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

NO: BHE/PW/PUR/NBNT-BLR(Vertical Pkg) U-2,4/847

Collection of materials from BHEL/client's stores/storage yard; transportation to site; erection, testing & assistance for commissioning, trial operation and handing over of boiler and its auxiliaries, air preheaters, ducts and dampers, fuel piping, boiler integral piping & associated valves, electrostatic precipitator, fans, power cycle piping, coal mills and coal feeders, chemical dozing system, insulation, final painting etc of 4x250 MW Nabinagar Thermal Power Project Unit no 2 & 4

AT

BHARATIYA RAIL BIJLEE COMPANY LIMITED

NABINAGAR THERMAL POWER PROJECT (4x250 MW)

NABINAGAR, DISTT: AURANGABAD,

BIHAR

VOLUME – I

CONSISTING OF:

- **Notice Inviting Tender,**
- **Volume-IA : Technical Conditions of Contract-,**
- **Volume-IB : Special conditions of Contract,**
- **Volume-IC : General conditions of Contract**
- **Volume-ID : Forms & Procedures**

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

CONTENTS			
Volume No	Description	No. of pages	Hosted in website bhel.com as files titled
NIL	Tender Specification Issue Details	1	(Part of **Vol-IA-847**)
NIL	Notice Inviting Tender	19	(Part of **Vol-IA-847**)
I-A	Technical Conditions of Contract	91	Vol-IA-847
I-B	Special Conditions of Contract	47	Vol-IBCD-847
I-C	General Conditions of Contract	29	(Part of Vol-IBCD-847)
I-D	Forms & Procedures	54	(Part of Vol-IBCD-847)
II	Price Bid Specification	3	Vol-II-847

Tender Specification Issue Details

Tender Specification No: BHE/PW/PUR/NBNT-BLR(Vertical Pkg) U-2,4/847

Collection of materials from BHEL/client's stores/storage yard; transportation to site; erection, testing & assistance for commissioning, trial operation and handing over of boiler and its auxiliaries, air preheaters, ducts and dampers, fuel piping, boiler integral piping & associated valves, electrostatic precipitator, fans, power cycle piping, coal mills and coal feeders, chemical dozing system, insulation, final painting etc of **Unit no 2 & 4** 4x250 MW Nabinagar Thermal Power Project

AT

BHARATIYA RAIL BIJLEE COMPANY LIMITED

NABINAGAR THERMAL POWER PROJECT (4x250 MW)

NABINAGAR, DISTT: AURANGABAD,

BIHAR

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION Refer Notice Inviting Tender

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

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date:

847

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES

OR

PURCHASE TENDERS FROM THIS OFFICE ALSO

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**	**BHE/PW/PUR/NBNT-BLR (Vertical Pkg)U-2, 4/847**	
ii	**Broad Scope of job**	Collection of materials from BHEL/client's stores/storage yard; transportation to site; erection, testing & assistance for commissioning, trial operation and handing over of boiler and its auxiliaries, air preheaters, ducts and dampers, fuel piping, boiler integral piping & associated valves, electrostatic precipitator, fans, power cycle piping, coal mills and coal feeders, chemical dozing system, insulation, final painting etc of **Unit no 2 & 4** at **4x250 MW Nabinagar Thermal Power Project** A**T** BHARATIYA RAIL BIJLEE COMPANY LIMITED NABINAGAR THERMAL POWER PROJECT (4x250 MW) NABINAGAR, DISTT: AURANGABAD, BIHAR	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	Applicable
b	Volume-IB	Special Conditions of Contract (SCC)	Applicable

c	Volume-IC	General Conditions of Contract (GCC)	Applicable
d	Volume-ID	Forms and Procedures	Applicable
e	Volume-II	Price Schedule (Absolute value).	Applicable
iv	**Issue of Tender Documents**	**1. Sale from BHEL PS Regional office at :Nagpur** **Start : 30/03/2011** **Closes: 19/04/2011, Time :16.00 Hrs** **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	Applicable
v	**DUE DATE & TIME OF OFFER SUBMISSION**	**Date : 20/04/ 2010 , Time :15.00Hrs** **Place : BHEL PS Regional office at :Nagpur** Tenders being submitted through representative shall be handed over to any of the following BHEL officials after making entry/registration at the reception: SM Borkar/ Sr Manager (Purchase) RK Ranade/ Manager (Purchase) Pratish Gee Varghese/Engineer(Purchase)	Applicable
vi	**OPENING OF TENDER**	**1 hours after the latest due date and time of Offer submission** Notes: (1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time. (2) Bidder may depute representative to witness the opening of tender	Applicable
vii	**EMD AMOUNT**	Rs 2,00,000/- (Rupees Two Lakhs Only)	Applicable
viii	**COST OF TENDER**	Rs 2000/-.	Applicable
ix	**LAST DATE FOR SEEKING CLARIFICATION**	Date: Atleast 5 days before the due date of offer submission Along with soft version also, addressing to undersigned & to others as per contact address given below	Applicable
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	Date : Not 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)	*Applicable(Bidders to submit duly filled & signed Annexure III of NIT)*
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 Nagpur 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 Nagpur, 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 Nagpur. 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)

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	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under Sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under SL no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work,	

	Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **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	o Envelopes I o Envelopes II o 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 No Deviation with respect to tender clauses and no additional clauses/ suggestions/ in Techno-commercial bid/ Price bid shall normally 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 as per the following:

I. **Assigning Weightages (A) for Similar Jobs Under-Execution**: Weightages shall be worked out and assigned based on the average number of Similar Works under execution including works yet to be commenced by the agency, in the following manner:

i). Number of Similar Jobs
- a) No. of jobs in BHEL, PSER : Say 'J'
- b) No. of jobs in BHEL, PSSR : Say 'K'
- c) No. of jobs in BHEL, PSWR : Say 'L'
- d) No. of jobs in BHEL, PSNR : Say 'M'
- e) No. of jobs with other customers* : Say 'N' (*: Other than BHEL PSER, PSSR, PSWR & PSNR)
- f) Average No. of Jobs is 'P'= (J+K+L+M+N) divided by 5

ii) Weightage "A" assigned to bidders based on Average Number of jobs "P";
- a) If 'P' = 0-1, "A" will be equal to '3'
- b) If 'P' = 2-3, "A" will be equal to '2'
- c) If 'P' = 4-5, "A" will be equal to '1'
- d) If 'P' is Above 5, "A" will be equal to '0'

II. **Weightage "B" for Quarterly Performance Reports of Vendors**: This shall be based on the averages of the net weighted score obtained by the bidder for the jobs under execution (excluding works not commenced) for the quarter previous to the last quarter reckoned from the date of latest due date of submission, in all four Regions i.e. BHEL PSER, PSSR, PSWR & PSNR, in the following manner.

i). Ratings by Power Sector Region:
- a) PS ER's Rating 'R**e**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- b) PS WR's Rating 'R**w**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- c) PS SR's Rating 'R**s**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- d) PS NR's Rating 'Rnr' = $(X_1 + X_2 + .. + X_n)$ divided by n
- e) **Over all Power Sector Region Rating 'R_{BHEL}'=** (R**e**r+ R**w**r+ R**s**r+ R**n**r) divided by 4

(where "X_1, X_2, X_3,…X_n" is the net weighted score obtained by the bidder as per the "Evaluation of Contractor Performance (Quarterly)" against the various contracts 'n' under execution in the respective Region).

ii) Weightage "B" assigned to bidders based on Overall Power Sector Rating **(R_{BHEL}):**
- a) If **R_{BHEL}** is 80% and above, "B" will be equal to '6'
- b) If **R_{BHEL}** is > 70% < 80%, "B" will be equal to '5'
- c) If **R_{BHEL}** is > 60% < 70%, "B" will be equal to '4'
- d) If **R_{BHEL}** is = < 60%, "B" will be equal to '0'

III. Evaluation of Bidders capacity to execute the job under tender: shall be based on the sum of scores obtained in 'A' and 'B', as below:
- **a) 6 or above : Considered 'Qualified' for the job under tender**
- **b) Less than 6: Considered 'NOT Qualified' for the job under tender**

IV. **Explanatory note**:
- a) Similar work means Boiler or Turbine or Civil or Electrical or CI, etc irrespective of rating of Plant
- b) Quarter shall be as per the quarter defined in the "Evaluation of Contractor performance (Quarterly)". For contracts where annexed Quarterly Evaluation performance was not part of the contract, 'Quarterly Performance Reports' previous to the last quarter reckoned from the

date of latest due date of submission, given by the respective project site against the contract will be the basis for evaluation.

c) Vendors who are not executing any jobs presently in the Region and first timers to the Region, may be considered subject to satisfying all other tender conditions

d) 'Under execution' shall mean works in progress upto Boiler Steam Blowing (for Boiler and Auxiliaries) or Synchronization (for all other jobs including Civil) shall be considered.

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 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. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of above.

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 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 (xi) of 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 pre-qualification evaluation/ techno-commercial bids, approval/ acceptance of customer (as applicable), etc. and date of opening of price bids shall be intimated to only such bidders.

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) or specified otherwise in SCC of tender.

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 In case Consortium Bidding is allowed as per Pre Qualifying Requirement, then Prime Bidder and Consortium Partner shall enter into Consortium Agreement. Validity period of Consortium Agreement shall be 6 months after which the same can be re validated.

'Stand alone' bidder cannot become a '**prime bidder' or a 'consortium bidder' in a consortium 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. .

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

AGM (Purchase)

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03 Other Tender documents as per this NIT.
04 Integrity Pact

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	Collection of materials from BHEL/client's stores/storage yard; transportation to site; erection, testing & assistance for commissioning, trial operation and handing over of boiler and its auxiliaries, air preheaters, ducts and dampers, fuel piping, boiler integral piping & associated valves, electrostatic precipitator, fans, power cycle piping, coal mills and coal feeders, chemical dozing system, insulation, final painting etc of **Unit no 2 & 4** at **4x250 MW Nabinagar Thermal Power Project** A**T** BHARATIYA RAIL BIJLEE COMPANY LIMITED NABINAGAR THERMAL POWER PROJECT (4x250 MW) NABINAGAR, DISTT: AURANGABAD, BIHAR
TENDER NO	**BHE/PW/PUR/NBNT-BLR (Vertical Pkg)U-2, 4/847**

SL NO	**PRE QUALIFICATION CRITERIA**	**Bidders claim in respect of fulfilling the PQR Criteria**	
		Name and Description of qualifying criteria	Page no of supporting document
A	Submission of Integrity Pact duly signed	**APPLICABLE**	
B	Assessment of Capacity of Bidder to execute the work as per Sl no 9 of NIT	**APPLICABLE**	
C	**Technical** **c)** Bidder must have, achieved any one of the following: **c.1)** Executed in the last seven years as on 28/02/2011, One job of Erection, Testing and Commissioning (Upto Boiler Light Up of the Unit or beyond) of Coal Fired Boiler of rating 100 MW or higher. **c.2)** Bidder should have been Techno Commercially Qualified for E&C works of atleast one unit of Coal Fired Boiler of rating 250 MW or higher by any of the Power Sector Region of BHEL, in the last 3(Three) years as on 28/02/2011 **c.3)** Bidder should be empanelled with BHEL-PSWR for M-VP-2 (Boiler Vertical Package rating 100 MW to 300 MW) OR M-VP-3 (Boiler Vertical Package of Rating above 300 MW) category.		
D 1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (Audited) of **Rs 1800 Lakhs** or more over last three Financial Years (FY) i.e. 2007-08, 2008-2009, 2009-2010		
D 2	NETWORTH Net worth of the Bidder based on the latest Audited Accounts as furnished for 'D1' above should be positive		

D 3	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'D1 above based on latest Audited Accounts.		
E	Approval of Customer 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 criteria (if applicable)	**NOT APPLICABLE**	
	Explanatory Notes for QR 'A' 1. The word 'executed' means the bidder should have achieved the criteria specified in the QR even if the total contract has not been completed or closed 2. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as given above along with all annexures 3. The word 'executing' means ----------		

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

Note:

- **Agency who have been awarded the job of E & C of Boiler Vertical Package of Unit 1 & 3 of subject project by BHEL PSWR shall not be considered for this tender**

CHECK LIST

ANNEXURE - 2

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	Details of Contact person for this Tender	Name : Mr./Ms Designation: Telephone No: Mobile No: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
		APPLICABILITY	BIDDER REPLY
5	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
6	Whether Audited profit and Loss Account for the last three years submitted	Applicable	YES/NO
7	Whether Copy of PAN Card submitted	Applicable	YES/NO
8	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	YES/NO
9	Integrity Pact	Applicable	YES/NO
10	Declaration by Authorised Signatory	Applicable	YES/NO
11	Whether No Deviation Certificate submitted	Applicable	YES/NO
12	Whether Declaration confirming knowledge about Site Conditions submitted	Applicable	YES/NO
13	Whether Declaration for relation in BHEL submitted	Applicable	YES/NO
14	Whether Non Disclosure Certificate submitted	Applicable	YES/NO
15	Whether Bank Account Details for E-Payment submitted	Applicable	YES/NO
16	Capacity Evaluation of Bidder for current Tender Refer Sl 9 of NIT	Applicable	YES/NO
17	Tie Ups/Consortium Agreement are submitted as per format	Not Applicable	Not Applicable
18	Whether Power of Attorney for Submission of Tender/Signing Contract Agreement submitted	Applicable	YES/NO
19	Whether Analysis of Unit rates submitted	Applicable	YES/NO

NOTE: STRIKE OFF 'YES' OR 'NO', AS APPLICABLE

DATE:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Annexure III
IMPORTANT INFORMATION

1. PRICE VARIATION COMPENSATION

Refer Clause 2.17 of Volume I C 'General Conditions of Contract' (Price Variation Compensation): For the purpose of calculating PVC, following 'Commodities shall be reckoned for the respective categories:

Category	Commodity to be Used for PVC Calculation
Electrode	**Welding Rod**(Individual Commodity)
High Speed Diesel	**High Speed Diesel** (Individual Commodity)
Cement	**Grey cement** (Individual Commodity)
Structural & Reinforcement Steel	**a1. Iron & semis** (Group Item)
Materials (Other than Cement & Steel)	**All Commodities**(Group Item)

2. INTEREST BEARING RECOVERABLE ADVANCE

Refer Clause 2.13 of Volume I C 'General Conditions of Contract' (Interest Bearing Recoverable Advance): Following additional points shall be noted:

- **Bank Guarantee towards 'Interest Bearing Advance' shall be atleast 110% of the advance so as to enable recovery of not only principle amount but also the interest portion, if so required.**
- **'Interest Bearing Recoverable Advance' shall not be paid in less than two installments. Contractor shall establish the utilization of advance drawn before the release of next installment.**

All Other Terms and Conditions shall remain unaltered

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 of 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 itself 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)/ Contractors(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 Bidders (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 execution 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 separate "Guidelines on for Suspension 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 to 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 his 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 his sub-contractors 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 Sub-contractor, 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)/ Contractors(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)/ Sib-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 meeting 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 reminder 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)

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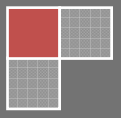
TECHNICAL CONDITIONS OF CONTRACT (TCC)

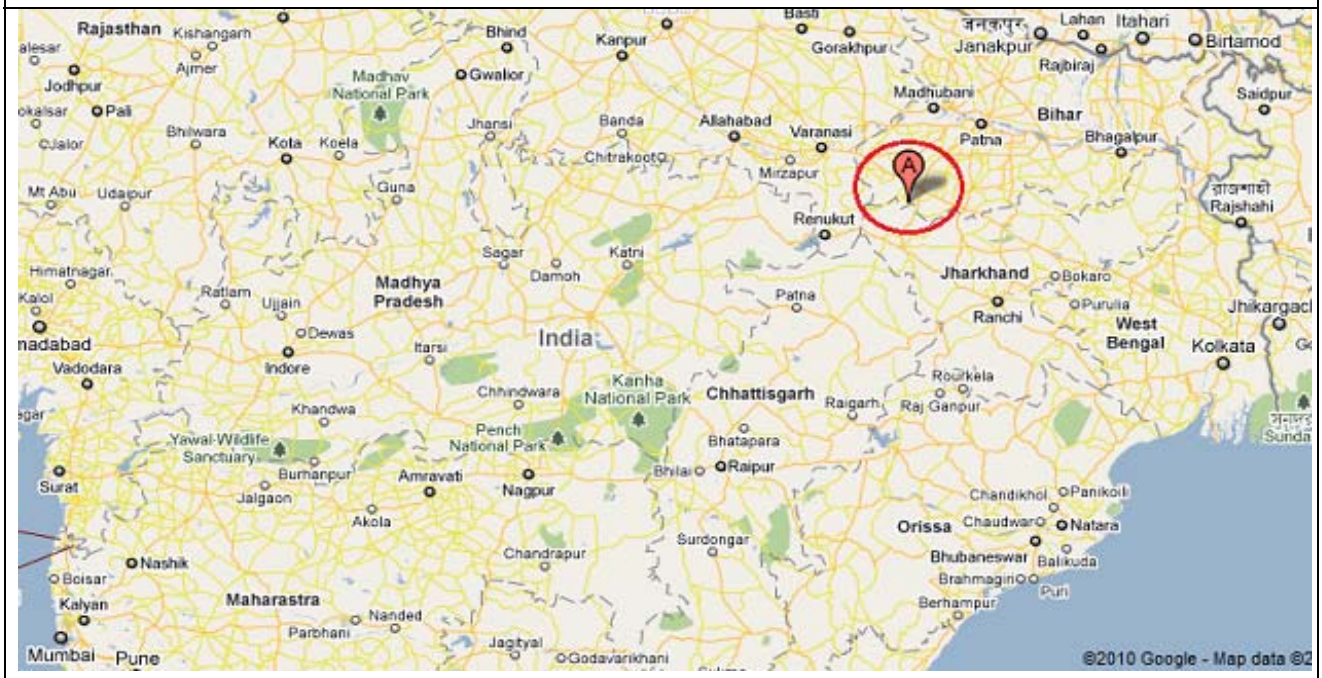
BHARAT HEAVY ELECTRICALS LIMITED

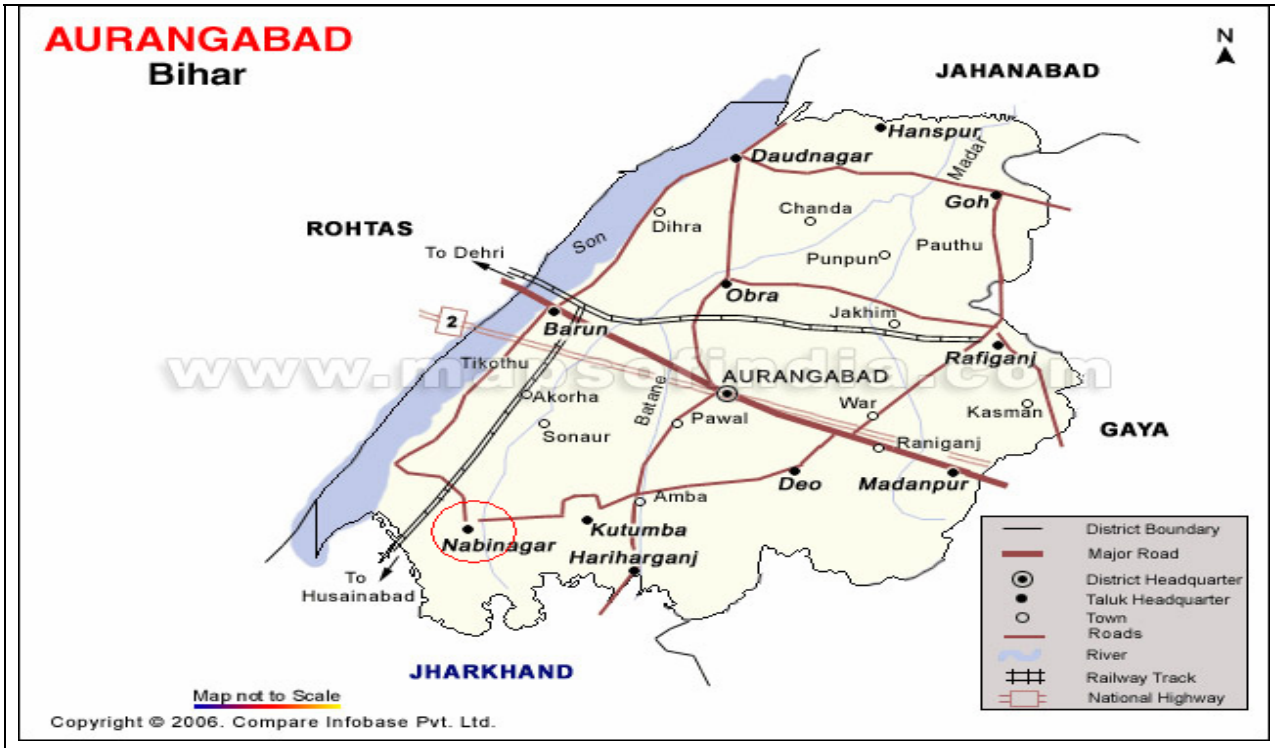


CONTENTS

1. Project Information

1. OWNER	:	BHARATIYA RAIL BIJLEE COMPANY LIMITED
2. PROJECT TITLE	:	NABINAGAR THERMAL POWER PROJECT
3. PROJECT RATING	:	4 x 250 MW
4. LOCATION	:	NABINAGAR, DISTT – AURANGABAD, BIHAR
5. NEAREST RAILWAY STN.	:	DEHRI–ON–SONE (30 KM FROM PROJECT LOCATION)
6. NEAREST PORT	:	PARADIP
7. NEAREST AIRPORT	:	GAYA (100 KM FROM PROJECT LOCATION)
8. ROAD APPROACH	:	NATIONAL HIGHWAY – 2 (25 KM FROM PROJECT SITE)
9. LATTITUDE	:	24°42'30" N
10. LONGITUDE	:	84°05'36" E





CLIMATE

- Nabinagar has an average elevation of 138 meters (452 feet). The climate of this region is Tropical.
- During the summer day's temperature rises up to 40 to 50 degree Celsius, whereas during the winter temperature falls almost near 5 degrees Celsius.
- Average rainfall in this region is near 50 to 75 centimeter.

THE BIDDER IS ADVISED TO VISIT AND EXAMINE THE SITE OF WORKS AND ITS SURROUNDINGS AND OBTAIN FOR HIMSELF ON HIS OWN RESPONSIBILITY ALL INFORMATION THAT MAY BE NECESSARY FOR PREPARING THE BID AND ENTERING INTO THE CONTRACT. ALL COSTS FOR AND ASSOCIATED WITH SITE VISITS SHALL BE BORNE BY THE BIDDER.

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

1) Collection of materials/components/equipments from BHEL/ customer stores/ storage yard, handling/ loading and transportation to erection site/ site of work, handling/unloading and feeding at erection site/ site of work.

2) Transportation / dragging of boiler drum from unloading bay to inside boiler structures and positioning on ground, erection using Strand Jack Method including final alignment.

3) Pre-assembly, if any, pre-erection checks as applicable

4) Erection, testing & commissioning, of:

i) Boiler supporting structures, stairways and galleries.
ii) Boiler pressure parts
iii) Boiler trim & integral piping and mountings.
iv) Fuel oil piping
v) Non-pressure parts, ducts, dampers
vi) Rotating machines (e.g. Mills, fans, air pre-heaters, coal feeders and motors etc. with their drives & lube oil system etc.)
vii) Electrostatic precipitator and Stairways & Galleries
viii) One no. Elevator serving each ESP controls room.
ix) Pulverized fuel piping
x) External structures (e.g. Duct supporting, pipe rack structures, elevator structure etc.)
xi) Handling arrangements for rotating machines
xii) Mill reject handling system
xiii) Power Cycle Piping (Main Steam, HRH, CRH etc) including P-91 material piping and valves including HP/LP Bypass
xiv) Low pressure (air & water) pipeline
xv) Hp by-pass system (valves, control fluid system with pipeline).
xvi) HP & LP chemical dozing systems
xvii) Roof & side cladding of boiler & elevator.
xviii) Passenger elevator and goods elevator.
xix) Entire piping supplied by PC Chennai (SG piping, TG piping, LP piping)

xx) Deaerator along with their structure.

5) Non-Destructive Examination & post weld heat treatment

6) Application of thermal lining & insulation on all the above equipments and TG equipments & auxiliaries as applicable

7) Pre-commissioning checks/tests, Trial Runs/Testing and Commissioning

8) Final painting of erected items

9) Trial operation and associated tests

10) Making unit ready for PG test and assistance for conductance.

11) Completion of all facility/systems

12) Handing over of the unit

Sl.No	Description **PART I**	Scope / to be taken care by		Remarks
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)	Yes		
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			

Sl.No	Description **PART I**	Scope / to be taken care by		Remarks
		BHEL	**Bidder**	
3.2.1	**Electricity For construction purposes 3 Phase** of Voltage 415 V **(to be specified whether chargeable or free)**	Yes		FREE
a	Single point source	Yes		at one point near the erection site
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores,etc of the bidder (to be specified whether chargeable or free)**	Yes		Free
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		Yes	
a	Single point source	Yes		
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	**WATER SUPPLY**			
3.3.1	**For construction purposes:**		**Yes**	
a	Making the water available at single point		Yes	.

Sl.No	Description **PART I**	Scope / to be taken care by		Remarks
		BHEL	**Bidder**	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			
a	Making the water available at single point		**Yes**	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**Water supply for Living Purpose**		**Yes**	
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			

Sl.No	Description **PART I**	Scope / to be taken care by		Remarks
		BHEL	**Bidder**	
a	Telephone, fax, internet, intranet, e-mail etc		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		**YES**	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
B	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl.No	Description **PART II** **3.9.0 ERECTION FACILITIES**	Scope / to be taken care by		Remarks
		BHEL	**Bidder**	
3.9.1	Engineering works for construction:			
a	Providing the erection/constructions drawings for all the equipments covered under this scope	Yes		**For Details Pl refer Chapter-II-**
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes	Yes		
d	Shipping lists etc for reference and planning the activities	Yes		
e	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL

Sl.No	Description **PART II** **3.9.0 ERECTION FACILITIES**	Scope / to be taken care by		Remarks
		BHEL	**Bidder**	
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on Sl No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on Sl No. g		Yes	In consultation with BHEL
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	
L	Arranging the materials required for preassembly		Yes	

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT
1	Crawler Crane	150 MT capable of lifting 9T at elevation of 64m.	1
2	Crawler Crane	75 MT	1
3	Mobile Crane	18 MT	2
4	Pick & Carry Crane	8 MT	2
5	Trailer with Prime Mover	30 MT	2
6	Trailer with Prime Mover	20 MT	2
7	Truck	9 MT	1
8	Passenger cum Goods Elevator	1.5 MT	1
9	Air Compressor (Electric/Diesel operated)	140 CFM, 7 Kg/cm^2	1
10	Strand and Jack Arrangement for Boiler Drum Erection	Adequate to erect Boiler Drum	1 set
11	TIG Welding Set	As required	As required
12	Plasma Cutting M/c	For cutting up to 10 mm thick Stainless Steel	As required
13	3-Phase Distribution Board with Complete Set Up for Drawl of Construction Power	As required	As required
14	Power Cable for drawl of Construction Power	As required	As required
15	Pre Heating / Stress Relieving Set (Heating Control Panel, Cables, Heating Elements, Thermometers etc.)	As required	As required
16	Radiography Arrangement with Radioactive Isotope	Iridium-192	2 sets

	Source		
17	Radiography Arrangement with Radioactive Isotope Source	Cobalt-60	1 set
18	Theodolite of Required Accuracy	To ensure verticality of structural columns	1
19	Self Drilling Cum Tapping Machine for Screws of Boiler Roof Sheets	As required	2
20	Chemical circulation pumps to handle acid solution, opr temp 80 deg cel, with drive motors, starter panel, cable, switch fuse unit etc. Suggested rating: 150 m^3, 120 – 150m WC, with 90 kw, 3000 rpm, 150 amps motor. However, Contractor shall deploy the required capacity pump with accessories after obtaining written approval of BHEL.	As required	4 sets
21	Arrangement for UT of higher thickness joints with recording facility	Type USN 50 or equivalent/ upgraded type	1 Set
22	Electro-hydraulic pipe bending machine	Up to 2” Nb and 12 mm thick pipes	3 Sets
23	Welding Generator (Electrical)	300 Ampere rating	As required
24	Welding Generator (Diesel Operated)	300 Ampere rating	4 sets

25	Radiography Film Viewer	As required	As required
26	Hydraulic Pipe Bending Machine (manual)	For bending of pipes up to 50 mm Nb size	4 sets
27	Baking Oven with thermostat and temperature gauge for welding electrodes	As required	3
28	Holding Oven with thermostat and temperature gauge for welding electrodes	As required	2
29	Portable Over for welding electrodes	As required	25
30	Electric Winch	3 Ton Capacity	5
31	Electric Winch	1 Ton Capacity	5
32	HYDRAULIC TEST/ PRESSURIZING PUMP	600 & 450 Kg per cm^2	01 No EACH
33	Furnace Maintenance Platform (Sky Climber)	0.5 MT	1
34	Hand Winch	0.5 Ton Capacity	3
35	Scaffolding Materials	Suitable for working at various heights	Adequate qty for parallel working in multiple work fronts.
36	Profile making M/c	for aluminium sheet cladding work	As required

37	Nibbling M/c	work	As required
38	Shearing M/c		As required
39	Water Pump to lift water to top of boiler	for refractory and other required activities	1 Set
40	Portable Grinding M/c	As required	As required
41	Portable Drilling M/c	As required	As required
42	Chain Pulley Blocks	Up to 15 MT Capacity	As required
43	Fire retardant Tarpaulins	As required	As required
44	Fire Extinguisher	As required	As required

B: MEASURING AND MONITORING DEVISES (MMD):

AS PER REQUIREMENT TO BE FINALIZED AT SITE, SHALL MEET THE REQUIREMENTS AS PER FIELD QUALITY PLAN AND OTHER ERECTION, TESTING RELATED ACTIVITIES.

NOTE:
THE LIST INDICATED ABOVE IS ONLY SUGGESTIVE AND NOT EXHAUSTIVE. CONTRACTOR SHALL DEPLOY ALL OTHER T&P AND MMD AS WELL THAT ARE NECESSARY FOR PROPER EXECUTION OF WORK UNDER ERECTION & COMMISSIONING OF WORK UNDER THE SCOPE.

SN	Description	Capacity	Quantity	Remarks
(i)	Heavy Lift High Reach (HLHR) Crane	See Note-1	1	See Notes 1 to 5 (For ceiling girder erection)
(ii)	Huck Bolting Machine Complete Set	As required	1	For ESP work. See Note 6 here
(iii)	Induction Heating Equipment	As required	4	For welding of P-91 pipeline. See Note 6 here
(iv)	Air-leak test equipments with all auxiliaries	As required	01 SET	For leakage test of ESP

Notes	
1	HLHR crane will be used generally for erection of boiler ceiling structures and equipment/components above boiler ceiling structure or components/equipment beyond the reach of other cranes or non-availability of other BHEL cranes or for activities that essentially require services of this crane as decided by BHEL. This crane will accordingly be deployed at appropriate time as decided by BHEL for suitable duration and for intended purpose.
2	HLHR cranes are to be used on sharing basis with other agencies working in the project. Contractor shall furnish his requisition for the crane to BHEL sufficiently in advance to ensure proper planning and timely deployment. Decision of BHEL for allocation of HLHR to different agencies in the project will be based on the overall interest of the project and priority of the activity. Such decision will be binding on the contractor.
3	Contractor shall make necessary arrangements like laying of sleepers; minor earth filling & consolidation; assembly & dismantling of heavy lift attachment, boom, jib etc for movement and operation of the crane.

4	BHEL will obtain all the aforelisted cranes on hiring basis including operating and maintenance crew. **Bidder shall arrange for fuel (HSD) in his own cost**. Since the cranes are to be used on sharing basis with other agencies of BHEL, the fuel/cost of fuel shall be shared in proportion to usage at mutually agreed rates.
5	Contractor shall transport the equipments from BHEL stores, install, operate, carry out preventive as well as breakdown maintenance, dismantle after use and return to BHEL stores.
6	Certain tools / components / consumables for Huck Bolting M/c and Induction Heating M/c shall have to be arranged by the contractor in his cost.
7	This crane is owned or hired by BHEL. Operator for BHEL owned crane will be arranged by BHEL.

6.1 TIME SCHEDULE & MOBILIZATION

6.1.1 INITIAL MOBILIZATION

After receipt of fax LOI, Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall mobilize necessary resources within 2 weeks of issue of fax letter of intent or as per the directive of Project Manager / Construction Manager. Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

6.1.2 MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

The activities for erection, testing etc. shall be started as per directions of Construction Manager of BHEL. Contractor shall mobilize further resources (in addition to those required for activities under clause no. 6.1.1) as per requirement to commence the work of erection, testing etc. of boiler and auxiliaries and progressively augment the resources to match schedule of the project.

6.1.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Erection/placement on it's designated foundation / location, of the first major permanent equipment / component / column covered in the scope of these specifications shall be recognized as "start of contract period". Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period.

The Contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:
According to the contract between BHEL and BRBCL the tentative schedule of important milestones is as follows:

SN	Major milestone	Tentative completion Schedule for Unit # 2
1	Boiler Erection Start	01-06-2011
2	Boiler drum lifting	01-10-2011
3	Boiler hydraulic test (drainable)	01-07-2012
4	Boiler light up	01-12-2012
6	Steam blowing	01-01-2013
7	Synchronization	01-03-2013

8	Completion of trail run	01-06-2013

In order to meet above schedule in general, and any other intermediate targets set, to meet customer/ project schedule requirements, Contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

Tentative schedule for Unit # 4 will be with a time gap of six months after that of Unit # 2.

6.1.4 CONTRACT PERIOD

The contract period for completion of entire work for U#2 & 4 under scope shall be **34 (thirty four) months** from the "start of contract period as specified earlier.

The period from the commencement of preparatory work for erection till the actual "start of contract period" shall not be reckoned for the above purpose.

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

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

12.1.1 E & C OF BOILER AND AUXILIARIES, PIPING, FABRICATED STRUCTURES ETC .

TERMS OF PAYMENT FOR STEAM GENERATOR												
SL NO	Contract (Main Package) Identitification ---->	Boiler				Rotating Machine	ESP		PIPING			INSULATION
	Rate schedule Identification -------->	Structure	Pressure Parts	Non Pressure Parts (upto ESP inlet Funnel)	Air Pre Heaters	1) RM 2) Handling Eqpts	ESP	NPP (ESP outlet Funnel to Chimney)	1)P-91 2) AS 3) CS (HP) 4) CS (LP) 5) SS	Hangers & Supports	Temporary Piping 1) Steam Blowing 2) Chemical Cleaning	1) Castable & Pourable 2) Iron Components 3) Wool mattresses 4) Aluminium sheeting
I	**PRO RATA PAYMENTS (85%)**											
1.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION SHALL BE CLUBBED WITH PLACEMENT IN POSITION)	20	20	25		15	15	15	20	15		--
1.2	PLACEMENT IN POSITION	15	10	10		20	20	10	20	25		50
1.3	ALIGNMENT	15	15	10		20	15	15	10	15		15
1.4	WELDING/BOLTING/FIXING	15	20	15		20	20	30	15	30		20
1.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be paid along with welding)	5	10	--		--	--	--	5			--
1.6	On Drum Lifting	0										

1.7	COMPLETION OF ATTACHMENT WELDING, FIN WELDING, SUPPORTS		5									
1.8	COMPLETION OF ROOF SKIN CASING		5									
1.9	INSTALLATION OF TEMPORARY PIPING										60	
1.10	DISMANTLING OF TEMPORARY PIPING, EDGE PREPARATION AND RETURN TO BHEL STORES, AREA CLEANING										25	
1.11	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG		--	25		--	--	15	10			--
1.12	COMPLETION OF FURNACE ALIGNMENT AND FIRE BALL CHECKING	5										
1.13	COMPLETION OF BACK PASS ALIGNMENT	5										
1.14	COMPLETION OF VIBRATION SNUBBERS, MECHANICAL SPACERS, CASSETTE BAFFLES, STEAM COOLED SPACERS	5										
1.15	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC		--	0		--	5		--			--
1.16	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC		--	--		--	5	--	--			--
1.17	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES		--	--		--	5	--	--			--
1.18	EQUIPMENT TRIAL OPERATION					10						
1.19	HYDRAULIC TEST OR PNEUMATIC TEST								3			
1.20	FLOATING OF LINES, FINAL ADJUSTMENT OF SUPPORTS FOR COLD AND HOT VALUES (if not applicable, this portion to be clubbed along with hydraulic test/pneumatic test)								2			

1.21	**AIR PRE HEATERS (PG 52)From the total amount payable for the PGMA weight at tonnage rates, payment will be regulated as under:**											
1.21.1	Completion of Support steel squareness and levelling, Expansion arrangement, Housing panel erection and alignment, Erection, alignment and welding of pedestals				11							
1.21.2	Completion of Erection, alignment and welding of Support Bearing, Guide Bearing, Rotor post, Bottom and Top centre sections, Hot and cold end connecting plates				14							
1.21.3	Completion of erection and alignment of modules				15							
1.21.4	Completion of erection, alignment and welding of Pin Rack assembly and Drive assembly				12							
1.21.5	Completion of seals setting				17							
1.21.6	Erection, alignment and welding of Lube oil systems, Cleaning Device, Fire sensing device, Deluge and water wash lines, Observation port and lighting assemblies and other accessories				13							
1.21.7	Completion of PGMA				1							
1.21.8	Air preheater Trial Run				2							
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	**85**	**85**	**85**	**85**	**85**	**85**	**85**	**85**	**85**	**85**	**85**
II	**STAGE/MILESTONE PAYMENTS (15%)**											

2.1	AIR & GAS TIGHTNESS TEST		--	5		--	1	5	--			--
2.2	GAS DISTRIBUTION TEST		--	--		--	1	--	--			--
2.3	CHARGING OF ESP FIELDS		--	--		--	4	--	--			--
2.4	COMPLETION OF AIR & GAS TIGHTNESS TEST FOR FURNACE		2									
2.5	BOILER HYDRAULIC TEST (DRAINABLE)	0	2									
2.6	BOILER HYDRAULIC TEST (NON DRAINABLE)		1									
2.7	Reheater Coils Hydraulic Test		2									
2.8	Clean Air Flow test					1						
2.9	Boiler Light Up	0	1		2	1			1	1		1
2.10	ABO		1	1	2	1		1	1	1		1
2.11	Steam Blowing	0		2	1	1			1	1		1
2.12.	SVF		2		2				1	1		1
2.13	Oil Flushing (TG)											
2.14	Barring Gear (TG)											
2.15	Rolling and Synchronisation	0								1		
2.16	Coal Firing			2	2	2	2	2		1		1
2.17	Full Load					1			1	1		1

2.18	Trial Operation of Unit					2	1	2	2	2		2
2.19	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	3										
2.20	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing								2			
2.21	Painting	6	0	1	1	2	2	1	2	1		0
2.22	Area cleaning, temporary structures cutting/removal and return of scrap	1	1	1	1	1	1	1	1	2		3
2.23	Punch List points/pending points liquidation	2	1	1	2	1	1	1	1	1		1
2.24	Submission of 'As Built Drawings'											
2.25	Material Reconciliation	2	1	1	1	1	1	1	1	1	15	2
2.26	Completion of Contractual Obligation	1	1	1	1	1	1	1	1	1		1
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**
	TOTAL I + II	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
	*INCLUDING NDE AND SR/HT WHERE EVER APPLICABLE (IF APPLICABLE, WEIGHTAGE OF 10%)											

8.0 TAXES, DUTIES, LEVIES

8.1.1

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.

8.1.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate (presently 10.3 %) on the admitted bill value.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,

I. **The name, address and the registration number of the contractor,**
II. **The name and address of the party receiving taxable service,**
III. **Description, classification and value of taxable service provided and,**
IV. **The service tax payable thereon.**

All the Four conditions shall be fulfilled in the invoice before release of service tax payment.

Wherever, more than one route/option are available for discharge of service tax liability under a particular service, (e.g. "works contract Service"), contractor shall obtain prior written consent from BHEL site before billing the amount towards Service Tax.

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

8.1.4 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.

8.1.5 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.

8.1.6 Submission of Periodical Reports

Contractor shall submit periodical reports in respect of following aspects of operation:

1) Consumption of welding electrodes and gases
2) Consumption of construction power
3) Manpower reports
4) Daily and Monthly Progress reports
5) Field calibration reports

BHEL at site will inform formats for these reports.

8.1.7 It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer/ BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permit for working beyond normal working hours

8.2 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998.

In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-

i. It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a licence to the Competent Authority under the BOCW Act and obtain proper certificate thereof by specifying the

scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of licence / permission to BHEL within a period of one month from the date of award of contract.

ii. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on the extant of work involving building or construction workers engaged by the contractor within a period of one month from the receipt of payment.

iii. It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building workers) engaged by the sub-contractor during the preceding month.

iv. It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

1.1Boiler Structures(35,36,38)

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
35	010	Foundation Materials-Boiler	11.50	11.50
35	110	Main Columns Left	222.00	222.00
35	120	Main Columns Right	243.00	243.00
35	130	Main Columns Middle	140.00	140.00
35	140	Auxiliary Columns-Left Side	105.00	105.00
35	150	Auxiliary Columns-Rightside	61.00	61.00
35	190	Girder Pin Connections	5.50	5.50
35	210	Boiler Ceiling Structure-Fabricated	335.00	335.00
35	220	Boiler Ceiling Structure-Rolled Beams	49.50	49.50
35	230	Boiler Ceiling Structure-Bracings	16.00	16.00
35	310	Horizontal Bracing I Mbl	20.70	20.70
35	320	Horizontal Bracing Ii Mbl	21.00	21.00
35	330	Horizontal Bracing Iii Mbl	16.40	16.40
35	340	Horizondal Bracing Iv Mbl	14.70	14.70
35	350	Horizondal Bracing V Mbl	16.50	16.50
35	360	Horizondal Bracing Vi Mbl	14.60	14.60
35	380	Landing Platforms	44.00	44.00
35	390	Platform At Drum Floor Level	37.50	37.50
35	441	Horizontal Beams-Lower	125.50	125.50
35	443	Horizontal Beams-Upper	92.10	92.10
35	511	Front Bracing-Lower	18.20	18.20
35	513	Front Bracing-Upper	15.00	15.00
35	521	Side Bracing-Lower	33.70	33.70
35	523	Side Bracing-Upper	48.50	48.50
35	531	Rear Bracing-Lower	34.70	34.70
35	533	Rear Bracing-Upper	26.10	26.10
35	610	Boiler Roof Structure	52.70	52.70
35	611	Boiler Roof Sheeting	18.00	18.00
35	700	Hsfg Fasteners For Pg 35	9.30	9.30
35	811	Floor Grills And Guard Plate	116.00	116.00
35	820	Stairs	18.00	18.00
35	851	Hand Rails And Posts	23.70	23.70
35	993	Consumables and erection materials	11.00	11.00

36	110	Columns Near Air Pre Heaters	36.40	36.40
36	310	Main Mbl Floor 11th Level	43.40	43.40
36	311	Main Floor I Mbl 1st Pass	48.10	48.10
36	320	Main Floor 12th Level	55.00	55.00
36	321	Main Floor Ii Mbl Ist Pass	91.00	91.00
36	322	Main Floor Ii Mbl 2nd Pass	42.50	42.50
36	330	Main Floor 13th Level	22.30	22.30
36	331	Main Floor Iii Mbl 1st Pass	23.00	23.00
36	332	Main Floor Iii Mbl 2nd Pass	22.10	22.10
36	340	Main Floor 14th Level	21.20	21.20
36	341	Main Floor Iv Mbl 1st Pass	69.20	69.20
36	350	Main Floor 15th Level	39.50	39.50
36	351	Main Floor V Mbl Ist Pass	23.30	23.30
36	352	Main Floor V Mbl Ii Nd Pass	8.70	8.70
36	360	Main Floor 16th Level	7.60	7.60
36	361	Main Floor Vi Mbl 1st Pass	36.40	36.40
36	391	Miscellaneous Platforms-Part I	24.60	24.60
36	392	Miscellaneous Platforms-Part Ii	181.30	181.30
36	393	Miscellaneous Platforms Part Iii	16.00	16.00
36	610	Boiler Roof Structure	46.80	46.80
36	611	Boiler Roof Sheeting	11.40	11.40
36	612	Weather Protection For Burner Roof	17.60	17.60
36	740	Posts And Hangers	32.40	32.40
36	811	Floorgrillsandguardplates-Lower	89.60	89.60
36	813	Floorgrills and guardplates-Upper	43.70	43.70
36	853	Handrails And Posts Upper	36.00	36.00
38	110	Lift Columns	50.80	50.80
38	210	Inter Conn Platforms between Boiler/Elevator	10.10	10.10
38	299	Mill Handling Monorails	51.30	51.30
38	310	Conn Platforms To Mill Deaerator Bay	0.50	0.50
38	381	Eco Handling Structure	58.20	58.20
38	410	Mill Maintanance Platforms	79.00	79.00
38	510	Lift Beams And Bracings	34.20	34.20
38	610	Elevator Cladding Structure	15.00	15.00
38	611	Elevator Cladding Sheeting	14.80	14.80
38	710	Lift Machine Room Details and misc Structure	4.00	4.00
38	810	Floorgrills And Guard Plate	66.00	66.00
38	850	Hand Rails And Hand Rail Posts	15.90	15.90
38	993	Consumables And Erection Materials	2.70	2.70

Total of Structures (Both units) 7016.00

1.2 Pressure Parts (04,05,06,07,08,09,10,11,12,15,16,17,19,21,24-part,28,31,32,42,45,52,mtm pads & clamps of 97)

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
04	126	Upper Drum Without Intl Id 61-71	132.75	132.75
04	136	Upper Drum Internals Only For Id 61-71	4.06	4.06
04	146	Upper Drum Sspn Id 61-71	13.79	13.79
05	137	Inlet Front Lower Ww Header	13.73	13.73
05	147	Inlet Rear Lower Ww Header	13.73	13.73
05	155	Inlet Side Lower Ww Header	16.70	16.70
05	175	Inlet Extended Side Lower Ww Header	1.28	1.28
05	227	Waterwall Rear Hanger Outlet Header	2.79	2.79
05	229	Waterwall Rear Screentube Outlet Header	5.26	5.26
05	231	Outlet Front Upper Ww Header	3.79	3.79
05	251	Outlet Side Upper Ww Header	6.84	6.84
06	400	Unclassified Burner Panel	15.84	15.84
06	631	Front Upper Ww Pnl	45.44	45.44
06	634	Front Intermediate Ww Pnl	29.18	29.18
06	637	Waterwall Lower Front Panel	22.20	22.20
06	644	Rear Intermediate Ww Pnl	45.60	45.60
06	647	Rear Lower Ww Pnl	22.92	22.92
06	651	Side Upper Ww Pnl	64.68	64.68
06	655	Side Lower Ww Pnl	61.71	61.71
06	670	Extended Side Ww Pnl	8.36	8.36
07	108	Down Comer Piping Upper Portion	64.76	64.76
07	109	Down Comer Piping Lower Portion	87.53	87.53
07	215	Relief Tubes From Side Wall Outlet Hea	20.29	20.29
07	216	Relief Tubes From Rear Hanger Header	20.21	20.21
07	218	Relief Tubes From Front Outlet Header	6.56	6.56
07	223	Furnace Screen Tubes	22.51	22.51
07	225	Furnace Rear Hanger Tubes	9.67	9.67
07	226	Furnace Rear Arch Tubes	16.45	16.45
07	231	Lower Corner Transition Tubes	1.79	1.79

07	232	Upper Corner Transition Tubes	0.54	0.54
07	401	Waterwall Suspension	21.65	21.65
07	410	Downcomer Suspension	8.27	8.27
07	420	Downcomer Guides	3.56	3.56
07	431	Riser Tube Support	2.21	2.21
07	500	Misc Components - Pressure Parts	0.33	0.33
07	501	Furnace Insert Tubes	2.14	2.14
07	601	Pressure Seals	0.76	0.76
07	700	Bulked Bps Items For Pg 04 To 07	0.90	0.90
07	992	Imported Electrodes	0.10	0.10
07	993	Consumables & Erection Materials	0.44	0.44
08	101	Furnace Upper Buckstay	52.90	52.90
08	104	Furnace Intermediate Buckstay	44.60	44.60
08	107	Furnace Lower Buckstay	30.60	30.60
08	111	Furnace Rear Arch Buckstay	2.20	2.20
08	380	Furnace Bottom Support	34.40	34.40
08	400	Furnace Guide	7.20	7.20
08	500	Furnace Back Pass Buckstay	64.40	64.40
08	700	Ex.Movement Measurement Components.	0.50	0.50
08	900	Furnace Key Buckstay	2.80	2.80
09	001	Seal Boxes For Furnace Opening	6.67	6.67
09	002	Seal Boxes For Instrument Inserts	1.28	1.28
09	003	Material For Instrument Inserts	0.19	0.19
10	135	Horizontal Spaced Shinlet Header	7.20	7.20
10	174	Vertical Spaced Sh Centre Inlet Header	11.30	11.30
10	178	Vertical Platen Sh 1nlet Header	7.37	7.37
10	182	Sh Rear Wall Inlet Header	3.75	3.75
10	183	Sh Frontwall Inlet Header	5.33	5.33
10	184	Sh Extended Side Wall Inlet Header	0.62	0.62
10	185	Sh Rear Roof Inlet Header	3.68	3.68
10	191	Sh Radiant Wall Roof Inlet Hdr	2.86	2.86
10	235	Horizntl Spaced Sh Outlet Header	8.69	8.69
10	274	Vertical Spaced Sh Centre Outlet Header	15.58	15.58
10	278	Vertical Platen Sh Outlet Header	7.99	7.99
10	283	Sh Frontwall Outlet Header	4.94	4.94
10	284	Sh Extended Side Wall Outlet Header	1.00	1.00
10	291	Sh Radiant Wall Roof Outlet Hdr	5.53	5.53
10	687	Sh Radiant Wall Junction Header	3.18	3.18
11	236	Sh Hor Spaced Upper Coil + Atch	122.00	122.00
11	237	Sh Hor Spaced Inter Coil + Atch	101.45	101.45

11	274	Sh Vertical Spaced Coil + Attachment	86.20	86.20
11	278	Vert Platen Centre Sh Coil Assy+Attach	123.00	123.00
11	616	Sh Rear Upper Panels	10.96	10.96
11	618	Sh Rear Lower Panels	4.96	4.96
11	684	Sh Extended Side Wall Panels	2.58	2.58
11	685	SH front wall panel	13.10	13.10
11	686	Sh Roof Panels	9.46	9.46
11	687	Sh Rear Roof Panels	7.45	7.45
11	688	Sh Center Roof Panels	11.67	11.67
11	691	Sh Radiant Wall Roofpanels	20.55	20.55
11	694	S.H.Extended Bottom Panels	1.92	1.92
12	174	Vertical Spaced Sh Inlet Pipes	8.16	8.16
12	184	Roof Inlet Sh Pipes	2.24	2.24
12	187	Sh Inlet Rear Roof Pipe	1.24	1.24
12	535	Sh Hor Spaced Hanger Tube	38.08	38.08
12	803	Sh Steam Cooled Spacer Tubes	1.08	1.08
12	805	Super Heater Hanger Tubes	5.08	5.08
12	850	Sh Conn Pipes-Saturated	5.30	5.30
12	852	Sh Desh Links	11.17	11.17
12	900	Sh Desh	2.34	2.34
12	903	5h Miscl Components	45.66	45.66
12	906	Sh Suprts For Lines & Links	4.66	4.66
12	914	Suspension Of Sh Radiant Roof Headers	0.64	0.64
12	917	Suspension Of Radiant Roof	3.89	3.89
12	924	Suspension Of Sh Back Pass Headers	13.23	13.23
12	927	Suspension Of Rear Roof	2.37	2.37
12	928	Suspension Of Sh Rear Wall	4.95	4.95
12	944	Suspension Of Sh Platen Headers	1.70	1.70
12	948	Suspension Of Vertical Spaced Assembly	18.33	18.33
12	954	Suspension Of Vertical Spaced Headers	4.27	4.27
12	968	Suspension Of Platen Assembly	15.50	15.50
12	992	Imported Electrodes	0.07	0.07
12	993	Consumables & Erection Materials	0.32	0.32
15	174	Reheater Vert Spaced Inlet Header Rhh1	4.12	4.12
15	274	Reheater Vert Spaced Outlet Header Rhh	15.80	15.80
16	275	Rh Vertical Spaced Front Coil + Att	70.00	70.00
16	277	Vert Rear Platen Rhcoil Assy Attach	77.00	77.00
17	904	Rh Hdr Suprts & Suspensions Above Roof	4.80	4.80

17	919	Rh Front Suspension	7.59	7.59
17	929	Rh Rear Suspension	13.33	13.33
17	992	Rh Site Electrodes Imported	0.04	0.04
19	114	Coils And Supports Of Upper P.Tube Ec	110.89	110.89
19	124	Coils And Supports Of Lower P.Tube Ec	167.72	167.72
19	701	Inlet Eco Headers	6.04	6.04
19	702	Outlet Eco Headers	4.81	4.81
19	753	Headers Of Rear Intert Eco	2.89	2.89
19	763	Headers Of Front Intert Eco	2.90	2.90
19	783	Headers Of Centre Intert Eco	2.90	2.90
19	802	Eco Hanger Tubes	13.88	13.88
19	850	Eco Feed Pipe	2.90	2.90
19	851	Eco Links To Drum	10.26	10.26
19	904	Eco Suprts & Suspensions Above Roof	15.16	15.16
19	905	Eco Suprts & Suspensions Below Roof	12.38	12.38
19	906	Eco Suprts For Lines & Links	0.74	0.74
19	907	Eco Feed Pipe Support	0.80	0.80
19	992	Imported Electrodes	0.02	0.02
21	600	Soot Blower Piping And Fittings	6.80	6.80
21	601	Sootblower Piping Supports	5.60	5.60
21	700	Bulked Bps Components For Sb Piping	0.80	0.80
21	800	Sb Valves (Bhel)	1.00	1.00
21	825	Sb Valves (Sub Delivery)	1.60	1.60
21	850	Soot Blower Safety Valve (Bhel)	0.03	0.03
21	992	Imported Electrodes	0.05	0.05
24	260	Valves (Bhel) Rh Uty Blr	17.00	17.00
24	265	Valves & Fittings (Sd) Rh Uty Blr	7.10	7.10
24	273	Direct Water Level Gauge - Bhel	0.25	0.25
24	275	Headers For Trim Piping	1.60	1.60
24	280	Erv And Safety Valves(Bhel)	3.80	3.80
24	285	Safety Valve/Erv Silencers(Bhel)	34.00	34.00
24	700	Bulked Bps Components For Trim Pipes	0.35	0.35
24	955	Lapping Tools For Sv&Erv	0.10	0.10
24	960	Lapping Tools For Conventional Valves(	0.05	0.05
24	987	Commg Spares For Safety Valves/Erv	0.00	0.00
24	989	Commg Spares For Conventional Valves	0.03	0.03
24	992	Imported Electrodes	0.03	0.03
24	993	Consumables & Erection Materials	0.01	0.01
24	994	Name Plates	0.23	0.23
28	220	Doors	4.85	4.85

28	700	Bps Fasteners	0.65	0.65
31	010	Skin Casing Comps Welded To Pressure P	3.45	3.45
31	102	Fornace Bottom Skin Casing	1.00	1.00
31	104	Furnace Rear Arch Skin Casing	5.45	5.45
31	105	Second Pass Skin Casing	0.30	0.30
32	010	Fixing Comp For Blr Pr Parts Insul	7.13	7.13
32	110	Fixing Comp For Blr Mountings Insul	5.00	5.00
32	120	Fixing Comp For Sb Pipes Insul	1.40	1.40
32	310	Fixing Comp For Air Ducts Insul	28.40	28.40
32	410	Fixing Comp For Ah And Gas Ducts Insul	6.30	6.30
32	510	Fixing Comp For Id Ducts Insul	50.30	50.30
32	710	Fixing Comp For Oil System Insul	2.00	2.00
42	001	Pneumatic Fittings	0.30	0.30
42	002	Steam Blow Materials	1.50	1.50
42	005	Instrument Fittings	0.80	0.80
42	010	Lfo Pump Set	5.20	5.20
42	020	Hfo Pump Set	10.00	10.00
42	030	Hfo Heater Set	29.00	29.00
42	046	Drain Oil Pump-Motor Assy	0.30	0.30
42	065	Drain Oil Tank	6.00	6.00
42	070	Burner Station Skid Assembly	4.50	4.50
42	120	Piping, Pump House-Fuel Oil	11.00	11.00
42	128	Piping,Pump House Steam - Ibr	0.75	0.75
42	150	Piping, Operating Floor Hfo & Tracer	3.50	3.50
42	152	Piping,Opr'G Floor Lfo	0.90	0.90
42	154	Piping,Opr'G Floor Drain Oil	2.00	2.00
42	157	Piping,Opr'G Floor Atm Air	0.80	0.80
42	158	Piping,Opr'G Floor Steam-Ibr	2.50	2.50
42	200	Subdelivery Fuel Oil System	4.00	4.00
42	300	Bhel Valve F.O. System	1.00	1.00
42	358	Bhel Valve,Opr'G Floor Stm-Ibr	0.80	0.80
42	700	Bps Fasteners	1.20	1.20
42	992	Imported Electrodes	0.01	0.01
45	220	Wind Box Assembly 22-In Width	69.70	69.70
45	221	Wind Box Support 22-In Width	6.50	6.50
50	510	STEAM COIL A P H	6.20	6.20
50	610	SCAPH-HORIZONTAL TYPE	7.46	7.46
97	297	Mtm Clamps And Pads	0.10	0.10
52	0	SPECIAL TOOLS/CONTRA	0.42	0.42
52	10	LARG AH-ROTOR ASSY	395.22	395.22

52	11	LARG AH-ROTOR POST	15.55	15.55
52	12	LARG AH-ROTORPINRACK	3.80	3.80
52	13	LARG AH-ROTORSEALS	4.58	4.58
52	30	LARG AH-ROTORHOUSING	43.08	43.08
52	41	HOT END CONN PLATE	39.68	39.68
52	42	COLD END CONN PLATE	60.06	60.06
52	54	LARG AH-AXIAL SEAL	0.42	0.42
52	55	LARG AH-BY PASS SEAL	0.87	0.87
52	100	LARGE AH ROTOR DRIVE	3.90	3.90
52	211	LARG AH-AIRSEAL PIPE	0.67	0.67
52	212	LARG AH-OBSER. PORTS	0.07	0.07
52	217	LARG AH-STOP.ALARMS	0.00	0.00
52	220	LARG AH-GENS DETAILS	10.22	10.22
52	261	LARG AH-GUIDE BEARNG	2.92	2.92
52	262	LARG AH-SUPRT BEARNG	4.26	4.26
52	271	OIL PIPING GUIDE BRG	0.52	0.52
52	272	OIL PIPING SUPRT BRG	0.54	0.54
52	274	LUB OIL CIRCULATION UN	1.10	1.10
52	301	WASH MANIFLD GAS INL	0.60	0.60
52	302	WASH MANIFLD GAS OUT	0.57	0.57
52	326	CLEANG EQPT GAS OUT	0.33	0.33
52	329	CLE EQPT DRIVE UNIT	1.63	1.63
52	360	FIRE SENSING SYSTEM	0.03	0.03
52	600	LARGE AH E,C&I COMPONE	0.12	0.12
52	988	LARG AH COMMISSIONING	0.29	0.29

Total Boiler Pressure Parts (both Units) 6776.69

1.3 Non Pressure Parts (upto ESP inlet funnel): 30,41,43,47,48-part,57,80-part,81-part,99-part

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
30	103	Seal Plate Assy	2.70	2.70
30	105	Furnace Bottom Enclosure Framing	5.05	5.05
30	211	Furnace Rear Arch Enclosure Framing	1.95	1.95
30	212	Furnace Extd Side Bottom Enclosure Fra	8.20	8.20
30	215	Main Boiler	3.85	3.85
30	219	Vertical Roof Enclosure Framing	41.05	41.05
30	220	Deck Support And Seals	24.65	24.65
41	350	Air Cooled Oil Gun Assy,	0.60	0.60

41	390	Oil Gun Vice Assy And Rack	1.10	1.10
41	500	High Energy Arc Ignitor	0.65	0.65
43	004	Assy Comp Scanner & Gun Air System	2.00	2.00
43	005	Assy Comp Mill Seal Air System	7.00	7.00
43	104	M/C Comp Scanner & Gun Air System	9.00	9.00
43	105	M/C Comp Mill Seal Air System	16.00	16.00
43	200	Subdel,Ignitor&Scanner Air System	5.20	5.20
47	221	Fuel Piping Supports With 22-In Pipe	30.20	30.20
47	223	Pipe Couplings,Orifice & Misc Items	28.30	28.30
47	229	St Pipes,Shop Bends For Rest Of The Mi	325.00	325.00
48	012	Rect Duct Bet F.D Fan And Airheater	66.85	66.85
48	014	Expn Piecesbet F.D Fan And Airheater	7.00	7.00
48	015	Supportsetcbet F.D Fan And Airheater	7.58	7.58
48	019	Foundation Materials	3.46	3.46
48	112	Rect Ducts Pri Fan To Airheater Prisid	72.52	72.52
48	114	Expn Piecespri Fan To Airheater Prisid	2.85	2.85
48	115	Supportsetcpri Fan To Airheater Prisid	10.29	10.29
48	141	Seal Air Hag And Id Fan Outgate	3.00	3.00
48	142	Rect Duct Coldairbus(Temp Air To Mill	34.34	34.34
48	144	Expn Piecescoldairbus(Temp Air To Mill	0.70	0.70
48	145	Supportsetccoldairbus(Temp Air To Mill	3.65	3.65
48	200	Instrument Tappings On Ducting	3.38	3.38
48	202	Rect Ductsairheater To Windboxduct	54.24	54.24
48	204	Expn Piecesairheater To Windboxduct	12.70	12.70
48	205	Supportsetcairheater To Windboxduct	5.14	5.14
48	207	Flowmeters For Secondary Air Flow	8.94	8.94
48	212	Wind Box Connecting Ducts - Rectangula	16.81	16.81
48	214	Expn Pieceswindbox Connecting Duct	3.30	3.30
48	222	Rect Duct-Airheater Prisidetohotair B	70.97	70.97
48	224	Expn Piecesairheater Prisidetohotair B	9.70	9.70
48	225	Supports For Hot P.A (Ah To Hot Bus)	6.59	6.59
48	382	Rect Duct Economiser To Airheater2nop	92.46	92.46
48	384	Expn Pieceseconomiser To Airheater2nop	10.90	10.90
48	385	Supportsetceconomiser To Airheater2nop	3.26	3.26
48	432	Rect Duct Airheater Boiler Outlet-Gas	49.11	49.11
48	434	Expn Piecesairheater Boiler Outlet-Gas	3.90	3.90
48	435	Supportsetcairheater Boiler Outlet-Gas	5.30	5.30
48	462	Rect Duct Boiler Outlet To Elec Precp	235.08	235.08

48	464	Expn Piecesboiler Outlet To Elec Precp	21.00	21.00
48	465	Bof To Ep Ducting Supports	29.35	29.35
48	662	Rect Duct Hot Air Bus To Mills	63.21	63.21
48	664	Expn Pieceshot Air Bus To Mills	2.20	2.20
48	665	Supports For Hot Pa To Mills	9.25	9.25
48	667	Venturi-Primary Air Flow	12.58	12.58
48	700	Bulked Bps Components	2.58	2.58
48	993	Erection Materials	3.81	3.81
57	013	DAMPERS BET FD FAN & A	4.91	4.91
57	033	SA SCAPH INLET DAMPER	9.50	9.50
57	110	GUILLOTENE GATE PA FAN	10.30	10.30
57	113	DAMPERS BETWEEN PAFAN	3.91	3.91
57	143	DAMPER COLD AIR BUS(TE	1.82	1.82
57	160	COLD AIRGATE, AIRBUS T	11.30	11.30
57	203	DAMP APH TO WINDBOX DU	11.33	11.33
57	209	MTG BKT FOR CL DAMPER	3.81	3.81
57	223	DAMP APH PRIMARY SIDE	7.10	7.10
57	270	GUILLOTENE GATE DUCT T	18.00	18.00
57	383	FLUE GAS SAH INLET DAM	25.03	25.03
57	433	DAMPER APH BOILER OUTL	20.21	20.21
57	460	GUILLOTENE GATE EP INL	21.31	21.31
57	466	PLATFORMS AND LADDERS	25.00	25.00
57	491	BLOWER WITH MOTOR	1.50	1.50
57	497	KNIFE GATE VALVE	1.00	1.00
57	577	ELECT ACTUATOR FOR GAT	10.00	10.00
57	663	DAMPER HOT AIR BUS TO	6.40	6.40
57	988	DUCTS COMMISSIONING SP	0.02	0.02
99	400	Airheater,Steamcoil Airheater Handlg E	3.00	3.00
99	512	Furnace Cradle 2 Wall Covrage Electr	6.00	6.00
99	600	Fo System Handling Equipment	1.50	1.50
99	501	Quick Erect Scaffolds	80.00	80.00
99	502	Pre.Parts Handling Equipmens	4.80	4.80
Total of Non Pressure Parts (upto ESP inlet funnel) both units				**3496.45**

2.1 Rotating Machines (ID/FD/PA Fans, Mills,etc & aux) - 55,56,61,65,67,99-part

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
55	11	FD FAN FOUNDATION MATL	1.43	1.43
550	17	FD FAN C&I ITEMS	0.02	0.02
55	31	PA FAN FOUNDATION MATL	1.35	1.35
55	37	PA FAN C&I ITEMS	0.02	0.02
55	214	1REAC FDFAN1600-2000	15.22	15.22
55	334	2 REACT PA FAN	24.50	24.50
55	810	AXIAL FDFAN COUPLING	0.85	0.85
55	830	AXL PAFAN COUPLING	1.00	1.00
55	910	AXL FDFAN ACCESSORY	4.35	4.35
55	911	AXIAL FDFAN SILENCER	31.23	31.23
55	916	ADDITIONAL FD ROTOR	3.40	3.40
55	930	AXL PAFAN ACCESSORY	4.40	4.40
55	931	PA FAN SILENCER	31.12	31.12
55	936	ADDITIONAL PA ROTOR	9.00	9.00
56	0	TOOLS & FIXTURE/CONT	0.50	0.50
56	21	ID FAN FOUNDATION MATL	2.77	2.77
56	27	ID FAN C&I ITEMS	0.01	0.01
56	77	SEAL AIR FAN C&I ITEMS	0.01	0.01
56	161	BAC 1 SUC SA FAN	0.90	0.90
56	171	SEALAIRFAN BCSS<1000	6.30	6.30
56	227	ID FAN ASSY NDZV33SIDO	101.68	101.68
56	670	IGNITR FAN MOTOR	1.20	1.20
56	820	RADL IDFAN COUPLING	0.10	0.10
56	870	SEAL AIR FAN COUPLING(	0.05	0.05
56	920	RAD IDFAN ACCESSORY	2.65	2.65
56	926	ADDITIONAL ID ROTOR	30.00	30.00
56	988	RADIAL FAN COMMG SPA	0.03	0.03
61	88	Journal Assembly	137.8	137.8
61	188	Mill Drive and Bowl Assembly	200.5	200.5
61	288	Mill Side and Liner Assembly	124.1	124.1
61	388	Classifier Assembly	249.3	249.3
61	488	MDV Assembly	43.2	43.2
61	788	Mill Motor Coupling	1.05	1.05
61	888	Mill Handling System (per Unit)	24.3	24.3
61	988	Commissioning Spares (per Unit)	0.63	0.63
61	888	Lubricating Oil (per unit)	10.88	10.88
65	736	36 Inch Gravimetric Feeder	46.00	46.00
67	204	Raw Coal Gates Needle Type	3.50	3.50

67	272	Coal Valve-36 Inch Motor Operated	6.80	6.80
67	276	Raw Coal Gate Chain Op 36" Circular	7.00	7.00
67	283	Feeder Outlet Isolation Gate	9.00	9.00
67	801	Down Spout	10.00	10.00
67	802	Bunker Emptying Chute	14.00	14.00
67	803	Feed Pipe To Mill	10.00	10.00

Total of Rotating Machines (ID/FD/PA Fans, Mills, etc aux) both units 2344.27

2.2 Rotating Machines (Handling equipments of Rotating machines) - 99-part

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
99	099	Misc Chain Pully Blocks	0.15	0.15
99	100	Fan Handling Equipment	13.00	13.00
Total of Rotating Machines (Handling equipments of Rotating machines) both units				**26.30**

3.1 Electrostatic Precipitator: 78, 79,7X

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
79	901	ROLL/SLIDE SUPPORTS	20.00	20.00
79	905	ESP-SUB-DELIVERY COMPO	0.31	0.31
79	906	INSULATOR HOUSING AS	31.70	31.70
79	908	GAS DIST. ASSY	37.12	37.12
79	909	GD-RAPPING MECHANISM	6.38	6.38
79	910	GD_DRIVE ARRANGEMENT	0.43	0.43
79	911	GAS SCREEN-EP	25.80	25.80
79	913	EMIT SYST SUSPENSION	9.91	9.91
79	914	SUPPORT INSULATORS	8.21	8.21
79	915	EMITTING ELECTRODES	14.18	14.18
79	916	EMIT ELECT RAPP MECH	22.09	22.09
79	917	DRIVE ARGT. FOR EMIT.	18.94	18.94
79	919	COL ELEC SUSPENSION	72.58	72.58
79	920	COLLECTING ELECTRODE	664.97	664.97
79	921	EMIT SYS FRAME-TOP	58.48	58.48
79	922	EMIT SYS FRAME BOTOM	85.82	85.82
79	923	INSPECTION DOORS	10.79	10.79

79	924	SHOCK BARS	52.91	52.91
79	925	COLL ELECT RAPP MECH	46.62	46.62
79	926	COLL ELEC RAPP DRIVE	3.88	3.88
79	928	ESP ROOF PANELS	84.82	84.82
79	930	ELECTRICAL SD COMPTS	13.19	13.19
79	931	GEARED MOTORS FOR RAPP	13.40	13.40
79	932	EMIT SYS FRAME-MIDLE	107.78	107.78
79	937	JUNCTION BOX & PUSH BU	1.00	1.00
79	942	OUTER ROOF-EP	154.35	154.35
79	943	HOPPER RIDGES	37.77	37.77
79	944	HOPPER UPPER PART	185.32	185.32
79	945	HOP MLD&LOWER PART	287.14	287.14
79	946	INSULATOR SUPP PANEL	56.17	56.17
79	947	ROOF PANEL ASSY	74.15	74.15
79	948	CASING STRUCTURE	289.25	289.25
79	949	CASING SHELL/PANEL	567.98	567.98
79	950	INLET-OUTLET FUNNEL	81.86	81.86
79	955	PENT HOUSE FOR E P	116.45	116.45
79	957	SPLITTER&GUIDE VANES	13.96	13.96
79	959	CONTROL ROOM-INSERTS	70.00	70.00
79	960	CABLE-CABLE RACKS	163.00	163.00
79	961	EP PERF TEST EQUIPT	0.65	0.65
79	962	EARTHING,CABLE TRAYS,S	74.00	74.00
79	963	ASH LEVEL INDICATOR	1.10	1.10
79	965	APP PLATFORM-HOPPER	130.04	130.04
79	966	WATER WASHING SYSTEM	3.85	3.85
79	967	MIN WOOL FOR ESP INSUL	225.24	225.24
79	968	FIXING COMP. FOR ESP I	119.50	119.50
79	972	INTERLOCKS-EP	1.00	1.00
79	973	ELECTRICALLY OPERTD HO	14.00	14.00
79	974	OPACITY MONITOR & ACCE	1.00	1.00
79	978	BAPCON & ACCESSORIES	0.50	0.50
79	980	FOUNDATION MATLS FOR E	14.69	14.69
79	981	SUPPOTING STRUCTURES F	449.56	449.56
79	988	COMMISSIONING SPARES	0.50	0.50
79	990	HEATING ELEMENTS	1.00	1.00
79	991	PANEL TYPE HOPPER HEAT	12.00	12.00
79	992	AUXILIARY CONTROL PANE	18.00	18.00
79	993	RAPPER CONTROL PANEL	1.20	1.20
79	994	STATCON PANEL	1.00	1.00
79	995	IOS PANEL	0.30	0.30

79	996	TOOLS & TACKLES	0.50	0.50
Total of Electrostatic Precipitator (both units)				**9156.71**

3.2 Non Pressure Part (ESP outlet funnel to Chimney):39,89,48,57

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
39	012	Foundation Materials I.D.Duct Supports	10.60	10.60
39	101	Columns Frames Before Esp- Left	23.00	23.00
39	102	Columns Frames Before Esp -Right	49.20	49.20
39	140	Cols Frames Near I.D.Fan	153.90	153.90
39	150	Col Frames Betn I.D.Fan And Chimney	52.00	52.00
39	300	Platforms - External Structure	127.00	127.00
39	301	Struc And Platform For Fans	3.90	3.90
39	302	Struc For Motor Hood Covering	7.40	7.40
39	303	Monorail Beams For Fans	217.20	217.20
39	304	Fan Handling Structure For Fd Fan	24.80	24.80
39	305	Fan Handling Structure For Pa Fan	20.00	20.00
39	810	Floor Grill	40.70	40.70
39	820	Stairs	6.70	6.70
39	850	Hand Rail And Hand Rail Posts	13.20	13.20
39	993	Consumables And Erection Materials	11.20	11.20
48	482	Rect Ducts-Elec Prptr/M.S To Inddraftf	116.63	116.63
48	484	Expn Pieceselec Prptr/M.S To Inddraftf	10.00	10.00
48	485	Supportsetcelec Prptr/M.S To Inddraftf	1.03	1.03
48	492	Rect Duct Ind Draft Fan To Chimney	170.90	170.90
48	494	Expn Piecesind Draft Fan To Chimney	4.00	4.00
48	495	I.D.System Duct Supports	12.08	12.08
48	499	Chimney Wall Frame For Embedding	4.00	4.00
89	610	EP GALLERIES&STAIRS	96.92	96.92
89	611	ESP ROOF HANDRAILS	6.12	6.12
57	470	EP OUTLET GATE	21.32	21.32
57	480	ID FAN INLET GATE	29.34	29.34
57	490	GUILLOTENE GATE ID FAN	29.72	29.72
87	10	CHIMNEY FDN MATERIAL	2.97	2.97
87	100	CHIMNEY SHELL	26.40	26.40
87	150	CHIMNEY STRAKES	2.63	2.63

87	200	PAINTER TROLLEY	0.58	0.58
87	300	PLATFORMS & LADDERS	5.00	5.00
87	930	AVIATION LAMPS	0.50	0.50
87	950	CHIMNEY INSULATION	6.57	6.57
87	960	CHIMN INS FIX COMP	1.78	1.78

Total Non Pressure Part (ESP outlet funnel to Chimney) **2618.56**

4.1 Piping -P91

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
80	300	MS from Superheater to Boiler Stop Valve	10.00	10.00
80	301	MS from Boiler Stop Valve to ESV	75.00	75.00
80	310	HRH from Reheater to Inceptor Valve	115.00	115.00
80	311	HRH from Interceptor Valve to Turbine	11.50	11.50
80	312	LPBP Valve Upstream and Downstream	33.00	33.00
80	320	CRH from Turbine to Reheater	55.00	55.00
		Total 2 units		**599.00**

4.2 Piping -AS

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
80	303	MS Header to Aux Prds	12.50	12.50
80	304	MS Header to HPBP Valve	5.00	5.00
80	321	HPBP Valve to CRH Piping	6.00	6.00
80	452	HP Piping Drains - SG Scope	5.00	5.00
80	901	Sd Valves&Specialities-Boiler Lightup	6.00	6.00
80	901	SUB DELIVERY VALVES FOR LIGHT UP	9.10	9.10
80	992	IMPORTED ELECTRODES	0.50	0.50
		Total 2 units		**88.20**

4.3 Piping -CS (HP)

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
80	340	Aux Steam Header	2.00	2.00
80	342	Aux Steam To Scaph	5.10	5.10
80	343	Aux Steam To Sootblowers	1.25	1.25
80	351	Aux Steam To Unlisted Users-Sg Scope	8.10	8.10
80	395	Aux Steam To Fo Atomising	0.65	0.65
80	451	Boiler Integral Piping Drains	3.05	3.05
80	340	Aux Steam Header	2.00	2.00
80	452	HP Piping Drains - SG Scope	5.00	5.00
80	454	Scaph Drains	4.95	4.95
80	992	Imported Electrodes	0.10	0.10
80	450	Cbd And Emergency Drum Drain	4.90	4.90
80	324	CRH Header to Aux. Prds	1.20	1.20
80	431	Soray water to Aux Prds	2.50	2.50
81	421	Sensing elements for Steam Lines	3.30	3.30
80	418	Ecection Materials For Instruments	0.10	0.10
80	418	ERECTION MATERIALS FOR INSTRUMENTS	1.30	1.30
81	411	DIRECT GAUGES FOR STEAM LINES	0.30	0.30
81	128	H P Dosing System	3.00	3.00
		Total 2 units		**97.60**

4.4 Piping-CS (LP)

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
80	364	Cbd Tank Vent To System	1.55	1.55
80	365	Cbd Tank Vent/Sv Exhaust To Atmosphere	0.05	0.05
80	366	Ibd Tank Vent To Atmosphere	7.40	7.40
80	373	AUX STEAM HEADER SV EXHAUST	5.00	5.00
80	453	LP Piping Drains-SG Scope	2.30	2.30
80	453	LP Piping Drains - SG Scope	0.70	0.70
80	460	SG Aux Cooling Water Unit System	25.80	25.80
80	471	Boiler Wash Water To & From Unit	9.20	9.20
80	480	Fire Water-Other Areas	5.20	5.20
80	612	Service Air For Unit	3.35	3.35
80	616	Inst Air For Unit	8.60	8.60
80	650	Heavy Fuel Oil Main Lines	0.00	0.00

80	901	Sd Valves&Specialities-Boiler Lightup	6.00	6.00
80	901	SUB DELIVERY VALVES FOR LIGHT UP	9.10	9.10
81	341	Sealing Compound-External Piping	0.60	0.60
81	412	Direct Gauges For Nonsteam Lines	0.35	0.35
81	414	Local Control Eqpt-Nonsteam Lines	0.10	0.10
81	414	LOCAL CONTROL EQPT FOR NON-STEAM LINES	0.30	0.30
81	415	TEST THERMOWELLS	0.40	0.40
81	416	PERFORMANCE GUARANTEE TEST MATERIALS	1.20	1.20
81	318	Fix Comp For Insuln Of Misc Piping	5.60	5.60
81	325	Mineral Wool Mattress-External Piping	35.30	35.30
81	341	Sealing Compound-External Piping	0.60	0.60
81	350	Aluminium Sheet-External Piping	21.10	21.10
81	411	Direct Gauges For Steam Lines	0.55	0.55
		Total 2 units		**174.40**

4.5 Piping -SS

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
80	600	Hp Dozing	0.40	0.40
81	128	H P Dosing System	3.00	3.00
		Total 2 units		**6.80**

4.6 Piping -Hangers & Supports

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
81	003	Cont Blow Down Expander-1500 Mm Od	2.45	2.45
80	921	H&S For Boiler Lightup-Steam Lines	22.60	22.60
81	009	Inter Blow Down Expander-2500 Mm Od	6.55	6.55
80	920	H AND S FOR HYDRO TEST	6.00	6.00
80	921	H AND S FOR LIGHT UP STEAM LINE	9.00	9.00
80	993	MISC ERECTION MATLS	0.50	0.50
		Total 2 units		**94.20**
Total of piping (both units)				**1060.20**

5.1 Insulation

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
81	341	SEALING COMPOUND FOR INSL	0.50	0.50
33	924	Misc Eqpts Asbestos Materials	0.20	0.20
33	975	Misc Eqpts Sealing Compound	0.20	0.20
		Total 2 units		**1.80**

5.2 Insulation (Pourable and castable)

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
33	201	Main Blr Formed Refractory Is8	0.50	0.50
33	212	Main Blr Castable Refractory Gr C	0.00	0.00
33	230	Main Blr Pourable Insulation	140.00	140.00
		Total 2 units		**281.00**

5.3 Insulation (Iron Parts)

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
33	970	Misc Eqpts Expanded Metal	5.00	5.00
33	971	Misc Eqpts Woven Wire Cloth	0.70	0.70
		Total 2 units		**11.40**

5.4 Insulation (Aluminium Cladding sheets)

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
79	968	FIXING COMP. FOR ESP I	119.5	119.5
		Total 2 units		**239.00**

5.5 Insulation (Wool Mattress)

PG	MA	PGMA DESCRIPTION	Weight-U#2 (In MT)	Weight-U#4 (In MT)
33	021	Blr Pr Parts Mineral Wool	75.10	75.10
33	121	Blr Mountings Mineral Wool	8.80	8.80
33	126	Sb Pipes Mineral Wool	2.65	2.65
33	321	Air Ducts Mineral Wool	98.00	98.00

33	421	Air Heater And Gas Ducts Mineral Wool	20.00	20.00
33	521	Id Ducts Mineral Wool	34.00	34.00
33	721	Oil System Mineral Wool	3.60	3.60
81	325	MINERAL WOOL MATTRESS	160.00	160.00
79	967	MIN WOOL FOR ESP INSUL	225.24	225.24
		Total 2 units		**1254.77**
Insulation total (both units)				**1787.97**

SUMMARY BOQ FOR BOILER VERTICAL PKG					
SL.NO	**Contract (Main Package)**	**Rate schedule Identifier**	**QTY**	**UNIT**	**PG MAs covered**
1.1	**Boiler**	Structures	**7016**	MT	35,36,38
1.2	**Boiler**	Pressure Parts	**6777**	MT	04, 05, 06, 07, 08, 09, 10,11, 12,15, 16, 17, 19, 21, 24 (part), 28, 31, 32, 42, 45, 52, mtm pads and clamps of 97
1.3	**Boiler**	Non Pressure Parts (upto ESP inlet funnel)	**3497**	MT	30,41,43,47,48 (part), 57, 80 (part), 81(part), 99 (part)
2.1	**RM**	Rotating Machines (ID/FD/PA Fans, Mills, etc and aux)	**2345**	MT	55,56,61,62,65,67,99 (part)
2.2	**RM**	Handling Equipments of Rotating Machines	**27**		99 (part)
3.1	**ESP**	ESP	**9157**	MT	78,79,7X
3.2	**ESP**	Non Pressure Parts (ESP outlet funnel to Chimney)	**2619**	MT	39,89,48, 57
4.1	**PIPING**	Piping-P91	**600**	MT	24,80, 81
4.2	**PIPING**	Piping-AS	**88**	MT	24, 80
4.3	**PIPING**	Piping-CS (HP)	**98**	MT	80, 81
4.4	**PIPING**	Piping-CS (LP)	**174**	MT	
4.5	**PIPING**	Piping-SS	**7**	MT	80,81
4.6	**PIPING**	Piping-Hangers and Supports	**94**	MT	80
4.7	**PIPING**	Piping-Temporary (Steam Blowing)		MT	

4.8	**PIPING**	Piping-Temporary (Chemical Cleaning)		MT	
5.1	**INSULATION**	Insulation	**2**	MT	
5.2	**INSULATION**	Pourable and castable	**281**	MT	
5.3	**INSULATION**	Iron parts	**12**	MT	
5.4	**INSULATION**	Aluminium Cladding sheets	**239**	MT	
5.5	**INSULATION**	Wool Mattress	**1255**	MT	
	TOTAL		**34288**	MT	

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
2.2	1B	Buck Stays and Structural Items: Buck stays **08** – 001, 003, 006, 007, 101, 104, 107, 111, 380, 382, 400, 500, 501, 503, 700, 900, 901, 904, 907, 910 Boiler Supporting Structures **35** – 100, 110, 111, 112, 120, 121, 122, 130, 131, 132, 133, 134, 135, 136, 140, 141, 142, 143, 144, 150, 151, 152, 153, 160, 161, 162, 171, 172, 173, 174, 181, 182, 183, 184, 185, 186, 191, 192, 193, 194, 195, 196, 210, 211, 212, 213, 214, 220, 221, 222, 230, 231, 232, 240, 250, 310, 311, 312, 320, 321, 322, 330, 331, 332, 340, 341, 342, 350, 351, 352, 360, 361, 362, 380, 381, 382, 383, 390,392, 410, 420, 430, 440, 441, 442, 443, 451, 452, 453, 461, 462, 463, 471, 472, 473, 481, 482, 483, 500, 510, 511, 512, 513, 514, 520, 521,522, 523, 524, 530, 531, 532, 533, 540, 541, 542, 550, 551, 552, 561, 562, 563, 571, 572, 573, 581, 582, 583, 591, 592, 593, 594, 595, 596, 597, 598, 599, 610, 612, 613, 710, 711, 712, 713, 715 **36** – 110,120, 130, 150, 200, 210, 211, 212, 220, 221, 222, 230, 231, 232, 240, 241, 242, 250, 251, 252, 260, 261, 262, 270, 271, 272, 280, 281, 282, 290, 291, 292, 300, 301, 302, 310, 311, 312, 313, 314, 315, 316, 320, 321, 322, 323, 324, 325, 326, 327, 330, 331, 332, 333, 334, 335, 340, 341, 342, 343, 344, 345, 346, 347, 348, 350, 351, 352, 353, 354, 355, 360, 361, 362, 363, 370, 371, 372, 380, 381, 382, 383, 390, 391, 392, 393, 394, 395, 396, 397, 410, 420, 430, 490, 491, 492, 510, 520, 610, 612, 620, 621, 630, 631, 632 **38** – 110, 120, 130, 210, 211, 299, 310, 311, 380, 381, 390, 410, 510, 511, 512, 513, 521, 522, 610, 611, 612, 620, 710, 712, 720, 730 **39** - 100, 101, 102, 110, 120, 121, 130, 140, 141, 142, 143, 150, 160, 200, 210, 300, 301, 303, 304, 305, 306, 311, 312, 323, 390, 391, 392, 393, 901 Duct Supports **48** – 005, 015, 025, 045, 055, 065, 085, 105, 115, 125, 145, 155, 185, 195, 200,205, 215, 225, 235, 245, 255, 265, 275, 295, 305, 315, 325, 335, 345, 355, 365, 375, 385, 415, 425, 435, 445, 455, 465, 475, 485, 495, 665, 805, 815, 825, 845, 855, 865, 875, 885, 995 Piping Centre: 80-800 to 882, 920 to 933, 940	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50µm per coat	2	–	–	Chlorinated Rubber Based Finish Paint DFT= 30µm per coat	2	Smoke Grey Shade No: 692 of IS 5	160

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
2.3	1BB	Hangers: **36** - 740, 741, 742, 743, 744	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50µm per coat	2	--	--	Chlorinated Rubber Based Finish Paint DFT= 30µm per coat	2	Smoke Grey Shade No: 692 of IS 5	160
2.4	1BC	Floor grills, Guard plate **35** – 811 **36** - 010, 810, 811, 812, 813, 814, 815, 816, 840 **38** - 810, 811 **39** – 810, 811, 840, 841	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50µm per coat	1	--	--	Chlorinated Rubber Based Finish Paint DFT= 30µm per coat	1	Black	80
2.5	1BC	Hand Rails & Posts **35** - 850, 851 **36** - 850, 851, 852, 853 **38** - 850, 851 **39** - 850, 851	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50µm per coat	1	--	--	Chlorinated Rubber Based Finish Paint DFT= 30µm per coat	1	Black	80
2.6	1BC	Ladders & Stairs **35** – 820, 821, 822, 823 **36** – 820, 821, 822, 823 **38** – 820, 821 **39** – 820, 830, 831 **48** - 466	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50µm per coat	1	--	--	Chlorinated Rubber Based Finish Paint DFT= 30µm per coat	1	Black	80

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
3.1	10	Components >95° C like silencers, vent pipes and safety valves etc. Un-insulated other than components coming in Gas Path **09** - 001, 002, 003 **21** - 800, 850, 875, 997 **24** – 120, 160, 173, 180, 185, 190, 195, 220, 260, 273, 280, 285, 290, 320, 345, 360, 373, 380, 385, 390, 395, 420, 460, 480, 485, 490, 495, 520, 560, 573, 580, 585, 590, 660, 680, 685, 690, 820, 860, 880, 885 **28** – 220 **42** – 300, 318, 328, 348, 358 **48** - 380	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Grade-I	1 (DFT =20 microns)	--	--	Heat Resistant Aluminium Paint to IS 13183 Grade-I	1 (DFT =20 µm per coat)	Aluminium	40
3.2	3	Components >95° C Insulated **05** - 137, 139, 147, 153, 154, 155, 158, 159, 175, 188, 195, 220, 227, 229, 231, 236, 241, 246, 251, 265, 281, 283, 296, 330, 340, 341, 350, 493, 879, 900 **07** - 101, 102, 104, 106, 107, 108, 109, 200, 201, 202, 203, 204, 211, 212, 214, 215, 216, 217, 218, 221, 222, 223, 225, 226, 229, 231, 232 **10** – 100, 120, 122, 135, 136, 140, 141, 151, 170, 174, 178, 179, 180, 191, 195, 218, 220, 222, 235, 236, 240, 241, 251, 270, 274, 278, 279, 280, 283, 284, 291, 295, 315, 687 **15** – 136, 138, 147, 174, 177, 192, 193, 236, 238, 274, 279, 292, 293, 999 **17** – 138, 177, 776, 807, 900, 903 **18** – 001, 002, 003, 010, 020 **19** – 701, 702, 753, 903 **21** – 600 **24** – 100, 115, 175, 200, 215, 275, 295, 300, 315, 375, 475, 500, 568, 600, 620, 675, **42** - 020, 021, 025, 030, 031, 032, 033, 036, 037, 038, 128, 150, 153, 158, 159, **48** –032,034,035,132,135,202, 204, 207, 208, 212, 214, 217, 221, 222, 224, 227, 228, 229, 232, 234, 242, 244, 252, 254, 261, 262, 264, 267, 272, 274, 276, 282, 284, 292, 294, 302, 304, 307,308, 309, 311, 312, 314, 318, 319, 322, 324, 332, 334, 342, 352, 362, 364, 372, 374, 381, 382, 384, 386, 388, 389, 392, 412, 414, 422, 424, 426, 432, 434, 438, 439, 442, 444, 452, 454, 462, 464, 467, 468, 469, 472, 474, 482, 484, 486, 487, 488, 489, 491, 492, 494, 496, 497, 498, 499, 602, 612, 622, 632, 646, 652, 654, 656, 662, 664, 666, 667, 668, 669, 676, 686, 696	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30µm per coat	-	--	--	--	Red Oxide	60

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
3.3	2	Heat Exchanger Coils: (SH, RH & Economiser Coils) **11** - 036, 037, 038, 074, 077, 078, 095, 135, 136, 138, 170, 174, 175, 178, 179, 235, 236, 237, 238, 248, 250, 251, 271, 272, 274, 275, 277, 278, 279, 280, 336, 337, 338, 340, 342, 356, 358, 370, 374, 377, 378, 395, 585, 587, 591, 606, 608, 616, 618, 682, 683, 684, 685, 686, 687, 688, 691, 694, 716, 717, 718, 767, 768, 769, 787, 791, 882, 883, 884, 885, 887, 916, 917, 918, 957, 968, 969, 986, 987, 988, 991, 994, 999 **12** – 135, 136, 170, 174, 178, 184, 187, 335, 395, 495, 515, 535, 551, 619, 800, 803, 805, 850, 851, 852, 900, 901, 903, 906, 914, 917, 924, 927, 928, 944, 948, 954, 968, 988, 999 **16** – 077, 079, 132, 235, 236, 237, 238, 256, 275, 277, 279, 281, 377, 379 **19** - 001, 104, 105, 114, 124, 184, 802, 814, 824, 884, 914, 924, 984	SSPC – SP2 or SSPC – SP3 Hand tool / Power tool cleaning	Red Oxide Zinc Phosphate Dip coat primer to PR: CHEM: 09 – 03	1 DFT= 35µm per coat	--	--	--	--	--	--	35
3.4	3	Components coming in Gas Path other than Coils **06** - 033, 036, 037, 041, 043, 046, 047, 052, 054, 089, 090, 091, 092, 093, 094, 130, 133, 136, 137, 141, 143, 146, 147, 152, 154, 189, 190, 191, 192, 193, 194, 231, 331, 350, 400, 430, 466, 467, 500, 530, 609, 611, 613, 614, 616, 620, 621, 623, 624, 630, 631, 633, 634, 636, 637, 639, 640, 641, 643, 644, 646, 647, 649, 650, 651, 652, 653, 654, 655, 657, 658, 659, 670, 689, 690, 691, 692, 693, 694, 695, 709, 713, 714, 715, 716, 720, 723, 730, 731, 733, 734, 737, 740, 741, 743, 744, 747, 749, 750, 751, 753, 755, 789, 790, 830, 840, 850, 851, 857, 895, 896, 897 **10** – 182, 183, 184, 185 **16** – 988, 999 **19** – 703, 704, 708, 763, 783, 850, 851, 900, 988, 999 **30** – 010, 104, 105, 211, 212, 216, 217, 218, 219, 220, 223, 227, 228, 233, 235, 993, **31** – 010, 101, 102, 103, 104, 105, 108, 301, 993 **32** – 001, 002, 005, 006, 007, 008, 009, 010, 011, 012, 021, 022, 023, 024, 025, 026, 027, 031, 033, 041, 042, 043, 044, 050, 055, 061, 073, 110, 120, 210, 310, 410, 510, 520, 610, 620, 710, 720, 810, 910, 993 **42** - 129	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30µm per coat	- -	--	--	--	--	Red Oxide	60
3.5	8A	Components > 95 C upto 130 C, un-insulated Fuel Pipes **47** – 229, 265, 266. 267, 268, 269 Duct for Tube Mill: **48** – 802, 804, 812, 814, 817, 822, 824, 832, 834, 842, 844, 852, 854, 857, 862, 864, 867, 872, 874, 882, 884,	SSPC-SP3/ Power Tool Cleaning	General Purpose Aliminium Paint to IS 2339 DFT= 20µm per coat	1	--	--	General Purpose Aliminium Paint to IS 2339 DFT= 20µm per coat	1	Aluminium	40

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
4	15	Constant Load and Variable Load Hangers (CLH / VLH) **(See NOTE 14)** **07** - 400, 401, 402, 403, 404, 405, 410, 420, 431 **10** - 200 **17** – 904, 906, 919, 929 **19** – 901, 904, 905, 906, 907 **24** - 346, 351 Piping Centre: 80-800,801,802,811 to 816, 831 to 839, 861 to 871, 920 to 933	Abrasive blast cleaning to Sa 2 ½ 35- 50 microns	Epoxy zinc rich primer to IS 14589 Gr. II %VS=35 (min)	1 DFT=40 µm / coat	--	--	Aliphatic acrylic Poly-urethane paint %VS=40 (min) t	1 DFT=30 µm per coat	Phirozi Blue Shade No. 176 of IS5	70
5.1	1A	Miscellaneous and Casing Sheets: **07**-500, 501, 600, 601, 997, 999, **19** – 101, 102,**21** - 601, 987, **24** - 101, 125, 130, 135, 140, 201, 225, 230, 235, 240, 301, 325, 335, 340, 350, 370, 374, 400, 401, 425, 430, 435, 440, 470, 471, 473, 501, 525, 535, 540, 570, 601, 625, 635, 640, 800, 801, 815, 825, 987, 989, 996, 998 **35** - 994, 995, **36** - 613, 903, 999, **37** - 010, 110, 210, 310, 410, 510, 610, **39** - 302, 924 Fuel Firing: **41** – 100, 110, 200, 310, 320, 330, 340, 350, 390, 410, 420, 430, 450, 460, 470, 997 Piping: **42** – 002, 003, 005, 010 **42** – 040, 045, 050, 055, 060, 065, 070, 111, 112, 113, 114, 118, 119, 120, 121, 122, 123, 124, 130, 131, 132, 151, 152, 154, 155, 156, 157, 160, 165, 170, 176, 180, 195, 196, 989, 997, 998 **43** – 000, 001, 002, 003, 004, 005, 006, 007, 008, 997, 999 **45** – 050, 120, 160, 161, 180, 181, 220, 221, 260, 261, 321, 325, 326, 401 **47** – 121, 122, 123, 124, 125, 129, 140, 141, 142, 143, 144, 145, 146, 149, 161, 162, 163, 164, 165, 169, 180, 181, 182, 183, 184, 185, 189, 200, 201, 202, 203, 204, 205, 209, 221, 222, 223224, 225, 241, 242, 243, 244, 245, 246, 247, 248, 249, 261, 262, 263, 264, 647, 648, 649, 650, 746, 953, 959, 963 Duct Plates and Expansion Joints: **48** – 002, 004, 007, 011, 012, 014, 017, 018, 022, 024, 028, 032, 034, 040, 042, 044, 052, 054, 062, 064, 066,072, 074, 082, 084, 092, 094, 102, 104, 107, 112, 114, 116, 122, 124, 132, 142, 144, 152, 154, 162, 172, 182, 184, 192, 194 Coal Handling: **65** – 051, 060, 070, 260, 402, 403, 460, 724, 736, 738, 786 **67** – 204, 251, 256, 261, 266, 271, 272, 276, 277, 283, 286, 400, 801, 802, 803, 804, 999 **99** – 201, 299	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	1 DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20	Smoke Grey Shade No: 692 of IS 5	70
5.2	3	Erection Materials and Commissioning Components: **04** - 988, **05**-993, **06**-993, **07** – 988, 993, 12-993, **24** – 993, **28** – 993, **35** – 993, **36** – 993, **37** – 993, **38** – 993, **39** – 993, **48** – 988, 993, **65** – 988, 97-585,**99** – 045, 099, 501, 502	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30µm / coat	--	--	--	--	Red Oxide	60

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
6.1	3	Piping (Steam, water) Insulated ■■ – 300 to 385, 389 to 392, 394 to 398, 399 ■■ – 417, 419 to 438, 442, 444 to 458, 462, 493, 494, 650 Insulated tanks 81 – 001 to 017, 020 to 033,	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30µm per coat	--	--	--	--	Red Oxide	60
6.2	1B	Piping (water, air) Un- insulated ■■ – 386, 387, 388, 393, 80 – 400 to 416, 418, 439, 440, 441, 443, 459, 460, 461, 464 to 4 67, 469 to 481, 495 to 497 80 – 600** to 616** (** Refer Note 6) (Note:- Painting for CW piping viz., 80 – 463, 468 shall be as per drawing/ QP) Un- Insulated tanks 81 – 035 to 067	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50µm per coat	2	–	–	Chlorinated Rubber Based Finish Paint DFT= 30µm per coat	2	Smoke Grey Shade No: 692 of IS 5	160

NOTES:

1. This painting scheme covers a comprehensive list of PGMAs being used in 125 / 210 / 250 / 500 MW and Industrial Boilers under Fossil Boilers working in normal environment, in an effort to standardise the painting scheme. Therefore, the entire list of PGMAs will not be applicable for any specific project and only those PGMAs applicable for the project may be used, while choosing the painting scheme applicable.
2. Rust Preventive coating should be given on HSFG Bolt and Nut threads.
3. All threaded and machined surfaces are to be applied with a coating of Temporary Rust Preventive oil.
4. All surfaces of foundation materials, insulation pins, Anchor channels, Sleeves shall be coated with Temporary Rust Preventive Fluid and during execution of civil works; the dried film of coating shall be removed using organic solvents.
5. PGMAs under Sub-Vendor items are not indicated. Please refer respective Engineering Document for all sub-vendor items.
6. No painting is required for Stainless Steel components and galvanized items.
7. Wherever **inside surfaces** of components under PGMA 48 – XXX, need protection till erection, two coats of Red-oxide zinc phosphate primer paint to IS12744 to a DFT of 60 microns shall be applied, after power tool cleaning.
8. The Temporary Rust Preventive coating that has already been applied on any component, tubes, pipes etc., shall be visually inspected for good adherence. If the coating is intact, direct coating of alkyd based red oxide paints over the coating is permitted. In case, the coating has peeled off over a large area, then the coating is to be removed by suitable solvents / heating to 350 –400 °C for an hour before primer paint application –but, in this case, it should be ensured that the minimum surface cleanliness required for primer paint application shall be SSPC – SP2 (equivalent – Hand Tool cleaning).
9. All currently active PGMAs are covered. Requirements for Missing / new PGMA s will be included under the relevant section, following the appropriate paint logic.
10. Ground shade/colour finish paints & identification tag/ band for equipments, piping, pipe service, boiler supporting structures and other boiler components shall be followed as per tender.
11. In components, wherever plates/sheets of thickness less than or equal to 5 mm, tubes/ rods/drain pipe are used, power tool /hand tool cleaning to SSPC-SP3/ SSPC-SP-2 shall be followed and the painting shall be done as described in Sl no: 5.1.
12. Touch-up painting of damaged areas shall be carried out as per clause applicable painting scheme.
13. Only weldable primer shall be applied on surfaces, which require to be welded subsequently at site. At those locations no other paint shall be applied.
14. DUs coming under Constant Load Hangers (CLH) shall be painted as per the system - **PS 15** indicated in Sl. No. 4 of the table. However, for DUs coming under Variable Load Hangers (VLH), the painting shall be as per Painting Scheme PS 1A indicated in Sl. No. 5.1 of the table. (i.e., one coat of Red Oxide Zinc Phosphate Primer followed by two coats of Synthetic Enamel Paint –shade smoke grey, total DFT – 70 microns)

Painting Scheme – Details for procurement & application purposes

Sl. No.	Material Code of Paint	Generic nature of paint	Theoretical Covering Capacity Sq. m per Litre	No. of pack	Volume solids, % (min) **	DFT in microns (min) per coat	Shade	Shade No. to IS5	Mode of appln.	Over coating interval, Hrs.
1	120016131800	Heat Resistant Aluminium paint to IS 13183 Grade I	10	1	-	-	Aluminium	--	Brush / Spray	24
2	120011111900	Red oxide Zinc Phosphate primer paint to IS 12744	10	1	--	--	Red Oxide	--	Brush / Spray	12
3	120011121900	Red oxide Zinc Phosphate Dip coat primer paint to PR: CHEM: 09-03	10	1	--	--	Red Oxide	---	Dip	12
4	120011311200	Long oil alkyd synthetic enamel finish paint to IS2932	10	1	--	--	Reqd. shade	Corrpdg. Shade no.	Brush / Spray	12
5	120011140000	Temporary Rust preventive fluid to PR: CHE: 09 – 04	10	1	--	--	Amber	--	Brush / Spray	12
6	120012141700	Epoxy Zinc rich primer to IS14589 Gr. II	8	2	35	40	Grey	--	Spray	24
7	120013310200	Aliphatic acrylic polyurethane paint to IS13213	10	2	40	30	Phirozi – Blue.	176	Spray	24
8	120017101800	De Oxy Aluminate Weldable Primer- Colour Aluminium	10	1	--	--	Aluminium	--	Brush / Spray	24
9	120014111700	HB Chlorinated Rubber Based Zinc Phosphate Primer - Colour Grey	8	1	40	50	Grey	–	Brush / Spray	12
10	120014301200	Chlorinated Rubber Based Finish Paint Smoke Grey	10	1	30	30	Smoke grey	692	Brush / Spray	12
11	120011130000	General Purpose Aluminium Paint to IS 2339	10	Dual	20	20	Aluminium	—	Brush / Spray	24

The covering capacity of paints specified is only approximate.
The paints and Rust Preventive fluid shall be procured from BHEL's approved suppliers. ** Values are indicative.

Sl. No.	Description	Material	Size (mm) (Dia. x Thickness)	No.of Joints
PG 04 TO 07:				
1.	Down Comer	SA 515 Gr.70 + SA 515 Gr.70	457.2 x 40	58 Nos.
2.	Ring Headers	SA 106 Gr.C + SA 106 Gr.C	406.4 x 56	4 Nos.
3.	Water Wall Panels	SA 210 Gr.C + SA 210 Gr.C	63.5 x 5.6	3428 Nos.
4.	Rear Arch Screen Tube	SA 210 Gr.C + SA 210 Gr.C	76.1 x 7.1	315 Nos.
5.	Riser Pipe	SA 210 Gr.C + SA 210 Gr.C	127 x 12.5	454 Nos.
6.	Hand Hole Pipe Assly.	SA 106 Gr.B + SA 234 wpc	127 x 20	12 Nos.
PG 12:				
1.	SH Conn. Pipes	SA 106 Gr.C + SA 106 Gr.C	127 x 12.5	66 Nos
2.	SH Roof Tubes	SA 213 T 11 + SA 213 T 11	51 x 5	400 Nos.
3.	SH Roof Outlet Header + SH Side Wall Inlet Header	SA 106 Gr.B + SA 106 Gr.A	323.9 x 40	2 Nos.
4.	SH Side Wall Inlet Header + Tubes	SA 210 Gr.C + SA 210 Gr.C	44.5 x 4.5	750 Nos.

5.	SH Side Wall Outlet Header Elbow + Front / rear Wall Inlet Header	SA 106 Gr.C + SA 106 Gr.C	273 x 36	4 Nos.
6.	SH Rear Wall Inlet Header + SH Rear Wall	SA 210 Gr.C + SA 210 Gr.C	44.5 x 5	216 Nos.
7.	Hand Hole Plate	SA 106 Gr.B + SA 234 wpc	127 x 20	2 Nos.
8.	SH Jn. Header Nipple + SH Rear Roof	SA 210 Gr.C + SA 210 Gr.C	44.5 x 4.5	408 Nos.
9.	SH Front Wall Header + SH Extl. Side Wall Supply Pipe	SA 106 Gr.C + SA 1-6 Gr.C	127 x 12.5	4 Nos.
10.	SH Extl. Header Nozzle + Roof Inlet Pipe	SA 106 Gr.C + SA 106 Gr.C	127 x 12.5	12 Nos.

Sl. No.	Description	Material	Size (mm) (Dia. x Thickness)	No.of Joints
11.	LTSH Inlet Header Nipple + Loose Tube + LTSH Coils	SA 210 Gr.C + SA 210 Gr.C	47.63 x 5	924 Nos
12.	LTSH Coils	SA 210 Gr.C + SA 213 T 11	47.63 x 5	528 Nos.
13.	LTSH Coil	SA 213 T 11 + SA 213 T 11	47.63 x 5	1280 Nos.

14.	SH DESH	SA 335 P 12 + SA 335 P 12	368 x 40	10 Nos.
15.	SH Platen Coil	SA 213 T 11 + SA 213 T 22 SA 213 T 22 + SA 213 T 22	47.63 x 10 47.63 x 10	32 Nos. 930 Nos.
16.	SH DESH Stage-II	SA 234 WP12 + SA 234 WP12 SA 335 P 12 + SA 335 P 12	406.4 x 65 406.4 x 65	4 Nos. 8 Nos.
17.	Steam Cooled Spacer	SA 210 Gr.C + SA 213 T 11 SA 213 T 11 + SA 213 T 11	44.5 x 4 44.5 x 5 51 x 5	15 Nos. 7 Nos. 1 No.
18.	Platen SH Coil	T 91	51 x 7.1	300 Nos
19.	Final SH Coil	T 91	44.5 x 5.6	400 Nos.
20.	RH Coil	T 91	54 x 4	400 Nos.
PG 17:				
1.	RH Header Nipple + Coil	SA 213 T 11 + SA 213 T 11 SA 213 T 11 + SA 213 T 22 SA 213 T 11 + SA 213 T 22	63.5 x 4.5 51 x 5 47.63 x 4	65 Nos. 65 Nos. 260 Nos.
2.	RH Coil + Coil	SA 213 T 22 + SA 213 T 22 SA 213 T 22 + SA 213 T 22	54 x 4 44.5 x 5	390 Nos. 195 Nos.

		SA 213 T 22 + SA 213 T 22 SA 213 T 22 + SA 213 T 22 SA 213 T 22 + SA 213 T 22	63.5 x 6.3 51 x 5 63.5 x 4.5	65 Nos. 65 Nos. 65 Nos.
PG 19 : Economiser:				
1.	Eco Feed Pipe + Reducer Valve	SA 106 Gr.C + SA 234 wpc + SA 217 wcb	368 x 48	2 Nos.
2.	Eco Feed Pipe	SA 106 Gr.C + SA 234 wpc SA 234 wpc + SA 234 wpc	368 x 32 323.9 x 40	1 No. 1 No.
3.	Eco Coil	SA 210 Gr.A1 + SA 210 Gr.A1 SA 210 Gr.A1 + SA 210 Gr.A1	44.5 x 4.5 44.5 x 5	591 Nos. 354 Nos.
4.	Hand Hole Plate	SA 106 Gr.B + SA 234 wpc	127 x 20	6 Nos.
5.	Eco Coil + Coil	SA 210 Gr.C + SA 210 Gr.C	44.5 x 5	594 Nos.
6.	Eco Link to Drum + Hdr. Tee	SA 234 wpc + SA 234 wpc	323.9 x 35	2 Nos.
7.	Eco Pipe + Elbow	SA 106 Gr.C + SA 234 wpc	273 x 32	14 Nos.

NOTE:

The number of joints indicated herein above is only tentative and likely to vary in actual. Contractor shall carry out all necessary site weld joints required for completion of entire scope of work under these specifications. No additional payments shall be made for any variations in the actual quantity of joints carried out.

1.0 General requirements – common to all work

1.1
The intent of specification is to provide services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

1.2
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.

1.3
The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with personnel of BHEL, BHEL's customer, customer's consultants and other contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.

1.4
The work covered under this specification is of sophisticated nature, requiring high quality workmanship, supervision, and construction engineering & construction management. The contractor should ensure proper planning and successful & timely completion of the work to meet the overall project schedule. The contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequate trained, qualified and experienced supervisory staff and skilled personnel.

1.5
Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.

1.6
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.

1.7
The boiler shall be erected as per relevant provisions of latest Indian Boiler Regulations (IBR) and amendments/addendums thereof, if any.

1.8
The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to contractor's fault, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.

1.9
The contractor shall perform any services, tests etc, which may not be specified but nevertheless, required for the completion of work within quoted rates.

1.10
All necessary certificates and licenses required for carrying out this work are to be arranged by the contractor expeditiously.

1.11
The contractor shall execute the work in the most substantial and workmanlike manner. The stores shall be handled with care and diligence.

1.12
BHEL reserves right to recover from the contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to contractor's lapse during any stage of work. Any loss to BHEL due to contractor's lapse shall have to be made good by the contractor.

1.13
During the course of erection, testing and commissioning certain rework/ modification / rectification / repair / fabrication etc may become necessary on account of feedback / revision of drawing etc. This will also include modifications/ re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc shall be maintained by the contractor for such reworks. Claim of contractor if any, for such works will be governed by relevant clauses of General Conditions of Contract.

1.14
~~All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of structures, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rates.~~

1.15
The contractor shall make temporary supports, jigs & fixtures, anchors for load and guide pulleys as required for the work. Contractor shall arrange necessary steel for such usage.

1.16
The contractor shall take delivery of the components, equipments, chemicals, and lubricants etc from the BHEL stores/ storage area after getting the approval of BHEL engineer on standard indent forms of BHEL. Contractor shall return the left over materials periodically and reconcile the detailed issue vis-à-vis consumption quantities of all such materials at regular intervals.

1.17
Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Contractor shall stack the materials neatly, preserve and store in the contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/site to enable other agencies to carry out their work or for any other reason, same shall be done by contractor most expeditiously as incidental to work.

1.18
Plant materials should not be used for any temporary supports/scaffolding/ preparing pre-assembly bed etc.

1.19
The details of equipments to be erected under this contract are generally as per the schedule given in relevant appendices. These details are approximate and meant only to give a general idea to the bidder about the magnitude of the work involved. Actual quantum and type of equipments will be based on the relevant erection documents which will be furnished to the contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

1.20
Hangers & suspensions, supports etc for tubes, piping, & ducts etc will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required.

1.21
Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.

1.22
Contractor shall lay/install the field-routed/small-bore pipelines to suit site condition/ requirement. Before laying/installing such pipelines, the contractor shall prepare necessary sketch for routing these pipe lines and get the same approved by BHEL. Contractor must take care of the location/layout of other systems and equipment before preparing such sketch to avoid interference. There is a possibility of minor change in routing such pipelines even after completion of erection; contractor shall carry out the same without any extra cost to BHEL.

1.23
Welding of necessary instrumentation tapping points, thermo-well, thermocouple pad, metal temperature measurement (MTM) pad and clamps, root valve, condensing vessel, flow metering & measurement devices, and control valves to be provided on boiler & its auxiliaries and piping are covered within the scope of this specification. The installation of all the above items will be contractor's responsibility even if:

a) Items are not specifically indicated under the respective product groups as given in the technical specifications.

b) Items are supplied by an agency other than BHEL.

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

1.24
Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc are received in assembled condition as integral part of equipments. Contractor shall dismount such instruments for calibration and hand over the same to BHEL. C&I erection agency of B HEL will do storage, re-erection and calibration etc.

1.25
Fixing and seal welding of thermo-wells & plugs before hydro test/ steam blowing of equipment or other piping system are within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermo-wells after hydro test/steam blowing of lines as part of work.

1.26
Actuators/drives of valves, dampers, gates, powered vanes etc may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.

1.27

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

1.28
In installation of various equipments it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials. Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipments to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements will be provided by BHEL on free-returnable basis which shall be returned to BHEL after the use.

1.29
The work shall be carried out strictly in accordance to the “Field Quality Plan” approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.

1.30
All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per the general engineering practice and as per BHEL engineers instructions at site, cutting, weld disposing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scraping, lapping, fitting up etc as may be applicable in such erection works and which are treated incidental to the erection work and necessary to complete the work satisfactorily shall be carried out by the contractor as part of the work within the quoted rates.

1.31
Interconnection/ hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

1.32
It may so happen that certain components like manhole doors, hanger etc may be supplied in loose items. They need to be assembled as per relevant drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.

2.0 DETAILS OF SCOPE OF WORK FOR BOILER & AUXILIARIES & PIPING

The scope of work is further detailed in the specifications hereinafter.

2.1 Pressure Parts

A) Fabrication and installation of **temporary structure** for erection of Boiler Drum is in the scope of the contractor's work. BHEL will issue the required Structural Steel for this purpose free of charges. Contractor shall have to fabricate Built Up Beams and other structural members that are required for supporting the drum lifting equipment. Contractor shall erect, fasten, weld these structures and carry out NDE as per relevant codes and practices as part of work. After completion of drum erection activity, contractor shall dismantle these structures and return to BHEL stores. Contractor shall repair the areas of permanent equipment/ structures as well as Built-Up Structural Beams affected due to installation of temporary structures and finish as per relevant codes of practice or as instructed by BHEL. Payment for installation of temporary structures as aforesaid will be made at the rate accepted for Structures; no separate payment will be made for fabrication, dismantling and finishing work and return of materials.

B) Pressure parts components like headers, panels, coils, loose tubes etc have to be flushed/blown with compressed air, checked for dimensional accuracy and configuration and minor rectifications, if necessary will have to be done before erection. This will involve making appropriate bed of steel structures over the concrete blocks/ steel pedestals. Necessary steel, concrete blocks shall be arranged by the contractor. Bed shall be fabricated as per BHEL requirement.

C) Normally the high pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. No gas cutting will be permitted. All fittings like "T" pieces, weld neck flanges, reducers, etc shall be suitably matched with pipes for welding (this is applicable to piping work also).

D) Welding of all attachments on pressure parts including those required for insulation work is in the scope of work.

E) Surfaces inside seal box and other areas that are to be applied with castable refractory lining shall be painted with black bitumen paint before application of refractory. Seal boxes need to be partially cut open in order to pour refractory. Contractor shall carry out necessary cutting and subsequent seal welding of such cut-outs after setting of refractory. Contractor shall provide the black bitumen paint of required specification for such applications.

F) Furnace area and heat recovery area of flue gas passage has to be made leak proof by seal welding. Air leak test by pressurization has to be conducted to prove effectiveness of the seal weld and soap bubble or any other similar test will have to be

carried out for the entire seal welds to ascertain the effective sealing is achieved. The tests may have to be repeated till satisfactory result is achieved.

G) If required, the pressure parts, after initial erection and tests, will have to be preserved by either dry or wet preservation procedure. Contractor shall erect the piping & valves and provide necessary assistance for the same. Required piping, valves and preservative (gas/chemicals) will be provided by BHEL as free issue.

H) The boiler drum internals, already installed at shop, shall have to be removed to facilitate inspection by statutory authorities and before chemical cleaning. The drum internals are to be preserved properly and re-fitted at appropriate stage as part of work.

I) Super-heater and/or re-heater system will have High Pressure butt weld joints of **T-91 material**. Welding of these HP joints shall involve pre-heating and post heating by resistance heating technique, argon purging of joints during welding process and full TIG welding. Contractor should follow required procedure for T-91 welding, NDE etc.

J) **Boiler drum**: BHEL will hand over the Boiler Drum duly unloaded and stacked on wooden sleepers at the unloading yard. Contractor shall transport the Boiler Drum from the said spot to the cavity of boiler as required for its erection. Contractor shall make all necessary arrangements like arranging and laying of sleeper bed, steel structurals, steel plates & rails etc for transport of Boiler Drum.

Boiler Drum is to be erected using **strand & jack** method. Contractor may engage specialized agency to erect the Boiler Drum by this method. Contractor shall deploy the agency and other resources well in time to suit the milestone schedule.

K) Corrections in the profiles of scalloped plates/bars, skin casing, seal plates etc for proper matching with mating parts, wherever required, shall be done as incidental to the work.

2.2 Trim & Integral Pipeline of Boiler, Power Cycle Pipeline

2.2.1

The work on various piping systems will include cutting to required length, edge preparation, laying, fixing & welding of the pipes / elbows / fittings/ valves etc. In the pipeline, fixing & adjustment of supports / anchors / shock absorbers and carrying out all other activities / work to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL engineers instructions and / or as per approved drawings / documents.

2.2.2

Tubes or pipes wherever deemed convenient, will be sent in random lengths. These shall be cut and edge prepared to suit the site conditions and the layouts. Fittings like bends tees, elbows, reducers, flanges etc will be supplied as loose items. However, bends of tube size up to Nb 65 mm will have to be formed at site as incidental to work.

2.2.3
All drains / vents / relief/ escape / safety valve exhaust piping etc to various tanks / sewage / drain canal / flash box / sump / atmosphere etc from the stubs on the piping and equipments are covered in the scope of work.

2.2.4
Connection (flanged, bolted or welded) of piping to the terminal points/equipments etc is in the scope of work even though such terminal point/equipment may not form part of this work. All NDE including radiography of joints so made, post-weld-heat-treatment if any, are also within the scope of work/specification. The terminal points work is inclusive of cutting of existing lines, if required, edge preparation, welding/ blanking and hook-up work.

2.2.5
It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the connected equipment. Necessary log sheets have to be prepared for such fit-up along with BHEL/customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, is also within the scope of work/ specification.

2.2.6
Mechanical freeness of valves has to be ensured prior to erection.

2.2.7
The above provisions shall be applicable, mutatis-mutandis, to other piping systems e.g. fuel oil piping, lube oil piping of rotating m/c, ACW lines etc.

2.2.8
Main Steam pipeline up to turbine including the strainer and terminal joint with turbine is included in the scope of work. The material will be SA-335 P-91. Bidder shall follow BHEL approved procedure for welding, pre heating, PWHT & NDT of SA-335 P-91 material. Detailed procedure will be issued to the contractor. The main steam pipeline between strainer and turbine does not undergo steam blowing, therefore this pipeline must be throwly cleaned of dust, scale, burr, any foreign materials and deposits by manual and mechanical cleaning method. Contractor shall take atmost care in the cleaning activity so as to ensure that no undesirable particle enters inside the turbine. Contractor shall obtain specific written clearance from BHEL before and after the cleaning activity.

2.2.9
Contractor shall take atmost care and work in co-ordination with BHEL's turbine erection egency to ensure that no undesirable stress/force/load gets tranfered to turbine or any other rotating machine that is connected to the pipelines in scope of this contract.

2.2.10 Following items of work shall also form part of piping erection:

1. Installation & removal of isolating devices/ NRVs and removal & re-fixing of internals required for hydraulic testing, pre-commissioning and commissioning activities. Required gaskets will be supplied by BHEL free of cost.

2. Matching of flanges for achieving parallelism and alignment resorting to heat correction or other suitable methods as per instructions of BHEL engineers.

3. To locate the cause of vibrations in pumps or other auxiliaries and to carry out necessary corrections in piping and its supports. This may involve cutting, fresh edge preparation, welding, radiography, stress relieving, etc. of suction, discharge, re-circulating and other connected piping and its supports at a number of places.

4. Fabrication and erection of racks and steel supports for all the piping including critical piping. Steel for this purpose will be supplied by BHEL.

5. Erection, welding, Heat Treatment and NDE of certain equipments like Flow Nozzles, Control Valves etc, after completion of certain activities e.g. Chemical Cleaning, Steam Blowing etc is part of work. This may involve removal of portions from the already erected pipelines in order to introduce these equipments and resultant edge preparation etc shall be incidental to work. BHEL will make payments for the fresh items on pro-rata basis; the contractual item rate as applicable for the concerned Pipeline shall be adopted for such payment. No separate/additional payment is envisaged for cutting and edge preparation in this regard. The removed pieces of pipes shall be returned to BHEL stores with proper cleaning, dressing and identification marking.

6. Welding of root valves with small length of pipeline to the pressure, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping.

7. Opening of valve actuators, dismantling of actuators from the valves, refitting and rendering assistance connected with the electrical and mechanical problems.

8. Fixing and welding including due NDE & PWHT etc of carrier plates on to the pipes.

2.2.11
As far as possible pre-assy of piping on ground is to be done. The erection of various piping may have to be started from any random reference instead of the terminal points in order to meet milestone completion schedule.

2.2.12
The location of drain headers, valves, stations, steam traps of piping as indicated in the BHEL drawings are suggestive only. The final location and routings shall be decided to suit the site conditions. While routing such lines and fixing the stations, it has to be erected so as to provide easy accessibility and free path for the purpose of easy operation and maintenance. These locations shall be acceptable to the client. Sometimes, the locations of stations and routing of lines may have to be changed as per the site conditions. All such works shall be carried out expeditiously as per the instructions of BHEL engineer. The decision of BHEL engineer is final and binding on the contractor.

2.2.13
The contractual rates shall deem to be inclusive of pre-heating, welding, post heating, post weld heat treatment/ stress relieving and NDE of piping.

2.2.14
Erection of piping systems shall involve co-ordination with the erection of the turbine, turbo-generator, condenser, boiler, boiler feed pumps and other major equipments. Wherever required, approval of concerned BHEL engineer/other erection agency must be obtained prior to making piping interface connections to such equipments. Sequence of work shall be carefully planned to minimize interference with other groups working in the same area. Actual sequence to be followed shall be subject to the approval of BHEL. BHEL may direct the contractor to reschedule his work to suit the status of the site work.

2.2.15
While erecting the field- routed pipelines, the contractor shall check the accessibility of valves, instruments tapping points and maintain minimum headroom/access requirement and other necessary clearances from the adjoining work areas to avoid interference and congestion.

2.2.16
All pipelines shall be given proper slope towards the drain points during erection. For maintaining the slopes as given in the drawings for larger thickness and larger dia pipelines, edge preparation for welding may have to be altered suitably.

2.2.17
All pipelines shall be provided, as per the instructions of BHEL engineer, with suitable vent and the drain points with valve (s) at the highest and the lowest points respectively of the pipeline although they may not be specifically mentioned in the drawings.

2.2.18
It may become necessary to make & install temporary spool pieces for certain process requirements. Contractor's scope shall include preparation, erection, fit-up, welding, NDE etc and dismantling of such spool pieces at appropriate stage without any additional payment.

2.2.19
Normally, setting of hangers in cold condition is done by simulation adding additional temporary weight, which will be roughly equal to the weight of the insulation. Attachment of temporary weights and floating of the joints in the simulation test is to be treated as part of contractual work. Hanger settings may have to be repeated till free-floating joints are achieving. Hanger adjustments to be repeated for steam blowing by resetting hot and cold values if required. This may have to be repeated several times after steam blowing and synchronization. The weights will be supplied by BHEL. Contractor has to transport from BHEL stores and return the same after completion of work. No extra claim on this account will be entertained.

2.3 Rotating Machinery

A) Specifications covered under the following paragraphs and also other relevant specifications contained in other paragraphs elsewhere in this tender specification document will be applicable for rotating machines like FD / ID / PA fans, air pre-heaters, seal air fans, blowers, coal mills, fuel feeders, HP & LP dosing pump skids and other similar auxiliaries.

B) All lubricants for testing, preservation and lubricants for trial runs of the equipments shall be supplied by BHEL as free issue. All services including labour shall be provided by the contractor for drawing these from BHEL / customer's stores, transporting, handling, filling, emptying, re-filling, accounting and return of surplus lubricants / empty containers / old & used

lubricants after draining etc. Contractor should clean the spilled / leaking lubricants thoroughly; consumables for such cleaning will be in contractor's scope.

C) All rotating machinery and equipments shall be cleaned, lubricated, checked for their smooth rotation, if necessary, by dismantling and re-fitting before erection. Also, the equipments may have to be checked for clearances, tolerances at any stage of the work including during testing, commissioning etc. Shaft of the rotating machines shall be rotated periodically to avoid damages. All these shall be part of work.

D) Trial run of the drives in un-coupled state and then coupled with equipment as to be done after necessary alignment.
Forced lube oil systems including lube oil piping of drives, rotating equipments etc form part of the work under these specifications. Hydraulic test of oil coolers, oil piping etc is in the scope of work. Where required cooler may have to be dismantled for hydraulic test and re-erected thereafter as part of work.

E) Certain rotating machinery, after testing, pre-commissioning may have to be re-aligned/hot aligned and vital clearances re-set. This may call for disconnection of cabling, removal of certain instruments etc and restoration at appropriate stage.

F) Protective lubricant coats / fill provided on / in the critical area of equipments have to remove at appropriate stage and regular lubricants, after removal / cleaning of protective coat / fill, as per specifications should be filled / applied. Cleaning / flushing agents / oils will be provided by BHEL.

G) Chemical cleaning, steam blowing and air drying of the connecting pipes for the lube oil system have to be carried out wherever required as per instruction manuals/drawings. Chemicals, suiting BHEL specification, for such chemical cleaning is in the scope of contractor.

H) Even though rotating machines may be grouted to foundation using non-shrink grout mix, blue matching of packer plates / shims with foundation / between packers / equipment base should be done as incidental to work wherever instructed by BHEL engineer.

J) Skid mounted equipments may need checking, re-setting due to various reasons as incidental to work.

K) There are six bowl mills for each boiler, all located in the mill & bunker bay between the boiler and the ESP.

2.4 Electrostatic Precipitator

2.4.1
Wherever called for, pre-assembly of supporting structures, casing walls have to be done, on ground.

2.4.2
Loading of collecting electrodes either from top or bottom, to be decided suiting site conditions, shall be done with due care as per instructions.

2.4.3

Straightness of all collecting electrodes has to be checked on ground prior to loading in to the field.

2.4.4
Bundle of collecting electrodes should be handled only with the set of special lifting beam & slings supplied by BHEL for the purpose.

2.4.5
Clearances as prescribed amongst collecting electrodes and with casing walls have to be maintained. Spot heating of collecting electrodes, wherever called for, shall be done as part of work to achieve the required clearances.

2.4.6
Erection, alignment/ fixing in final position, of high voltage rectifiers of ESP is in the scope of work. However testing & commissioning will be done by other agency.

2.4.7
Installation of high voltage interlocks (excepting rotary switch interlock of switchgear panels) is in the scope of work.

2.4.8
Complete erection, alignment, testing, pre-commissioning and commission etc for drive motors of collecting electrodes and emitting electrode rapping mechanism is in the scope of work.

2.4.10 **Air Leak Test**
After erection of ESP and before clearing for insulation, air leak test has to be carried out. Necessary equipment like, Air Blower, Ventury Meter and Instrument etc will be provided by BHEL. Handling such equipment at stores, transport, erection, commissioning and carrying out the leakage test, attending to the leakages till satisfactory sealing and demonstration of permissible pressure decay condition are in scope of the work. Contractor shall dismantle the test equipments and return to BHEL stores in good condition after due reconciliation, cleaning and servicing. No separate/ additional payment is envisaged for the same.

2.5 Main supporting structures, external structures, elevator structures, stairways, galleries & platforms, roofing and equipment handling arrangement

2.5.1
Boiler main supporting structures have to be erected in a sequential manner.

2.5.2
Quality norms with regard to verticality of column, inter-alia, have to be adhered to strictly, at various stages of erection.

2.5.3
Stiffening/strengthening of main supporting structure, if any, due to deviation in verticality of columns post drum lifting, shall be carried out, including fabrication, if any. Necessary steel for this will be provided in random sizes by BHEL as free issue. Payment for such stiffening/

strengthening shall be made for weight certified by BHEL engineer at the item rate applicable to structures, provided the deviation has occurred for the reasons not attributable to the contractor.

2.5.4
Each of the ceiling girders will be sent in 2 to 3 pieces which shall have to be assembled and welded. NDE & Post Weld Heat Treatment (Stress Relieving) shall be done on ground prior to their erection in position.

2.5.5
It is likely that, in deviation from prescribed sequence, erection of certain elements of structure may be deferred for later stage, to facilitate, say crane boom reach to higher elevation, passage of drum during drum lifting etc. This may necessitate temporary installation of some structural steels at appropriate locations to keep the stability of structure intact. Such temporary installations shall be removed subsequently and returned to BHEL stores/ storage yard. Finishing work in the related permanent structures shall be done as per the instruction of BHEL engineer. BHEL will provide necessary steels on free issue basis in random sizes for such installations, which shall be fabricated by the contractor to suit the requirement.

Payment for such installations shall be made on the accepted tonnage rate of structures. No separate payment will be made for fabrication, removal & return of the materials to BHEL stores.

2.5.6
In some cases, the structural material will be supplied in random lengths, which have to be fabricated to suit the requirement as incidental to work. Also, it may sometimes be necessary to remove some of the erected members to facilitate erection of bigger/ pre-assembled equipments. In such cases, the removal and re-erection of such members as agreed by the BHEL engineer will have to be done by the contractor as incidental to work.

2.5.7
Contractor shall arrange materials required for temporary cat ladders & working platforms during erection of columns, platforms and other structural components. Such arrangements shall, as far as possible, be only of clamping & bolting type, as welding on columns etc will not be permitted. After the completion of work these shall be removed.

2.5.8
All the hand rails and toe guards shall be provided as per drawings and site requirement. Hand rails supplied in running lengths shall be suitably cut, edge prepared and welded. Also, hand rails/ guards may have to be provided from the safety point of view in certain places though not indicated in the erection drawings. The weld joints of hand rails shall be ground smooth to flush finish.

4.2.5.9
Galvanized electro-forged floor grills will be supplied for this project. These may have to be cut to suit requirement. Cutting shall be done only by mechanical cutters **and not by gas cutting**. Cold galvanizing compound is to be applied on the cut surface/edge. Cold galvanizing paint will be supplied by BHEL free of cost.

Fixing of floor grills shall be done by self-tapping screws (approximately 5.5 mm dia and 32 mm long) **and not by welding of studs.** Special purpose electrically operated hand tools are available in the market for this, which drills, taps and fixes the screws in a single operation. BHEL

will supply the necessary self-drilling-cum-tapping screws and fixing clips. Contractor shall deploy the **drilling cum fixing machine** required for this purpose as a regular scope of work.

2.5.10
The contractor shall also install additional platforms of permanent nature for approaching different equipment as per the site requirement and to meet O&M requirements, though these may not indicated in the erection drawings. Materials required for such platforms will be supplied by BHEL in random sizes on free issue basis. These have to be fabricated to suit the requirement. Payment for erected weight as certified by BHEL engineer shall be made at the rate applicable for structures. No payment is envisaged for fabrication of structures.

2.5.11
All relevant provisions as above shall apply, mutatis-mutandis, to the work of external structures, interconnecting structures, elevator structures, ESP stairways and galleries & equipment handling system etc.

2.6 Other products and systems and common requirements

A) The ducting covered under this scope of work is flue gas ducting up to boiler outlet flange, boiler outlet flange to ESP, ESP to ID fans, ID Fans to Chimney, hot and cold secondary air ducting from FD fans outlet up to wind box, hot and cold primary air ducting from PA fans to Coal Mills including interconnections, flow-meters, dampers/gates and their drives, supports and suspensions etc for these systems.

B) Ducts / expansion bellows (metallic & non-metallic) are normally supplied in loose components / segments and these are to be assembled and welded/ jointed at site before erection. The fabric portion of non-metallic expansion joints (NMEJ) namely bolster, fabric belt and canopy shall be installed by contractor under supervision/guidance of equipment supplier/BHEL for the first few cases. Contractor shall ensure that all subsequent NMEJ are assembled with due care and proper procedure. In similar manner all joints, connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be made leak proof and tested as per technical instruction / requirement.

C) Certain structural items like silencer supports, roof cladding structure, platform etc will be supplied in running lengths which shall be cut to required suitable sizes and adjusted/trimmed as part of work.

D) Contractor has to make canopies for motors, actuators, lube oil units, control valves, etc. Material for this will be supplied in random lengths / sizes. No separate payment for fabrication is envisaged. Only the erection tonnage rate applicable for structure will be paid for this work.

E) BHEL will supply **Metapoly Sheets** for roof and side cladding of Boiler and elevator structure. These sheets are to be fixed with self tapping screws (supplied by BHEL) in similar manner as in case of Galvanized floor grills. Contractor shall

deploy the **drilling cum fixing machine** required for this purpose as a regular scope of work.

F) In case the ID fans are provided with variable frequency drive, Contractor has to erect & commission the mechanical components of the fan. Electrical/ Electronic Panels, transformers, cabling etc are not in this work specification. However in case of Hydraulic Coupling, the coupling shall be in scope of this contractor.

G) Actuators / drives of dampers, gates etc may have to be serviced, lubricated before erection, during pre-commissioning and commissioning, including carrying out adjustments required as incidental of the work.

H) All welded joints should be painted with anticorrosive paint/primer immediately after completion of all work. Necessary paints and other consumables for the above work are in the scope of the contractor.

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

J) Hangers and suspensions, support steels for ducts and other equipments, piping etc will be supplied in running/random lengths/ sizes, which shall be cut to suitable sizes and adjusted as required.

K) Touch up and preservative painting of all components issued to and/or erected by contractor shall form part of scope of work. The contractor shall arrange all paints, primer and consumables, T&P and facilities.

3.0 Preparations of foundations, Grouting of Various Equipment

3.1
Building foundations and other necessary civil works for supporting structures, equipments etc will be provided by BHEL / customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits have to be checked and logged by the contractor. The permanent benchmark / reference marks will have to be transferred to new locations with sufficient care to maintain the accuracy and protected / preserved with adequate care (to enable rechecking at later dates) as per BHEL instruction.

Minor adjustment of foundation level, dressing and chipping of foundation surfaces and blue-matching (wherever required) for of all equipments as per BHEL engineers instructions, should be done by the contractor as part of the work. Contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations up to 35 mm for achieving proper levels will be within the scope of work/specification.

3.2
All temporary foundations and anchor points required for installing erection equipments and winches, foundations for pumps, tanks etc are in the scope of contractor. All building materials like cement, steel including reinforcement bars, grits cements etc for such temporary foundations shall have to be arranged by the contractor within the quoted rates. All such foundations shall be demolished and normal ground conditions restored after the usage.

Neutralisation pit required for EDTA cleaning process is to be made by the contractor. After completion of cleaning process the pit has to be dismantled and area is to be backfilled, compacted and levelled before handing over of area to owner.

Effluent of the EDTA cleaning process is to be disposed off safely from neutralising pit to safe areas as per instruction of BHEL/Owner.

3.3
Contractor shall carry out scrapping and blue matching of embedded plates/ packers of rotating equipments. Chipping and the levelling of concrete surfaces, fine dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of this work. Scrapping, chipping and matching shall be done so as to achieve prescribed percentage of contact between the two surfaces.

3.4
BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting / chiselling / grinding

and de-burr the same. However, machining of the packers wherever necessary shall be arranged by contractor.

3.5
Complete grouting of structures equipments, including anchor/ foundation bolts, beneath base, base hollows etc, as may be applicable, is included in the scope of contractor. Arranging all labour, building materials including cement, ordinary Portland as well as quick setting – free flow - non-shrink grout mix (e.g. Conbextra GP1/GP2), form work, shuttering, and any other requirements is in the contractor's scope. Contractor shall obtain approval of BHEL for cement (ordinary Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use. Cleaning of foundation surfaces, pocket holes and anchor bolt pits, making them free of oil, grease, sand and other foreign materials by soda washing, water washing & de-watering and blowing with compressed air or any other methods approved by BHEL are within the scope of this specification/work.

3.6
After the grouting has finally set and cured, alignment of equipments involved shall be checked again to verify for any disturbance or any other reason. If required, de-coupling of equipments has to be done for conducting the verification. In case any disturbance is noticed the cause, if any, shall be removed and re-alignment done as part of work.

4.0 Welding, Radiography and Other Non-Destructive Testing, Post Weld Heat Treatment

4.1 Welding

4.1.1
Installation of equipment involves good quality welding, NDE checks, post weld heat treatment etc. Contractor's personnel engaged should have adequate qualification on the above works.

4.1.2
The method of welding (viz) arc, TIG or other method will be indicated in the detailed drawing/documents. BHEL engineer will have the option of changing the method of welding as per site requirement.

4.1.3
Welding of high pressure joints shall be done by IBR certified & authorized high pressure welders who have been permitted by the Chief Inspector of Boiler (CIB) of state concerned for deployment at the site of work.

4.1.4
Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.

4.1.5
Before any welder is engaged on work, he shall be tested and qualified by BHEL/ customer, though they may possess the IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason. All the expenditure in testing/qualification of the contractor's welder shall be borne by contractor.

4.1.6
Unsatisfactory and continuous poor performance may result in discontinuation of concerned welder.

4.1.7
The welded surface shall be cleaned of slag and painted with primer paint to prevent rusting, corrosion. For this consumables like paint /primer etc will be in the contractor's scope.

4.1.8
HP joint fit-up, should be protected, where required, by use of tapes/protective paint as may be prescribed by BHEL. The contractor shall arrange consumables like protective paints/tapes etc.

4.1.9

The contractor shall maintain welding records in the form as prescribed by BHEL containing all necessary details, and submit the same to the BHEL engineer as required. Interpretation of the BHEL engineer regarding acceptability of the welds shall be final.

4.1.10
In the case of P-91 pipe welding, contractor shall deploy welders qualified for welding of P-91 material. The welders engaged by contractor if not qualified for P-91 welding will be trained by BHEL at BHEL welding research institute (WRI) Trichy and allowed to work only after passing the required test arranged by BHEL. All the expenditure towards such qualification including cost of training, travelling expenses, stay etc., shall be borne by the contractor.

4.1.11
Joint fit up will be a stage of inspection. Where required, joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

4.1.12 Socket Welding:

In execution of this work, considerable number of socket weld joints is involved. The exact quantity of such socket welds or probable variation in the quantum cannot be furnished. The bidder shall take notice of this while quoting as no extra claim on this account will be entertained. The socket welding on hp parts/ hp piping shall be done by the IBR qualified welders. Contractor has to adhere to the procedures/ specification as indicated in the drawing for socket welding.

4.1.13
Welding electrodes have to be stored in enclosures having temperature and humidity control arrangements. This enclosure shall meet BHEL specifications.

4.1.14
Welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the welding electrodes have to be carried in portable ovens.

4.2 HEAT TREATMENT:

4.2.1
For the purpose of temperature recording of stress relieving process, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations shall be as per the standards of BHEL. Thermocouples have to be attached using capacitor discharge type portable thermocouple attachment unit. Contractor shall arrange sufficient number of thermocouple attachment units.

4.2.2

Contractor should provide temperature indicator / temperature recorder for measuring temperature during pre-heating for welding or for controlling temperature of metal for hot correction etc. The temperature recorders should be preferably of solid state type.

4.2.3
Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The contractor shall make all necessary arrangements including labourer required for the same as per directions of BHEL.

4.2.4
In certain cases only the pre-heating of weld joints may be called for.

4.2.5
For weld joints of heavy structural sections, if heat treatment is required, the same shall be carried out as part of the work.

4.2.6
Checking effectiveness of stress relieving by hardness tests (by digital hardness tester or other approved test methods as per BHEL engineer's instruction) including necessary testing equipments is within the scope of the work / specification.

4.2.7
Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the contractor in accordance with BHEL engineer's instructions. Where the electric resistance heating method is adopted contractor shall make all arrangement including heating equipment with automatic recording devices, all heating elements, thermocouples and attachment units, graph sheets, thermal chalks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

4.2.8
All the recorded graphs for heat treatment shall be handed over to BHEL/IBR authorities and due clearances obtained.

4.2.9
During welding & post weld heat treatment of main steam piping (P-91 material), the induction heating process shall continue un-interrupted. Therefore, contactor shall arrange back-up dg set to take care of power interruptions during the process.

4.2.10
Results of these processes shall be verified/ validated as per requirements of BHEL/client.

4.3 NON DESTRUCTIVE EXAMINATION:

4.3.1

Contractor shall provide all resources and make all arrangements for the radiographic examination of welds for this work. For reasons of safety, invariably the radiography work will be carried out after the normal working hours and close of other site activities only. In this regard, the contractor has to adhere to the safety rules / regulations laid by BARC authorities from time to time.

4.3.2
Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL engineer. The minimum quantum of radiographic inspection shall be as per provision of IBR/BHEL's erection documents. They may, however be increased depending upon the performance of the individual welder at the discretion of BHEL engineer/boiler inspecting authority. Bidder shall also arrange the UT equipment with recording facility at his own cost. Usage of UT equipment shall be as per direction of BHEL engineer. Records of UT shall be produced as per site requirement.

4.3.3
All x-ray / gamma ray films of weld joints shall be preserved properly and be handed over to BHEL/IBR authorities and requisite clearances shall be obtained by the contractor.

4.3.4
The field welded joints shall be subject to dye-penetration/MPT/RT/ other non-destructive examination as specified in the respective engineering documents/ as instructed by BHEL.

4.3.5
Where required, surface preparation, like smooth grinding of welded area, prior to radiography shall be done. It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/ technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The contractor shall take all this into account in his offer. The required NDE method/procedure will be decided by BHEL engineer at site.

4.3.6
The percentage of radiography test will be based on BHEL's standard practice/code requirement. Bidder shall note that the percentage shall be suitably increased in case the concerned welders' performance is found inconsistent/unsatisfactory by BHEL. In the event of continued/prolonged unsatisfactory performance, the concerned welder shall be withdrawn forthwith from any further welding work. He may however be re-inducted later after going through fresh qualification tests in accordance
The defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance / rejecting the joints will be final and binding on the contractor.

4.3.7
100% radiograph of certain sizes in piping have to be taken as per relevant codes of practice / BHEL drawings.

4.3.8
For carrying out ultrasonic testing of welding joints of large size tubes and pipes, it will be necessary to prepare surface by grinding and buffing to obtain a smooth finish and contour as necessary. The contractor's scope of work includes such preparation as incidental to work.

4.3.9
After stress relieving 5% of UT for all critical lines and 2% of UT for other alloy steel lines to be taken to ensure soundness of joints particularly stress relieving cracks. No separate payment will be made.

4.3.10
Contractor has to undertake radiography test (RT) of weld joints with Iridium-192 isotope camera. However, for any reason, RT does not become possible then such joints shall be tested by Ultrasonic Test (UT). Contractor has to deploy Level–2 certified operator for conducting RT as well as UT.

4.3.11
In the case of P-91 piping wherever radiography is not possible, Ultrasonic Test has to be carried out apart from other NDE.

4.3.12
For pipes with wall thickness less than 25 mm, no radiography plugs will be provided. Radiography shots to be taken by double wall technique or any other method to be adopted in consultation with BHEL engineer at site.

4.3.13
No separate item rate payment for NDE activities,

5.0 LINING AND INSULATION

Application of insulation, finishing, cladding and outer casing etc of the following:

1. Main Boiler
2. Boiler Auxiliaries including ESP.
3. Pipelines, Tanks & Vessels.
4. Other Equipment including BOIs, though not listed above but required for completion of any system in scope.

5.1
The work shall conform to dimension and tolerances specified in the various drawing and documents that will be provided during the execution. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost. Failing which the work will be got done by engaging other agencies or departmentally and recoveries will be deducted from contractor's bills towards expenditure incurred including 30% departmental charges.

5.2
The terminal points as decided by BHEL shall be final and binding on the contractor.

5.3
All insulation and refractory materials including iron components and outer sheet casing materials, cladding sheets etc required will be supplied by BHEL and the same have to be erected/ applied as per the drawings and specifications of BHEL by the contractor.

5.4
The contractor shall provide the required quantity of wire, nails, and planks for formwork and other materials for shuttering and curing works.

5.5
Contractor shall observe all precaution for laying, curing etc of pourable insulation. The contractor at his own cost shall redo any defective works found.

5.6
Wool insulation is received at site as loose bonded mattresses in standard sizes. These are to be dressed/cut to suite the equipments. Multiple layers of wool have to be applied as directed and as per drawings and specifications for all equipments/ systems covered under the scope of work.

5.7
Cutting & dressing of insulation bricks to suit the site area of application is incidental to work.

5.8
Removable type of insulation has to be provided for valves fittings, expansion joints etc as per drawing or as directed buy BHEL engineer.

5.9
The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for aluminium sheets have to be adhered to.

5.10
Cladding/outer casing shall be fixed expeditiously, so as to avoid damage to the insulation from the weather.

5.11
The overlapping surface of outer casing/cladding sheet shall be coated with sealing compound, which will be supplied by BHEL free of cost.

5.12
To take care of bimetal corrosion due to variety of metals in contact of each other viz retainer to support, support to outer casing/cladding, cladding-to-cladding etc, suitable paints specified by BHEL, to be applied and/or neoprene rubber packing/ strips or any other insert may have to be fixed as required.

5.13
The contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL engineer to facilitate inspection by boiler inspector or during commissioning to fix gauges, fittings, instruments etc. These gaps will have to be finished as per drawings at later date by the contractor at his cost.

Contractor shall cut open works in needed as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over without any extra payment.

5.14
A log book shall be maintained by the contractor for the clearance of the area for application of refractory and insulation. Where the contractor dose the work on his own accord without prior permission, such work should be re-done at his own cost.

5.15
Wastage allowances for the material issued are envisaged as follows:

A	Pourable & Castable insulation	-	2%
B	Insulation bricks and motor	-	2%
C	Wool mattresses	-	2%
D	Cladding sheets	-	2%

The wastage allowance will be applicable on the net issued quantity i.e. Total quantity issued reduced by the quantity returned to stores as unused/fresh item. Contractor shall reconcile the material issues periodically as prescribed by BHEL site.

5.16
The following works are also included in the scope of this contract.

Cutting of cladding sheets as per the profile of the equipment and painting on inner surface with two coats of bituminous paint. Paint will be supplied by BHEL free of cost.

Cutting of the wool mattresses to the required shape and application of finishing cement of required thickness wherever required.

5.17
Insulation work of temporary piping for alkali boil out, steam blowing and chemical cleaning has to be carried out at site. The same have to be removed and returned to the BHEL stores after the completion of activity. Rates quoted for application of wool for boiler and auxiliaries will be applicable for this work also. No separate payment will be made for removal of temporary insulation and return of the same to BHEL stores/yard.

5.18
In certain instances, co-coordinated/phased application of castable refractory/ insulation on pressure parts etc may be necessitated in consideration of sequence of activities of other erection agencies. Contractor shall do such phased work as may be directed by BHEL.

5.19
Prior to application of refractory bituminous painting on the pressure parts and other area is under contractor scope. Only the bituminous paint will be supplied by BHEL free of cost. No separate payment will be made for application of paint.

6.0 PAINTING

Components of the Boiler & Auxiliaries will in general be supplied by BHEL with one coat of Primer and two coats of finish paint applied at the manufacturing shop; contractor shall apply one coat of finish paint on all such components (which are not insulated) after erection at site unless and otherwise the shop coating is damaged in the meanwhile. Following types of paints shall be used for this project.

1) Structure: Chlorinated Rubber
2) Safety Valves and their exhaust pipes: Heat Resistant Aluminium
3) Equipments: Epoxy / Chlorinated Rubber

6.1
In addition to components/equipment as above, there could be limited few without any prior protective coating. Such components shall first be thoroughly cleaned of all dirt, rust, scale, grease, oil and other surface deposits by wire brushing, scraping, washing, wiping with solvent or any appropriate method and the same being inspected and approved by BHEL followed by application of one coat of primer. Afterwards, the above parts shall be over-coated with two layers of **Chlorinated Rubber** paint as per application procedure prescribed by the paint manufacturer.

6.2 Touch-up painting on damaged areas -

a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer.

6.3
Painting of site-welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc has been carried out by the bidder.

(a) Clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.
(b) Painting procedure to be followed as mentioned above for touch-up painting on damaged areas.

6.4
The scope of work includes painting of colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/ customer engineer at site for the equipments/components covered in these specifications.

6.5
In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

6.6
Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The contractor at his own cost shall provide all the consumables and application implements.

6.7
During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, contractor shall repair the same free of cost to BHEL. BHEL will make available only the primer and paints free of any charge to contractor.

6.8
Specified drying time shall be permitted from one to another coat.

6.9
This work requires working at higher altitudes from ground level to as high as 60 m and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to ensure safe and hazard-free working condition. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of appropriate quality for safe and smooth execution of work.

6.10
Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by contractor, BHEL shall have the right to recover the cost of such damages from the contractor.

6.11
Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the contractor without any extra charges.

6.12
In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipment inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the contractor. For the purpose of spray painting, service air at one point will be made available by BHEL free of cost. Laying of air pipeline, hose and any other line required shall be done by contractor at his cost. The contractor shall provide spray equipment set.

6.13
The contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

6.14

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

7.0 Testing, Pre-Commissioning, Assistance for Commissioning

7.1

Testing, pre-commissioning and assistance for commissioning will involve, though not limited to these, various testing e.g. Hydro-static pressure, pressure decay tests, leak test, trial runs of equipments; flushing by air, water, oil, steam as applicable; checking/ setting various clearances/parameters, ensuring operation of various equipments free of undue restrictions, chemical (EDTA) cleaning of boiler, steam blowing of the boiler and the critical piping, floating of safety valves, coal firing, trial operation and loading etc are some of these activities. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

7.2

All these tests should be repeated till all the equipments satisfy the requirement / obligations of BHEL to their client and also the relevant statutory authority.

7.3

Contractor shall lay / install necessary temporary piping, pumps, valves, blanks, gauges, cables, switches etc for conduct of hydraulic / pressure test, chemical cleaning, steam / air blowing etc. This may involve cutting of some portion of existing piping / valves, placing of rubber wedges / blanks in the valves and other openings, fabrication and installation of temporary tanks for chemical mixing, temporary access platforms to mixing tanks etc. Where required, bends have to be fabricated / formed at site from random length / size of pipes / structural steel. Temporary installation itself has to be tested, tried, and subject to non-destructive examinations as per the instructions of BHEL as part of work**.**

No payment will be made for temporary installations made for hydraulic testing of various systems & piping. Similarly no payment will be made for electrical installations made for any temporary system.

7.4

All materials, equipments necessary for installation of temporary system as above will be supplied by BHEL as free returnable issue in random sizes / lengths. However, servicing, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the contractor.

In accounting of materials following wastage allowances are provided:

1. Structural items : 5%
2. Pipes : 3%

No wastage allowance for valves & other equipments.

7.5

Fabrication, fit-up, pre-heating, welding, post-weld heating and post-weld-heat treatment if any, of requisite blanks for conduct of hydraulic test / leakage test is part of work. Similarly, removal of blanks, restoration and normalization of the concerned system / line is to be done as part of work. BHEL will provide the material for blanks free of charge. No separate payment is envisaged for these activities.

7.6
Overhauling, cleaning, servicing of tanks, pumps, equipments, valves, during erection and commissioning stages are in the scope of work. Gaskets, packing & spares for replacement will be provided free of charges by BHEL.

7.7
After chemical cleaning / pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems as per instructions of BHEL engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machinery before and after oil flushing is in the scope of work.

7.8
Transportation of oil drums from customer's / BHEL's stores, filling of oil for flushing, first fill of lubricants and subsequent topping up during trials, tests and commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer / BHEL stores. Similarly, for various pre-commissioning / commissioning activities / processes mentioned in various clauses, transport of chemicals from BHEL / customer's stores, charging of chemicals into the system and returning of remaining chemicals and the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.

7.9
During trial runs/ tests, pre-commissioning / commissioning, replacing / changing mechanical / other seals of equipments like pumps, removal and cleaning / replacing of filters etc is within the scope of work. Replacement spares for this purpose will be provided by BHEL.

7.10
In case any defect is noticed during tests, trial runs of all equipments and their auxiliaries, such as interferences, rubbing, loose components, abnormal noise or vibration, strain on connected equipment etc the contractor shall immediately attend to these defects and take necessary corrective measures. Readjustment and/or realignment, if necessary, shall be done as per BHEL engineer's instructions. Claim, if any, for these works shall be governed by relevant clauses of General Conditions of Contract provided the cause of such work is not attributable to the contractor.

7.11
i) Contractor shall cut / open / dismantle work, if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

ii) Similarly, during the course of erection, if certain portion of equipments erected by the contractor has to be undone for enabling other contractors / agencies of BHEL / customer to carry out their work, contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other contractors / agencies of BHEL / customer as per BHEL engineer's / agencies of BHEL / customers instructions. Claims, if any, in this regard shall be governed as per relevant clauses of General Conditions of Contract.

7.12
During this period, though BHEL/ client's staff will also be associated in the work, the contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc till such time the commissioned unit undergoes trial operations.

7.13
Commissioning activities will continue till the completion of trial operation. During this period contractor shall make available the services of separate dedicated workforce comprising of suitable skilled and semi-skilled / un-skilled workmen and supervisory staff along with necessary tools and plants, consumables etc.

7.14
It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning and commissioning period along with BHEL engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors.

7.15
The contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the contractor.

7.16
At various stages of completion boiler has to be preserved against corrosion either by wet preservation or by dry preservation as per the requirement of BHEL engineer. Contractor shall carry out the entire incidental jobs like filling up of water, dozing of chemicals and pressurizing the system to the required pressure, change of gas refills etc. The boilers have a permanent n_2 blanketing arrangement.

During this period, though BHEL/ client's staff will also be associated in the work, the contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc., till such time the commissioned unit is taken over.

7.17
Commissioning activities will continue till the completion of trial run, trial operation. During this period contractor shall make available the services of separate dedicated labour force comprising of suitable skilled and semi/un-skilled hands along with necessary tools and plants, consumables etc.
7.18
It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning and commissioning period along with BHEL engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors.
7.19
Assistance for conducting performance guarantee test is in the scope of contractor. Contractor shall install all necessary tapping points; instruments etc and provide necessary assistance in this regard.

In case PG test gets delayed beyond the contract period (normal plus grace plus extension if any) due to reasons not attributable to the contractor, PG test issue will be mutually discussed and commercially settled. However contractor shall install the tapping points, impulse pipes, approaches etc as per BHEL instruction and to the extent BHEL inputs are available prior to closure of contract.

7.20
The contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the contractor.

8.0 GENERAL RESPONSIBILITY OF THE CONTRACTOR

8.1
The contractor shall have total responsibility for all equipment and materials in his custody at contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

8.2 Preservation & Protection of Components

BHEL will issue majority of the plant equipment/components duly applied with primer and one coat of finish paint at shop. Components/equipment that will finally remain exposed to atmosphere will be coated with Chlorinated Rubber painting system (except the steam system silencers and their exhaust pipes – provided with heat resistant aluminium paint); while the remaining components will be coated with synthetic enamel paint. During the course of activities at site, the shop coat of paint may get peeled off/burnt. Contractor at all stages of work, shall ensure appropriate preservation of all such equipment/ component that are in his custody including those erected by him by way of applying touch up paint coating. Such preservation shall conform to preservation procedure of BHEL (if any), else according to the instructions of BHEL engineer. BHEL will provide the necessary primer and paint for Chlorinated Rubber paint system free of charges; while contractor shall arrange for the preservation materials for all other types of surfaces including machined surfaces in his cost.

8.3
The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

8.4
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of contractor in compliance of this requirement, BHEL will make suitable arrangement at contractor's risk and cost.

8.5
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc shall be returned to BHEL stores by the contractor.

8.6
The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilisation of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.

8.7
For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.

8.8 Handling of materials from new storage yard.
Customer allotted storage area is about 1 km from the Erection area. The heavy consignments related to boiler & auxiliaries shall be unloaded in this yard area. Contractor has to arrange required capacity crane/trailer and all associated arrangement for loading/transportation of these material up to erection site. No additional claims shall be entertained for this work.

8.9 Computer Based System
BHEL is operating web based computerized site operation management system (SOMS) that includes, inter-alia, issue of materials, daily progress reporting, contractor's running monthly billing and material reconciliation through a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work. In the event the computerized SOMS is inoperative for any reasons, the contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the SOMS as and when the SOMS is re-activated/normalized.

9.0 EXCLUSIONS

The following listed activities are specific exclusions from the scope of work under this tender specification-

1. LP By-pass valve with Hydraulic System
2. Downstream Steam Pipeline from LP by-pass valve to Condenser
3. Interceptor Valve to IP Turbine pipeline
4. Electrical components such as push-buttons, junction boxes etc.
5. E&C work of cable trays, cables and earthing etc
6. Control panels, EPMS, MCC etc.
7. Electrical & C&I items of equipment handling system
8. All electrical and control & instrumentation items except those specified elsewhere in these specifications.
9. Civil works except to the extent specifically indicated elsewhere in this tender.
10. Supply of primer and paints for final painting
11. Pneumatic copper tubing and fittings thereof.
12. Testing and commissioning of heating elements, thermostats, HV rectifier transformers.
13. Electrical and C&I items of variable frequency drives as provided elsewhere in these specifications.