,which will be supplied by BHEL free of cost.
- 7.46 Lubricating oil units of the rotating machines are to be cleaned thoroughly before pouring of final lubricating oil.