

TENDER SPECIFICATION

No BHE/PW/PUR/VNT5-BLR(Vertical Pkg) U-13 /1091

FOR

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, ELECTROSTATIC PRECIPITATOR, FANS, POWER CYCLE PIPING, COAL MILLS AND COAL FEEDERS, CHEMICAL DOZING SYSTEM, INSULATION, FINAL PAINTING (INCLUDING SUPPLY) ETC AT

1x500 MW NTPC STPP STAGE-V UNIT-13

AT

NATIONAL THERMAL POWER CORPORATION LIMITED (NTPC), VINDHYACHAL
DISTRICT- SINGRAULI
MADHYA PRADESH

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

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1x500 MW NTPC STPP STAGE-V UNIT-13

AT

NATIONAL THERMAL POWER CORPORATION LIMITED (NTPC), VINDHYACHAL
DISTRICT- SINGRAULI
MADHYA PRADESH

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.

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PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date:

1091

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/VNT5-BLR (VERTICAL PKG)U-13/1091
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, ELECTROSTATIC PRECIPITATOR, FANS, POWER CYCLE PIPING, COAL MILLS AND COAL FEEDERS, CHEMICAL DOZING SYSTEM, INSULATION, FINAL PAINTING (INCLUDING SUPPLY) ETC AT UNIT-13 OF 1X500 MW NTPC VINDHYACHAL PROJECT NEAR VINDHYANAGAR DISTRICT SINGRAULI IN MADHYA PRADESH STATE
iii	DETAILS OF TENDER DOCUMENT	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> Applicable
d	Volume-ID	<i>Forms and Procedures</i> Applicable
e	Volume-II	<i>Price Schedule (Absolute value).</i> Applicable
iv	Issue of Tender Documents	<ol style="list-style-type: none"> <u>Sale from BHEL PS Regional office at :Nagpur</u> Start : 10/01/2013 Closes: 30/01/2013 , Time :16.00 Hrs From BHEL website (www.bhel.com) Applicable

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		Tender documents can however be downloaded from website till due date of submission	
v	DUE DATE & TIME OF OFFER SUBMISSION	Date : 31/01/2013, Time :15.00Hrs Place : <u>BHEL PS Regional office at :Nagpur</u> 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/ DGM (Purchase) RK Ranade/ Sr 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)- 500 033	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

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

6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below.
(All pages to be signed and stamped)

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

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vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : <u>Technical</u> Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	<p>ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p>CONTAINING THE FOLLOWING:-</p>	
i.	<p>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</p> <p>2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)</p>	

	PART-II	
	PRICE BID consisting of the following shall be enclosed	
	<p>ENVELOPE-III superscribed as: PART-II (PRICE BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p>CONTAINING THE FOLLOWING</p>	
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	
	<p>ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD</p>	

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	TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING:	
i	<ul style="list-style-type: none">○ Envelopes I○ Envelopes II○ Envelopes III	

SPECIAL NOTE : All documents/ annexures submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

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

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

9.0 Assessment of Capacity of Bidders:

Bidders capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

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

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

i). Total number of Packages

Total number of Packages in hand = P

Where

- P is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced.

ii) Weightage "A" assigned to bidders based on Total number of Packages 'P':

- a) If 'P' = 0-9, : "A" will be equal to '4'
- b) If 'P' = 10-18, : "A" will be equal to '3'
- c) If 'P' = 19-36, : "A" will be equal to '2'
- d) If 'P' = 37-60, : "A" will be equal to '1'
- e) If 'P' is above 60 : "A" will be equal to '0'

- II. **PERFORMANCE:** Here 'Monthly Performance' of the bidder for all the packages (**under execution/** executed during the 'Period of Assessment' in all the Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding the cut off month. The cut off

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month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if 'latest date of bid submission' is in Aug 2011, then the 'performance' shall be assessed for a 6 month period upto and inclusive of June 2011, for all the unit wise identified packages (refer Table I)

- i). Calculation of Overall 'Performance Rating' for 'similar Package/Packages' for the tendered scope under execution at Power Sector Regions:
This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:
- a) $P_1, P_2, P_3, P_4, P_5, \dots P_N$ etc be the packages (**under execution/** executed during the 'Period of Assessment' in all Regions) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = P_T (ie $P_T = P_1 + P_2 + P_3 + P_4 + \dots P_N$)
 - b) Number of Months ' T_1 ' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1 . Similarly T_2 for package P_2 , T_3 for package P_3 , etc for the tendered scope. Now calculate cumulative total months ' T_T ' for total similar Packages ' P_T ' for all Regions (i.e $T_T = T_1 + T_2 + T_3 + T_4 + \dots T_N$)
 - c) Sum ' S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, S_{1-5}, \dots S_{1-N}$) for similar package P_1 , for the 'period of assessment' ' T_1 ' (i.e $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \dots S_{1-N}$). Similarly S_2 for package P_2 for period T_2 , S_3 for package P_3 for period T_3 , etc for the tendered scope for all Regions. Now calculate cumulative sum ' S_T ' of 'Monthly Performance Evaluation' Scores for total similar Packages ' P_T ' for all Regions (i.e ' $S_T = S_1 + S_2 + S_3 + S_4 + S_5 + \dots S_N$ ')
- d) **Overall Performance Rating ' R_{BHEL} ' for the similar Package/Packages (under execution/** executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL):

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

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

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

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

Sl no	Item Description	Details for all Regions							Total
		(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)		(viii)	(ix)	(x)
1	Similar Packages for all Regions →	P_1	P_2	P_3	P_4	P_5	...	P_N	Total No of similar packages for all Regions = P_T ie Sum (Σ) of

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									columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package (as in row 1)	T ₁	T ₂	T ₃	T ₄	T ₅	...	T _N	Sum (Σ) of columns (iii) to (ix) = T _T
3	Monthly performance scores for the corresponding period (as in Row 2)	S _{1-1,} S _{1-2,} S _{1-3,} S _{1-4,} ... S _{1-T1}	S _{2-1,} S _{2-2,} S _{2-3,} S _{2-4,} ... S _{2-T2}	S _{3-1,} S _{3-2,} S _{3-3,} S _{3-4,} ... S _{3-T3}	S _{4-1,} S _{4-2,} S _{4-3,} S _{4-4,} ... S _{4-T4}	S _{5-1,} S _{5-2,} S _{5-3,} S _{5-4,} ... S _{5-T5}	.. ... ... ... ... ...	S _{N-1,} S _{N-2,} S _{N-3,} S _{N-4,} ... S _{N-TN}	-----
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S ₁	S ₂	S ₃	S ₄	S ₅	...	S _N	Sum (Σ) of columns (iii) to (ix) = S _T

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

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

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

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

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

IV. Explanatory note:

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

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Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above

b) **Identified Packages (Unit wise)**

Table-1

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

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

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

d) Vendors who are not first timers and who have not been executing any package or packages similar to the packages under the tender in the 'Period of assessment', shall be considered qualified subject to them satisfying all other tender conditions.

e) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders', then BHEL at its discretion, reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating 'R_{BHEL}'** only.

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

- i. upto Boiler Steam Blowing in case of Steam Generator and Auxilliaries
- ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)
- iii. upto execution of at least 75% of anticipated contract value (unit wise), in case of Enabling works or Civil & Structures.

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

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- g) Performance evaluation in CL 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work
- 10.0 Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.
- 11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.
- 12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.
- 13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.
- 14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.
- 15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**
- 16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.
- 17.0 In case BHEL decides on a 'Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.
- 18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.
- 19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .

However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDS' will be opened for deciding the successful bidder. BHEL's

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decision in this regard will be final and binding on bidder.
- 20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.
- 21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.
- 22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.
- 23.0 Consortium Bidding (or Technical Tie up) shall be allowed only if specified in Pre Qualifying Requirement (PQR) criteria, and in such a case the following shall be complied with:
- 23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.
- 23.2 'Stand alone' bidder cannot become a **'Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected.
- 23.3 Number of partners for a consortium Bidding (or Technical Tie up) shall be as specified in the PQR
- 23.4 Prime Bidder shall be as specified in the Pre Qualification Requirement, else the bidder who has the major share of work
- 23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder" as specified in clause 9.0
- 23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'
- 23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified
- 23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.
- 23.9 Prime Bidder shall be responsible for the overall execution of the contract
- 23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats
- 23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.

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- 23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.
- 23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.
- 23.14 The consortium partner shall submit SD equivalent to 2% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.
- 23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also
- 24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.
- 25.0 The bidder may have to produce original document for verification if so decided by BHEL.
- 26.0 Order of Precedence
In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:
- a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
 - b. Notice Inviting Tender (NIT)
 - c. Price Bid
 - d. Technical Conditions of Contract (TCC)—Volume-1A
 - e. Special Conditions of Contract (SCC) —Volume-1B
 - f. General Conditions of Contract (GCC) —Volume-1C
 - g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(AGM (Purchase))

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List .
03. Annexure-3: Integrity Pact.
04. Annexure -4: Important Information

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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, ELECTROSTATIC PRECIPITATOR, FANS, POWER CYCLE PIPING, COAL MILLS AND COAL FEEDERS, CHEMICAL DOZING SYSTEM, INSULATION, FINAL PAINTING (INCLUDING SUPPLY) ETC AT UNIT-13 OF 1X500 MW NTPC VINDHYACHAL PROJECT NEAR VINDHYANAGAR DISTRICT SINGRAULI IN MADHYA PRADESH STATE		
TENDER NO	SI No	Tender Specification Number	Unit Number & Project
	1	BHE/PW/PUR/VNT5-BLR(Vertical Pkg) U-13 /1090	Boiler Unit 13 of 1X500MW Boiler Vertical Pkg

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 (if applicable)	APPLICABLE	
B	Assessment of Capacity of Bidder to execute the work as per SI no 9 of NIT	APPLICABLE	
C	Technical Executed Erection Testing & Commissioning of Atleast One Boiler (Consisting of Pressure Parts, Structures/ESP and IBR/Power Cycle Piping, of the same Unit as a Stand alone bidder) of a Unit of 190 MW or higher.	APPLICABLE	
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. 2008-2009, 2009-2010, 2010-2011	APPLICABLE	
2	NETWORTH (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive	APPLICABLE	
3	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three Financial Years defined in 'C-1' above based on latest Audited Accounts.	APPLICABLE	

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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	
<p><u>Explanatory Notes for the PQR (unless otherwise specified in the PQR):</u></p> <ol style="list-style-type: none"> 1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures 2. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e total divided by three. 3. C-2:-NETWORTH : Shall be calculated based on the latest Audited Accounts as furnished for C-1 above. Net worth = Paid up share capital + Reserves. (Net worth is required to be evaluated in case of companies) 4. C-3:- PROFIT : shall be NET profit (PAT + Non cash expenditure viz depreciation) earned during any one of the three financial years as in C-1 above 5. Additional Criteria in respect of 'Technical' criteria of PQR (as in 'B' above) for Civil, Electrical, CI, unless otherwise specified:- <ol style="list-style-type: none"> 1. Bidder should have executed similar work of any one of the following: <ol style="list-style-type: none"> a. One (1) work of value not less than Rs XXX <li align="center">OR b. Two (2) works of not less than Rs YYY <li align="center">OR c. Three (3) works of not less than Rs ZZZ <p>(Value XXX, YYY, ZZZ shall be as indicated by BHEL</p> 2. 'Similar' work for criteria 5 above means <ol style="list-style-type: none"> a. Civil or Structures or Civil & Structures or Chimney respectively as applicable to the tendered scope in respect of 'CIVIL' Works b. Electrical works in respect of 'ELECTRICAL' c. CI works in respect of 'CI' Works d. Material Handling and/or Management works in respect of 'MM' works 6. Time period for achievement of the 'Technical' criteria of PQR (as in 'B' above) will be the last 7 years ending on the 'latest date' of Bid submission 7. 'EXECUTED' means the Vendor should have achieved the criteria specified in the Technical criteria of PQR (as in 'B' above) even if the Contract has not been completed or closed 8. Unless otherwise specified, for the purpose of 'Technical' criteria of PQR (as in 'B' above), the word 'EXECUTED' means: <ol style="list-style-type: none"> 1. "BOILER LIGHT UP" in respect of Boiler & Aux and ESP 2. "SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG 3. "STEAM BLOWING COMPLETION" in respect of at least Main Steam Line of Power Cycle Piping 4. "HYDRAULIC TEST" of the system in respect of Structures, Pressure parts/IBR Piping 5. "CHARGING" in respect of power Transformers, Bus ducts, HT/LT switchgears 6. "Completion of RCC Shell and liner (steel or brick as per tendered scope) up to the HEIGHT specified using slip form" in case of RCC Chimney. 7. Achievement of physical Quantities as per respective PQRs in respect of Civil & Structures and Piling Works 8. "Readiness for coal Filling" in respect of Bunker Structure Work. 9. Boiler means HRSG or WHRB or any other types of Steam Generator 10. Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass lines 11. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating in terms of MW shall be considered for evaluation. 12. In case the experience/PAWO certificate enclosed by bidders do not have separate break up prices for the E&C portion of Electrical and CI Works, (i.e. the certificates enclosed are for composite order for supply and erection of Electrical & CI and other works if any), then value of Erection and Commissioning for the Electrical & CI portion shall be considered as 15% of the supply & erection of Electrical & CI, unless otherwise specifically indicated in the PQR. 13. Scope for capital overhaul of STG shall cover Bearing Inspection work and overhauling of all cylinders of the Turbine unless otherwise specifically indicated in the PQR. 			

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	14. In case the tendered scope is not a Pulverised Fuel Boiler, experience of Oil/Gas Fired Boilers also can be considered unless otherwise specifically indicated in the PQR.
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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.

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ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3	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	Whether duly filed & Signed Integrity Pact (Annexure III of NIT) submitted	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 SI 9 of NIT	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)**

Registered Office : BHEL House, Siri Fort, New Delhi – 110 049, India
Website : www.bhel.com

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.

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

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- 8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC/PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

- 9.1 This Pact begins and shall be binding on and from the submission of bid(s) by bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.
- 9.2 If any claim is made/ lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.
- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 10.5 Only those Bidders/ Contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On Behalf of the Principal
(Office Seal)

For & On Behalf of the Bidder/ Contractor
(Office Seal)

IMPORTANT INFORMATION

3. The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site (www.bhel.com ---> Tender Notification -> List of Banned Firms)

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC) CONTENTS

SI No	DESCRIPTION	Chapter	No. OF PAGES
Volume-IA	Part-I: Contract specific details		
1	Project Information	Chapter-I	2
2	Scope of Works	Chapter-II	2
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4	T&Ps and MMEs to be deployed by Contractor	Chapter-IV	6
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V	2
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	Estimated Weights of Various Systems in Scope of Work	Annexure I	26
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Volume-IA	Part-II : Technical Specifications		
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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter - I: Project Information

1.0	Project Information
1.1	INTROUCTION VINDHYACHAL SUPER THERMAL POWER PROJECT IS PIT-HEAD COAL BASED PROJECT OWNED BY NATIONAL THERMAL POWER CORPORATION. 6X210 MW & 6X500 MW UNITS ARE PRESENTLY OPERATIONAL. THE CAPACITY OF PLANT IS BEING AUGMENTED BY INSTALLATION OF ADDITIONAL 1X500 MW SET -13 STAGE -V. THE PROPOSED POWER STATION IS LOCATED IN SINGRAULI DISTRICT OF MADHYA PRADESH HAVING LATITUDE AND LONGITUDE OF 24° 6'N AND 82° 40'E RESPECTIVELY. THE SITE IS SITUATED ON NORTH -WESTERN BANK OF RIHAND RESERVOIR. NEAREST TOWN IS RENUKUT AT A DISTANCE OF 50 KM FROM THE PROJECT. THE NEAREST BROADGAUGE RAIL HEAD SHAKTINAGAR RAILWAY STATION, IS APPROXIMATELY 2.0 KM AWAY FROM PROJECT SITE. MIRJAPUR STATION IS APPROXIMATELY 200 KM AWAY FROM THE PROJECT. PROJECT IS ACCESSIBLE BY ALL SEASON ROAD FROM VARANASI - RABERTSGANG – RENUKUT OR SINGRAULI – WAIDHAN ROAD. THE NEAREST AIR PORT IS VARANASI. OTHER IMPORTANT DATA HIGHEST AMBIENT TEMPERATURE : 44° C LOWEST AMBIENT TEMPERATURE : 10° C

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - II: Scope of Works

2.0 SCOPE OF WORK

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

- 1) 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, electrostatic precipitator, fans, power cycle piping, coal mills and coal feeders, chemical dosing system, insulation, final painting (**including supply**) etc. of 1x500 MW.
- 2) Erection, alignment and welding, bolting, fastening, grouting as applicable of:
 - a) Boiler supporting structures, galleries / walk way / roofing / platforms
 - b) Boiler pressure parts, drum / separator, super heaters, re heaters, economizer, startup circulation system / water circulation pumps, SH and RH desuperheating spray system, soot blowing system, critical steam piping, aux steam pressure reducing and desuperheating system
 - c) Boiler trim & integral piping and mountings
 - d) Fuel oil system comprising of HFO and LDO system, fuel oil piping
 - e) Non-pressure parts, ducting and dampers,
 - f) Rotating machines (e.g. Air heaters, steam coil air pre heaters, coal mills, coal feeders, FD fans, ID fans, PA fans, sa fans, blowers etc. with their drives & lube oil system etc.)
 - g) Pulverised fuel piping, Ceramic Bends for Coal Pipe (Supplied by Jagdishpur)
 - h) External structures (e.g. Duct supporting, pipe rack structures etc.) Including elevator structure.
 - i) Handling arrangements for rotating machines, passenger and goods elevators, passenger elevators for ESP control room
 - j) Power cycle piping (main stream, HRH, CRH etc) and valves including HP/LP bypass
 - k) Electrostatic precipitator and stairways & galleries

TECHNICAL CONDITIONS OF CONTRACT (TCC) Chapter - II: Scope of Works

- l) Chemical dozing system
 - m) Insulation and refractories
 - n) Equipment cooling water sys for SG and aux
 - o) Vibration isolation and spring system
 - P) Fabrication of rack structures and embedment
- 3) Pre-assembly, if any, pre-erection checks as applicable
- 4) Transportation /dragging of boiler drum from unloading bay to inside boiler Structures and positioning on ground, erection using strand jack method including final alignment. **Strand & Jack is in BHEL scope.**
- 5) Non-destructive examination & post weld heat treatment
- 6) Insulation of all exposed metal parts of the equipments including piping, structures etc
- 7) Pre-commissioning checks/tests, trial runs/testing and commissioning
- 8) **Supply of primer/intermediate/finish paint** & Final painting of erected items
- 9) Trial operation and associated tests
- 10) Assistance for conductance of PG test
- 11) Completion of facility/systems
- 12) Handing over of the unit

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description	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		Location will be finalized after joint survey with owner

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	ELECTRICITY			
3.2.1	Electricity For construction purposes of Voltage 415/440 V	Yes		FREE
a	Single point source	Yes		At a distance of 700 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	Electricity for the office, stores, canteen etc of the bidder			Free
a	Single point source	Yes		At a distance of 700 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

SI. No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc			BHEL will not provide electricity for labour colony. Contractor has to make his own arrangement.
a	Single point source		-	
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		FREE
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	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.3.2	Water supply for bidder's office, stores, canteen etc.			Free
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	<u>Water supply for Living Purpose</u>			BHEL will not make any arrangement for water. Contractor has to make his own arrangement
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	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
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 drawings for all the equipments covered under this scope	Yes		
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	"

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/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	"
g	Weekly erection schedules based on SL No. e		Yes	"
h	Daily erection / work plan based on SL No. g		Yes	"
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	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
1	CRAWLER CRANE	75 MT	1	FROM BES TO FULL LOAD
2	CRAWLER CRANE	75 MT	1	FROM BES+3 TO TRIAL RUN
3	CRAWLER CRANE	40 MT	1	FROM BES TO TRIAL RUN
4	MOBILE CRANE	18 MT	1	BES+1 TO FULL LOAD
5	PICK & CARRY CRANE	14 MT	1	BES TO FULL LOAD
6	PICK & CARRY CRANE	12 MT	2	1 ST -BES TO FULL LOAD 2 ND -DL TO TRIAL RUN
7	PICK & CARRY CRANE	10 MT	2	1 ST -BES TO FULL LOAD 2 ND -DL TO TRIAL RUN
8	TRAILER WITH PRIME MOVER	40 MT	2	1 NO. FROM START AND 1 MORE FROM START+2 MONTHS BOTH TILL TRIAL RUN
9	PASSENGER CUM GOODS ELEVATOR	1.5 MT	1	
10	AIR COMPRESSOR (ELECTRIC/DIESEL OPERATED)	140 CFM, 7 KG/CM2	1	
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	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
15	PRE HEATING / STRESS RELIEVING SET (HEATING CONTROL PANEL, CABLES, HEATING ELEMENTS, THERMOMETERS ETC.)	AS REQUIRED	AS REQUIRED	
16	RADIOGRAPHY ARRANGEMENT WITH RADIOACTIVE ISOTOPE SOURCE	IRIDIUM-192	2 SETS	
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: 200 M ³ , 120 – 150M WC, WITH COMPATIBLE ELECTRIC DRIVE 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	

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
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 OVEN 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	FOR HYDRAULIC TEST OF BOILER AND HP PIPELINES.
33	FURNACE MAINTENANCE PLATFORM (SKY CLIMBER)	ADEQUATE CAPACITY	1	TO COVER ONE LENGTH AND ONE WIDTH OF FURNACE
34	HAND WINCH	0.5 TON CAPACITY	3	
35	SCAFFOLDING MATERIALS	SUITABLE FOR WORKING AT VARIOUS HEIGHTS	10,000 Nos.	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
36	PROFILE MAKING M/C	FOR ALUMINIUM SHEET CLADDING WORK	AS REQUIRED	
37	NIBBLING M/C		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	Assorted capacities	AS REQUIRED	
43	FIRE RETARDANT TARPAULINS	AS REQUIRED	AS REQUIRED	
44	FIRE EXTINGUISHER	AS REQUIRED	AS REQUIRED	

PASSENGER CUM GOODS ELEVATOR

Contractor, as part of his T&P, shall arrange, install, operate and maintain 1.5 MT capacity passenger-cum-goods elevator (1 No.) in boiler to facilitate access to various platform elevations upto top floor/boiler drum floor. The elevator shall conform to the national standard and industrial safety code as applicable. These shall be deployed at the time of Boiler Drum erection in consultation with BHEL site engineer.

The probable suppliers for the elevator are:

1. M/s Avon cranes pvt ltd, Gurgaon
2. M/s Mekaster engineering & equipment pvt ltd, Halol

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

B: MEASURING AND MONITORING DEVICES (MMD):

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

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

NOTE:

- 1) ALL THE TOOLS AND PLANTS REQUIRED FOR THIS SCOPE OF WORK, EXCEPT THE TOOLS & PLANTS PROVIDED BY BHEL ARE TO BE ARRANGED BY CONTRACTOR WITHIN THE QUOTED RATES. THE LIST IS SUGGESTIVE IN NATURE. ANY ADDITIONAL T&P REQUIRED TO BE ARRANGED BY THE CONTRACTOR.
- 2) IF ABOVE MENTIONED T & P ARE NOT DEPLOYED IN SPECIFIED TIME BHEL WILL CHARGE TO CONTRACTOR CURRENT MARKET RATE + 30 % OVERHEADS FOR NON AVAILABILITY T&P OR LEVY A DAY WISE PENALTY FOR NON DEPLOYMENT OR DELAYED DEPLOYMENT.
- 3) IF THE WORKS GET DELAYED DUE TO NON-AVAILABILITY OF T&P, BHEL RESERVES THE RIGHT TO GET THE WORK DONE AT THE RISK AND COST OF CONTRACTOR WITHIN PREJUDICE TO RIGHTS OF BHEL AS IN GCC.
- 4) THE MANUFACTURING YEAR OF ALL MAJOR T&PS DEPLOYED BY THE CONTRACTOR (75 MT, CRAWLER CRANE, 18 MT MOBILE CRANE AND 12/10 MT PICK & CARRY CRANE) SHOULD NOT BE MORE THAN 10 YEARS AS ON THE DATE OF DEPLOYMENT. IF AT ANY MOMENT OF TIME DURING THE EXECUTION OF WORK, ANY CRANE IS FOUND TO BE NOT IN A GOOD WORKING CONDITION AND NON-PERFORMING AT DESIRED MINIMUM CAPACITY, AS CERTIFIED BY BHEL ENGINEER, THE CONTRACTOR SHALL DEPLOY ANOTHER CRANE IN GOOD WORKING CONDITION WITH MINIMUM DESIRED CAPACITY. IF CONTRACTOR FAILS TO DEPLOY THE SAME WITH IN 10 DAYS, BHEL WILL RECOVER NON-REFUNDABLE PENALTY PER DAY OF DELAY IN THE FOLLOWING MANNER -
 1. IN RESPECT OF 75 MT CRANE: @ RS. 5,000 / -
 2. IN RESPECT OF 40 MT CRANE: @ RS. 5,000 / -
 3. IN RESPECT OF 18 MT CRANE: @ RS. 3,000 / -
 4. IN RESPECT OF 14 MT CRANE: @ RS. 1,000 / -
 5. IN RESPECT OF 12/10 MT CRANE: @ RS. 1,000 / -

BES = BOILER ERECTION START, CF = COAL FIRING, BLU = BOILER LIGHT UP, FL = FULL LOAD,

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – V: T&Ps to be deployed by BHEL

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – V: T&Ps to be deployed by BHEL

01	Cranes	-	All Cranes (except Contractor scope) required for the mentioned work will be arranged by BHEL as per requirement
02	Strand and jack arrangement	1 set	For boiler drum erection
03	INDUCTION HEATING M/C	As required	FOR WELDING OF P-91 PIPES
04	HUCK BOLTING MACHINE COMPLETE SET	As required	For ESP work
05	Huck installation tools (guns)	As required	FOR FASTENING 12 MM & 16 MM DIAMETER HUCK BOLTS IN ESP.
06	AIR LEAK TEST EQUIPMENTS WITH ALL AUXILIARIES	As required	FOR AIR LEAK TEST OF ESP AND DUCTING ETC.

NOTE:

1. CRANES DEPLOYED BY BHEL SHALL BE OWNED OR HIRED BY BHEL.
2. OPERATOR AND O&M FOR BHEL OWNED CRANE WILL BE ARRANGED BY BHEL.
3. OPERATORS AND O&M FOR HIRED CRANE WILL BE PROVIDED BY THE HIRING AGENCY
4. CONTRACTOR SHALL PROVIDE THE FUEL FOR BHEL PROVIDED CRANES (HIRED/OWNED) FOR THEIR USE.
5. CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENTS LIKE LAYING OF SPECIAL SLEEPER BEDS AND STEEL PLATES (ALL ARRANGED BY CONTRACTOR), ASSEMBLY AND DISMANTLING OF HEAVY LIFT ATTACHMENT, BOOM, JIB ETC FOR MOVEMENT AND OPERATION OF THE CRANE
6. CRANES PROVIDED BY BHEL WILL BE ON SHARING BASIS WITH OTHER AGENCIES / CONTRACTORS OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR. CRANES WILL BE DEPLOYED AT APPROPRIATE TIME AS DECIDED BY BHEL FOR SUITABLE DURATION AND INTENDED PURPOSE.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – IV: TIME SCHEDULE AND MOBILIZATION

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 its 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 Owner the schedule of important milestones is as follows:

SL No.	Milestones	Unit-13
1	Boiler Erection Start	03-Mar-13
2	Drum lifting	03-Aug-13
3	Hydraulic Test	03-Jul-14
4	BLU & ABO Completion	03-Jan-15
5	Steam Blowing Completion	03-Mar-15
6	Synchronization, Coal Firing & Full load operation	03-May-15
7	Trial operation completion	03-Aug-15

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC) Chapter – IV: TIME SCHEDULE AND MOBILIZATION

The contract period for completion of entire work under scope shall be **30 (THIRTY) 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

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

TERMS OF PAYMENT FOR STEAM GENERATOR												
SL NO	Contract (Main Package) Identification ---->	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									

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

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			

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Tender Specification No: BHE/PW/PUR/VNT5-BLR(Vertical Pkg)U-13 /1091
 Technical Conditions of Contract –Volume I A (Part I : Contract Specific Details)

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-VII: Terms of Payment

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	85
II	STAGE/MILESTONE PAYMENTS (15%)												

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-VII: Terms of Payment

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 Synchronization	0								1		
2.16	Coal Firing			2	2	2	2	2		1		1

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-VII: Terms of Payment

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%)											

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

8.0 TAXES, DUTIES, LEVIES (Consolidated Rev 02 dated 20/09/2012)

8.1. For All types of works excepting works covered under sl no 8.2

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

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 12.36 %) 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,

- 1. The name, address and the registration number of the contractor,**
- 2. The name and address of the party receiving taxable service,**
- 3. Description, classification and value of taxable service provided and,**
- 4. 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)/CST 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 inclusive of the same and in no case input or output VAT/CST will be reimbursed extra.

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. Contractor will submit all the details of VAT/CST paid for the contract in the prescribed format of the respective state VAT laws. Also, the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

contractor will issue the tax Invoices to BHEL as per the Tax laws of respective state on monthly basis. Contractor shall also be required to furnish to BHEL necessary proof of VAT remittance on monthly basis.

Deduction of tax at source shall be made as per the provisions of law and is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made.

Further, if BHEL, at the instance of customer or otherwise adopts the specific route for discharging output VAT liability itself, benefit of the reduction in liability of the contractor will be passed on to BHEL.

In case, BHEL is forced to pay any VAT liability on behalf of contractor, the same will be recovered from contractor's bill or otherwise as deemed fit

8.2 'Enabling Works'

~~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. (i.e. rates quoted by bidder shall be inclusive of Service Tax, VAT/WCT and all other taxes and duties)~~

~~However, Since the proposed work is in the nature of 'Works Contract service' as per Service tax law, Hence, For non-corporate contractors being Individual, HUF, Proprietary Firm, Partnership Firm or Association of Persons (AOP), BHEL shall recover the applicable Service Tax under reverse charge mechanism from the contractor and remit the same with the Government as per the provisions of Law. Necessary advice/confirmation of remittance shall be issued to the contractor. The contractor shall not be eligible for any refund/reimbursement of such service tax from BHEL. It shall be the responsibility of the contractor to submit proper invoice giving all the requisite details as per Service Tax Law for the determination of the service tax liability of BHEL under reverse charge mechanism. BHEL reserves the right to determine such liability based on the invoice submitted by the contractor or otherwise independently and remittance of the same with the Government.~~

8.3 New Taxes/Levies

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

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

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

8.4 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.

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Chapter-IX: SPECIFIC INCLUSIONS

SPECIFIC INCLUSIONS

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X : SPECIFIC EXCLUSIONS

10.0 EXCLUSIONS

The following works are specific exclusions from the scope of work under erection, testing & commissioning of tender specification-

- i) Sub-delivery items and electrical components such as push-buttons, junction boxes etc.
- ii) E&C work of cable trays, cables and earthing etc
- iii) Control panels, EPMS, MCC etc.
- iv) Electrical & C&I items of handling system (PG 99)
- v) All electrical and control & instrumentation items except those specified elsewhere in these specifications.
- vi) Civil works except to the extent specifically indicated elsewhere in this tender.
- vii) Pneumatic copper tubing and fittings thereof.
- viii) Testing and commissioning of heating elements, thermostats, HV rectifier transformers.
- ix) Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

APPENDIX -1
LIST OF APPLICABLE PGMA'S FOR ONE UNIT

TRICHY SUPPLY

SI No.	PGMA	Description	Weight (in Kg)
Structures (Rate Schedule Identifier SI No. 1.1 of Rate Schedule)			
1	35010	Foundation Materials-Boiler	21844.6
2	35111	Main Columns Left 1st Pass	432203.6
3	35112	Main Columns Left 2nd Pass	193743.2
4	35121	Main columns Right 1st Pass	432224.2
5	35122	Main Columns Right 2nd Pass	193714.2
6	35130	Main Columns Middle	304704.4
7	35140	Auxiliary Columns-Left Side	319066.6
8	35150	Auxiliary Columns-Right side	319066.6
9	35190	Girder Pin Connections	13212.2
10	35211	Ceiling Structure main Girders 1st Pass	278259.1
11	35212	Ceiling Structure main Girders 2nd Pass	144157.1
12	35213	Ceil Struct -Cross Welded Beams 1st Pass	199241.9
13	35214	Ceil Struct -Cross Welded Beams 2nd Pass	74402.5
14	35221	Ceiling Structure Rolled Beam 1st Pass	45941.1
15	35222	Ceiling Structure Rolled Beam 2nd Pass	29501.4
16	35231	Ceiling Structure Horbracing 1st Pass	18176.7
17	35232	Ceiling Structure Horibracing 2nd Pass	10184.9
18	35311	Horizontal Bracing I Pass I Mbl	26421.8
19	35312	Horiz Bracing li Pass Imbl	18876.7
20	35321	Horiz Bracing I Pass li Mbl	26511.9
21	35322	Horiz Bracing li Pass li Mbl	17001.7
22	35331	Horiz Bracing I Pass lii Mbl	24184.8
23	35332	Horiz Bracing li Pass lii Mbl	21828.5
24	35341	Horiz Bracing I Pass Iv Mbl	18700.5
25	35342	Horiz Bracing li Pass Iv Mbl	38596.8
26	35351	Horiz Bracing I Pass V Mbl	28505
27	35352	Horiz Bracing li Pass V Mbl	17833.7
28	35361	Horiz Bracing I Pass Vi Mbl	28586.8
29	35362	Horiz Bracing li Pass Vi Mbl	20722.9
30	35381	Land Platform Lower	60777.0
31	35382	Land Platform Middle	42008.7

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32	35383	Land Platform Upper	42980.5
33	35390	Platform At Drum Floor Level	64300.7
SI No.	PGMA	Description	Weight (in Kg)
34	35441	Horizontal Beams-Lower	127238.4
35	35442	Horizontal Beams Middle	103861.2
36	35443	Horizontal Beams-Upper	92766.6
37	35451	Horizontal Beams - Lower 2nd Pass	81409.6
38	35452	Horizontal Beams - Middle - 2nd Pass	74886.9
39	35453	Horizontal Beams - Upper - 2nd Pass	47298.0
40	35511	Front Bracing-Lower	53285.2
41	35512	Front Bracing Middle	34585.1
42	35513	Front Bracing-Upper	25642.2
43	35521	Side Bracing-Lower	132493.9
44	35522	Side Bracing Middle	72499.4
45	35523	Side Bracing-Upper	67651.6
46	35531	Rear Bracing-Lower	84926.0
47	35532	Rear Bracing- Middle	39863.7
48	35533	Rear Bracing-Upper	60106.0
49	35700	Hsfg Fasteners For Pg 35	29500.7
50	35811	Floor Grills And Guard Plate	246119.4
51	35821	Stairs – Lower	10026.9
52	35822	Stairs - Middle	7520.7
53	35823	Stairs – Upper	9176.2
54	35851	Hand Rails And Posts	23579.3
55	35993	Consumables and erection materials	11258.7
56	35995	Chute Pipe And Ladders	26448.8
57	36110	Columns Near Air Pre Heaters	297076.6
58	36130	Middle Columns In Boiler	116725.8
59	36150	Beams and bracings Near Air Pre Heater	512771.9
60	36311	Main Floor I Mbl 1st Pass	56262.4
61	36312	Main Floor I Mbl 2nd Pass	67350.7
62	36313	Non-Mbl Floor Between Mbl Iandii	45015.6
63	36314	Non-Mbl Floor Between Mbl Iandii	44624.0
64	36315	Non-Mbl Floor Between Mbl Iandii	58623.8
66	36321	Main Floor Ii Mbl Ist Pass	142952.9
67	36322	Main Floor Ii Mbl 2nd Pass	73130.8
68	36323	Non-Mbl Floor Between Mbl Iiandiii	91097.7
69	36324	Non-Mbl Floor Between Mbl Iiandiii	48128.7
70	36325	Non-Mbl Floor Between Mbl Iiandiii	45568.4

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71	36326	Non-Mbl Floor Between Mbl liandiii	66631.5
SI No.	PGMA	Description	Weight (in Kg)
72	36327	Non-Mbl Floor Between Mbl liandiii	75276.0
73	36331	Main Floor lii Mbl 1st Pass	46828.7
74	36332	Main Floor lii Mbl 2nd Pass	66023.5
75	36333	Non-Mbl Floor Between Mbl liiandiv	33659.1
76	36334	Non-Mbl Floor Between Mbl liiandiv	27363.4
77	36335	Non-Mbl Floor Between Mbl liiandiv	39682.2
78	36341	Main Floor Iv Mbl 1st Pass	53312.5
79	36342	Main Floor Iv Mbl 2nd Pass	82700.6
80	36343	Non-Mbl Floor Between Mbl Ivandv	21478.8
81	36344	Non-Mbl Floor Between Mbl Ivandv	71399.9
83	36346	Non-Mbl Floor Between Mbl Ivandv	12779.1
84	36347	Non-Mbl Floor Between Mbl Ivandv	18492.7
85	36348	Non-Mbl Floor Between Mbl Ivandv	10314.8
86	36351	Main Floor V Mbl Ist Pass	15580.4
87	36352	Main Floor V Mbl li Nd Pass	10642.2
88	36353	Non-Mbl Floor Between Mbl Vandvi	50483.7
89	36354	Non-Mbl Floor Between Mbl Vandvi	21846.7
90	36355	Non-Mbl Floor Between Mbl Vandvi	46754.3
91	36361	Main Floor Vi Mbl 1st Pass	30767.0
92	36362	Main Floor Vi Mbl 2ndpass	19502.6
93	36363	Non_Mbl Floor Above Mbl Vi	19860.6
94	36391	Miscellaneous Platforms-Part I	102439.2
95	36392	Miscellaneous Platforms-Part li	39102.3
96	36393	Miscellaneous Platforms Part lii	9262.0
97	36394	Miscellaneous Platforms Part Iv	10264.8
99	36610	Boiler Roof Structure	110370.0
100	36611	Boiler Roof Sheeting	19297.3
101	36613	Rain Water Pipes And Gutter	24948.1
102	36620	Boiler Side Cladding Structure	66835.3
103	36621	Boiler Side Cladding Sheeting	21891.1
104	36740	Posts And Hangers	67412.5
105	36811	Floor grills and guard plates-Lower	102606.3
106	36812	Floor grills and guard plate Middle	81564.2
107	36813	Floor grills and guard plates-Upper	225322.2
108	36814	Floor grills and guard plate Miscellaneous	84520.4
109	36820	Stairs And Ladders	29067.8
SI No.	PGMA	Description	Weight (in Kg)

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110	36851	Handrails And Posts Lower	15987.3
111	36852	Handrails And Posts Middle	15987.3
112	36853	Handrails And Posts Upper	61641.0
113	36993	Consumables and erection Materials	16553.9
114	37010	Blr Outer Casing Components	32701.2
	38110	Lift columns	14839.4
115	37810	Blr Outer Casing	44711.8
116	38210	Inter Conn Platforms betn Boiler/Elevat	14839.4
117	38299	Mill Handling Monorails	96392.4
118	38310	Conn Platforms To Mill Deaerator Bay	23560.7
	38381	Eco handling structure	32968.2
119	38410	Mill Maintenance Platforms	120580.5
120	38510	Lift beams & bracings	48927.5
121	38610	Elevator cladding structure	49507.0
122	38611	Elevator cladding sheet	19576.7
123	38710	Lift machine room details & misc structure	55549.5
124	38810	Floorgrills And Guard Plate	147656.3
125	38820	Stairs And Ladders	4215.1
126	38850	Hand Rails And Hand Rail Posts	15876.5
SUB TOTAL (STRUCTURES - TRY SUPPLY)			9257312

Pressure Parts (Rate Schedule Identifier SI No. 1.2 of Rate Schedule)			
SI No.	PGMA	Description	Weight (in KG)
1	04126	Upper Drum Without Intl Id 61-71	214252.2
2	04136	Upper Drum Internals Only For Id 61-71	9995.6
3	04146	Upper Drum Sspn Id 61-71	17520.0
4	04196	Upper Drum Trans Strr Id 61-71	4483.2
5	04988	Drum commissioning spares	2.0
6	05138	Inlet front lower WW Header	48311.3
7	05139	Lower Inlet Header Internals	60.0
8	05148	Inlet rear lower WW Header	46526.7
9	05158	Inlet Side Water wall Header (Left)	39347.2
10	05159	Inlet Side Water Wall Header (Right)	39347.4
11	05227	Water wall Rear Hanger Outlet Header	4793.4
12	05229	Water wall Rear Screen tube Outlet Heade	6342.4
13	05231	Outlet Front Upper Ww Header	6306.9
14	05251	Outlet Side Upper Ww Header	14426.4
15	06400	Unclassified Burner Panel	22579.2
16	06631	Front Upper Ww Pnl	61482.1

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17	06633	Front Upper Inter Ww Pnl	57232.6
18	06634	Front Intermediate Ww Pnl	25979.7
19	06637	Water wall Lower Front Panel	28372.5
20	06641	Rear Upper Ww Pnl	29931.7
21	06643	Rear Upper Inter Ww Pnl	55398.3
SI No.	PGMA	Description	Weight (in Kg)
22	06644	Rear Intermediate Ww Pnl	25282.7
23	06647	Rear Lower Ww Pnl	47034.5
24	06651	Side Upper Ww Pnl	82191.0
25	06653	Side Intermediate Ww Pnl	83022.2
26	06655	Side Lower Ww Pnl	64982.1
27	06670	Extended Side Ww Pnl	20730.4
28	07102	Downcomer Piping-Controlled Circulation	78812.5
29	07104	Discharge Line	26978.2
30	07106	Suction Manifold	14017.2
31	07107	Suction Spools	6873.9
32	07215	Relief Tubes From Side Wall Outlet Hea	43178.6
33	07216	Relief Tubes From Rear Hanger Header	5705.9
34	07217	Screen Relief Tubes Header	32951.1
35	07218	Relief Tubes From Front Outlet Header	8873.6
36	07223	Furnace Screen Tubes	28335.2
37	07225	Furnace Rear Hanger Tubes	17564.8
38	07226	Furnace Rear Arch Tubes	10366.7
39	07231	Lower Corner Transition Tubes	4637.1
40	07232	Upper Corner Transition Tubes	621.8
41	07402	Ww Front Header Suspension	18661.3
42	07403	Ww Side Header Suspension	19578.9
43	07404	Ww Hanger Header Suspension	29988.5
44	07405	Ww Screen Header Suspension	2147.3
45	07420	Downcomer Guides	7445.5
46	07431	Riser Tube Support	2736.6
47	07500	Misc Components - Pressure Parts	261
48	07601	Pressure Seals	2877.5
49	07992	Imported Electrodes	135.5
50	07993	Consumables & Erection Materials	1266.6
51	08001	Furnace Upper Buckstay-Frontand Rear	77244.4
52	08003	Furnace Upp.Inter Buckstay- Side	126580.9
53	08006	Furnace Inter.Buckstay	81941.7
54	08007	Furnace Lower Buckstays	81633.6

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55	08111	Furnace Rear Arch Buckstay	39093.7
56	08380	Furnace Bottom Support	46371.0
57	08382	Furnace Bottom Support Rear	46371.0
58	08400	Furnace Guide	8036.7
59	08501	Furnace Back pass buckstay front and Rear	83850.0
SI No.	PGMA	Description	Weight (in Kg)
60	08503	Furnace Back Pass Buckstayside	97125.9
61	08901	Furnace Key Buckstay Upper	5263.0
62	08907	Furnace Key Buckstay Lower	1707.4
63	08910	Ex. Movement Measurement Components.	680.0
64	09001	Seal Boxes For Furnace Opening	9818.4
65	09002	Seal Boxes For Instrument Inserts	2870.2
66	09003	Material For Instrument Inserts	609.4
67	10135	Horizontal Spaced Shinlet Header	7133.5
68	10178	Vertical Platen Sh 1inlet Header	17617.8
69	10182	Sh Rear Wall Inlet Header	6194.3
70	10183	Sh Frontwall Inlet Header	11484.2
71	10185	Sh Rear Roof Inlet Header	11930.9
72	10191	Sh Radiant Wall Roof Inlet Hdr	6059.6
73	10195	Sh Division Panel Inlet Header	11981.5
74	10218	Rear Lower Sh Outlet Hdr	3450.4
75	10235	Horizntl Spaced Sh Outlet Header	21615.1
76	10278	Vertical Platen Sh Outlet Header	32505.8
77	10283	Sh Frontwall Outlet Header	9200.7
78	10291	Sh Radiant Wall Roof Outlet Hdr	10371.9
79	10295	Sh Division Panel Outlet Header	11919.4
80	10315	Sh Rear Intermediate Header	12504.9
81	10687	Sh Radiant Wall Junction Header	6612.5
82	11036	Sh Rear Hori Spaced Coil Upper Left	69894.8
83	11038	Sh Rear Hori Spaced Coil Lower Left	107832.3
84	11077	Sh Rear Vertical Spaced Coil Left	50143.1
85	11078	Sh Vertic1l Platen Coil Left	75864.7
86	11095	Sh Division Panel Coil Left	53550.5
87	11336	Sh Hor spaced upper Coil+Hdr	69894.8
88	11338	Sh Hor Spaced Lower Coil + Hdr	100295.5
89	11377	Sh Vertical Spaced Rear Coil + Header	50144.7
90	11378	Sh Vertical Platen Coil + Header	70069.3
91	11395	Sh Division Panel Coil Right	53550.5
92	11606	Sh Front Upper Panels	8589.1

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93	11608	Sh Front Lower Panels	18138.3
94	11716	Sh Rear Upper Pnl + Atch	5105.0
95	11717	Sh Rear Inter Pnl + Atch	9077.8
96	11718	Sh Rear Lower Pnl + Atch	7874.0
SI No.	PGMA	Description	Weight (in Kg)
97	11767	Sh Stm Cool Side Wall Panel Upper Left	13866.9
98	11768	Sh Stm Cool Side Wall Panel Inter Left	9490.9
99	11769	Sh Stm Cool Side Wall PoneL Lower Left	16198.5
100	11787	Sh Rear Roof Panel + Attachment	8717.2
101	11791	Sh Radiant Wall Roof Panel + Attachmen	20674.4
102	11916	Sh Stm Cool Rear Wall Panel Upper Ri7h	4597.0
103	11917	Sh Stm Cool Rear Wall Panel Inter Righ	8180.4
104	11918	Sh Stm Cool Rear Wall Panel Lower Righ	10431.6
105	11967	Sh Stm Cool Side Wall Panel Upper Righ	13866.9
106	11968	Sh Stm Cool Side Wall Panel Inter Righ	9490.9
107	11969	Sh Stm Cool Side Wall Panel Lower Righ	16249.7
108	11987	Sh Stm Cool Rear Roof Panel Right	9646.2
109	11991	Sh Radiant Roof Panel Right	19905.1
110	12178	Sh Vertical Platen Inlet Pipe	42379.3
111	12395	Sh Division Panel Inlet Tubes	7284.1
112	12495	Sh Div9sion Panel Outlet Tubes	7248.6
113	12515	Sh Rear Hanger Tube	57551.7
114	12619	Sh Horizontal Support Tubes	14075.2
115	12803	Sh Steam Cooled Spacer Tubes	2556.1
116	12805	Super Heater Hanger Tubes	13945.7
117	12850	Sh Conn Pipes-Saturated	7855.4
118	12852	Sh Desh Links	36205.5
119	12900	Sh Desh	4706.2
120	12903	Sh Miscl Components	96523.2
121	12906	Sh Suprts For Lines & Links	7474.0
122	12914	Suspension Of Sh Radiant Roof Headers	4197.8
123	12917	Suspension Of Radiant Roof	13213.4
124	12924	Suspension Of Sh Back Pass Headers	21600.0
125	12927	Suspension Of Rear Roof	2006.1
126	12928	Suspension Of Sh Rear Wall	62088.7
127	12944	Suspension Of Sh Platen Headers	2342.3
128	12948	Suspension Of Vertical Spaced Assembly	40768.6
129	12954	Suspension Of Vertical Spaced Headers	10378.9
130	12968	Suspension Of Platen Assembly	31324.7

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131	12991	Indegenous Electrodes	78.5
132	12992	Imported Electrodes	72.1
133	12993	Consumables & Erection Materials	480.8
134	12994	Port Inst for Insitu Tube Thick measurement	37.1
SI No.	PGMA	Description	Weight (in Kg)
135	15174	Reheater Vert Spaced Inlet Header Rhh1	12214.1
136	15177	RH Vertical spaced rear inlet header	19363.6
137	15278	RH Vertical platen front outlet header	14931.8
138	15279	Rh Vertical Platen Front Outlet Header	30701.8
139	16077	Rh Ver Spaced Rear Coil Asy Left	133744.6
140	16079	Rh Ver Platen Front Coil Asy Left	119810.0
141	16377	Rh Vertical Spaced Rear Coil + Header	133742.3
142	16379	Rh Ver Platen Front Coil Asy Right	119810.0
143	17807	Rh Steam Cooled Spacers	1134.2
144	17174	RH Links	25514.6
145	17904	Rh Hdr Suprts & Suspensions Above Roof	13017.9
146	17919	Rh Front Suspension	32216.5
147	17929	Rh Rear Suspension	63282.1
148	17991	Indegenous Electrodes	75.0
149	17992	Rh Site Electrodes Imported	124.2
150	18002	First Pass Roof Skin Casing	18024.2
151	18003	Second Pass Roof Sk9n Casing	3283.6
152	18010	Pr Pts Attachmnts In Furn Roof Skn Cas	2159.2
153	18020	Vibration Snubbers	216.9
154	19701	Inlet Eco Headers	14240.3
155	19702	Outlet Eco Headers	10415.0
156	19814	Economiser coil Assy Upper Left	71781.9
157	19824	Economiser Coil Assy Lower Left	73268.7
158	19850	Eco Feed Pipe	2957.1
159	19851	Eco Links To Drum	43366.6
160	19884	Eco.Coil Assy Intermediate Left	194911.2
161	19903	Eco. Miscellaneous Components	775.6
162	19905	Eco Suprts & Suspensions Below Roof	393.7
163	19906	Eco Suprts For Lines & Links	3372.5
164	19907	Eco Supports/Feed Pipe Suspension	1837.4
165	19914	Econ-Miser Coil Assy Upper Right	71606.8
166	19924	Economiser Coil Assy Lower Right	63308.5
167	19984	Economiser Coil Middle Right	194911.2
168	19991	Indegenous Electrodes	16.0

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169	19992	Imported Electrodes	14.0
170	21600	Soot Blower Piping And Fittings	14398.9
171	21601	Soot blower Piping Supports	9171.0
172	21700	Bulked Bps Components For Sb Piping	859.0
173	21800	Sb Valves (Bhel)	1913.0
174	21825	Sb Valves (Sub Delivery)	880.0
SI No.	PGMA	Description	Weight (in Kg)
175	21850	Soot Blower Safety Valve (Bhel)	53.0
176	21987	Commissioning spare for SB Safety valve	1.0
177	21988	Commissioning spare for Sub deliveries	0.600
178	21992	Imported Electrodes	62.1
179	24316	RH Dsh	2510.0
180	24355	Circulating Pump Components(Sd)	38286.6
181	24360	Valves (Bhel) Cc Rh Blr	46846.1
182	24365	Valves & Fittings (Sd) Cc Rh Blr	6154.8
183	24374	Cooler & Strainer Assy For Bwcp	2253.2
184	24375	Headers For Trim Piping	2882.8
185	24380	Erv And Safety Valves(Bhel)	8179.4
186	24385	Safety Valve/Erv Silencers(Bhel)	46327.0
187	24700	Bulked Bps Components For Trim Pipes	673.3
188	24950	Special Tools	159.2
189	24955	Lapping tools for SV & ERV	115.8
190	24960	Lapping Tools for Conventional Valves	36.8
191	24987	Commg Spares for Safety Valve/Erv	7.7
192	24988	Commg Spares for Imported Sub-Dely	40.8
193	24989	Commg Spares for Conventional Valves	50.8
194	24992	Imported Electrodes	53.9
195	24993	Consumables & Erection Materials	23.0
196	24994	Name Plates	400.2
197	28220	Doors	12706.5
198	28700	Bps Fasteners	907.5
199	31010	Skin Casing Comps Welded To Pressure P	7878.6
200	31102	Furnace Bottom Skin Casing	866.9
201	31104	Furnace Rear Arch Skin Casing	6763.0
202	31105	Second Pass Skin Casing	360.2
203	31993	Erection Materials	882.4
204	32010	Fixing Comp For Blr Pr Parts Insul	8919.9
205	32110	Fixing Comp For Blr Mountings Insul	3790.1
206	32120	Fixing Comp For Sb Pipes Insul	1210.3

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207	32310	Fixing Comp For Air Ducts Insul	84817.0
208	32410	Fixing Comp For Ah And Gas Ducts Insul	24810.4
209	32510	Fixing Comp For Id Ducts Insul	126899.3
210	32710	Fixing Comp For Oil System Insul	2720.5
211	42001	Pneumatic Fittings	108.6
212	42002	Steam Blow Materials	2426.2
213	42005	Instrument Fittings	520.7
214	42010	LFO Pump Set	6406.9
215	42020	HFO Pump Set	13687.6
216	42030	HFO Heater Set	27669.5
217	42046	Drain oil pump motor assy	800.0
218	42065	Drain oil tank	5510.1
219	42070	Burner Station Skid Assembly	7127.5
220	42120	Piping, Pump House-Fuel Oil	16305.2
221	42128	Piping PH Steam-IBR	1533.8
222	42150	Piping ,Oprg floor HFO & Tracer	8574.6
223	42152	Piping,Opr'G Floor Lfo	1205.4
224	42154	Piping ,Oprg floor- Drain oil	2283.2
225	42157	Piping,Opr'G Floor Atm Air	1752.4
226	42158	Piping , Oprg floor –steam-IBR	4230.9
227	42200	Sub delivery Fuel Oil System	4006.2
228	42300	Bhel Valve F.O. System	889.3
229	42358	Bhel valve, Oprg floor-Steam	1044.4
SI No.	PGMA	Description	Weight (in Kg)
230	42700	Bps Fasteners	1075.1
			28.0
231	42992	Imported Electrodes	
232	42988	Oil & Gas system commissioning spare	14.0
233	45321	Wind Box Support 32-In Width	10533.6
234	45325	Wind box For One And Three Corners	71963.6
235	45326	Wind box For Two And Four Corners	73774.7
236	97297	Mtm clamps & Pads	143.3
237	97298	Mtm Thermocouples & junction boxes	5094.0
SUB TOTAL (Pressure Parts -TRY SUPPLY)			5932587

Non Pressure Parts (Upto ESP Inlet Funnel) (Rate Schedule Identifier SI No. 1.3 of Rate Schedule)

1	20051	Long Retractable Soot Blower T30 Mk li	58836.9
2	20054	Wall Box Non Pressurised For Lrsb Mk I	1237.2

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3	20201	Wall Deslagger Rw5e	15033.6
4	20204	Wall Box Non Pressurised For Rw5e	1739.7
5	20511	DA Head main assy.	226.0
6	20794	Wall Box Non 7ressurised For Temp Prob	63.0
7	20962	FTP IE Main assy	2032.7
8	20998	Special tools	7.4
9	20988	Commissioning spares	5.4
10	30103	Seal Plate Assy	3453.0
11	30105	Furnace Bottom Enclosure Framing	8220.9
12	30211	Furnace Rear Arch Enclosure Framing	5399.2
13	30212	Furnace Extd Side Bottom Enclosure Fra	4777.3
14	30215	Main Boiler	13663.7
15	30219	Vertical Roof Enclosure Framing	75480.0
16	30220	Deck Support And Seals	65726.5
17	30235	Enclosure Support Steel	26678.5
18	41350	Air Cooled Oil Gun Assy	1302.0
19	41390	Oil Gun Vice Assy And Rack	1487.8
20	41500	High Energy Arc Igniter	743.1
21	41988	Commissioning spares	3.0
22	43004	Assy Comp Scanner & Gun Air System	2396.0
23	43005	Assy Comp Mill Seal Air System	17304.9
24	43104	M/C Comp Scanner & Gun Air System	19170.4
25	43105	M/C Comp Mill Seal Air System	35671.1
26	43200	Subdel,Ignitor&Scanner Air System	6026.0
27	47261	Fuel Pipe Supports	44121.8
28	47263	Fuel Pipe Coupling Coller & Orifice	47793.8
29	47266	Fuel Pipe St Pipes For Mill A & B	68630.3
30	47267	Fuel Pipe St Pipes For Mill C & D	75232.5
31	47268	Fuel Pipe St Pipes For Mill E & F	95931.7
32	47269	Fuel Pipe St Pipes For Mill G & H	169104.2
SI No.	PGMA	Description	Weight (in Kg)
33	48012	Rect Duct Bet F.D Fan And Airheater	132491.3
34	48014	Expn Piecesbet F.D Fan And Airheater	5703.0
35	48015	Supportsetcbet F.D Fan And Airheater	21375.6
36	48019	Foundation Materials	4276.4
37	48112	Rect Ducts Pri Fan To Airheater Prisd	64137.2
38	48114	Expn Piecespri Fan To Airheater Prisd	5724.6
39	48115	Supportsetcpri Fan To Airheater Prisd	24979.3
40	48132	Rect Duct Pri Air Fan To Coldairbusdu	33822.2

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41	48141	Seal Air Hag And Id Fan Outgate	2339.2
42	48142	Rect Duct Coldairbus(Temp Air To Mill	43829.3
43	48144	Expn Piecescoldairbus(Temp Air To Mill	3678.9
44	48145	Supportsetccoldairbus(Temp Air To Mill	3945.9
45	48152	Rect Duct Pri Air Fan Interconnection	46919.2
46	48200	Instrument Tappings On Ducting	5363.8
47	48202	Rect Ducts air heater To Wind box duct	229754.1
48	48204	Expn Pieces air heater To Windbox duct	31470.9
49	48205	Supportsetcairheater To Windboxduct	31926.3
50	48207	Flow meters For Secondary Air Flow	38287.0
51	48212	Wind Box Connecting Ducts - Rectangula	31170.9
52	48214	Expn Pieces windbox Connecting Duct	6440.8
53	48222	Rect Duct-Airheater Praside to hotair B	138623.4
54	48224	Expn Pieces air heater Praside to hotair B	14679.6
55	48225	Supports For Hot P.A (Ah To Hot Bus)	12389.4
56	48232	Rect Ducts Hot Air Bus duct(Hotair to mil	86001.7
57	48235	Support Hot Air Bus	9205.8
58	48372	RES. Liner plated panel	16465.3
59	48382	Rect Duct Economiser To Airheater2nop	98895.0
60	48384	Expn Pieces economiser To Airheater2nop	35394.7
61	48385	Supportsetceconomiser To Airheater2nop	28951.1
62	48386	Duct Below Diverter	113728.2
63	48388	Sq Duct, Economiser-Pri Ah	71605.3
64	48412	Rect duct Eco bypass-Gas side	218465.2
65	48414	Exp joint Eco bypass –Gas side	36861.6
66	48415	Supports-Eco bypass –Gas side	37983.6
67	48432	Rect Duct Airheater Boiler Outlet-Gas	108448.3
68	48434	Expn Pieces air heater Boiler Outlet-Gas	23234.3
69	48435	Supportsetcairheater Boiler Outlet-Gas	15811.2
SI No.	PGMA	Description	Weight (in Kg)
70	48462	Rect Duct Boiler Outlet To Elec Precp	346045.9
71	48464	Expn Pieces boiler Outlet To Elec Precp	45811.0
72	48465	Bof To Ep Ducting Supports	42292.2
73	48662	Rect Duct Hot Air Bus To Mills	72715.4
74	48664	Expn Pieces hot Air Bus To Mills	10068.1
75	48665	Supports For Hot Pa To Mills	12814.6
76	48667	Venturi-Primary Air Flow	20232.9
77	48700	Bulked Bps Components	5954.9
78	48993	Erection Materials	16882.6

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79	99300	Cir.Pump,Feed Pump, Handling Equipment	8400.0
80	99400	Airheater,Steamcoil Airheater Handlg E	7740.0
81	99600	Fo System Handling Equipment	975.0
SUB TOTAL (Non Pressure Parts (Upto ESP Inlet Funnel)- TRY SUPPLY)			3291812

Rotating Machine (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)			
1	65736	36 Inch Gravimetric Feeder	75307.5
2	67204	Raw Coal Gates Needle Type	4433.6
3	67272	Coal Valve-36 Inch Motor Operated	9438.7
4	67276	Raw Coal Gate Chain Op 36" Circular	9917.9
5	67283	Feeder Outlet Isolation Gate	12096.1
6	67801	Down Spout	15334.2
7	67802	Bunker Emptying Chute	32939.8
8	67803	Feed Pipe To Mill	23820.8
9	67997	Feeder outlet isolation gate	12096.1
10	97593	Elevator & acc.	60000.0
11	97599	Pneumatic actuator in A& FG System	7340.0
12	97960	Face cutter Tool Electr. Water level Indicator	1.8
SUB TOTAL (Rotating Machines - TRY SUPPLY)			262727

Handling Equipment of Rotating Machines (Rate Schedule Identifier SI No. 2.2 of Rate Schedule)			
1	99099	Misc Chain Pulley Blocks	60.0
2	99100	Fan Handling Equipment	18000.0
3	99502	Pressure parts handling equipment	6320.0
SUB TOTAL (Handling Equipment of Rotating Machines - TRY SUPPLY)			24380

Non Pressure Parts (ESP Outlet funnel to chimney)(Rate Schedule Identifier SI No. 3.2 of Rate Schedule)			
1	39012	Foundation Materials I.D.Duct Supports	22160.2
2	39101	Columns Frames Before Esp- Left	138243.9
SI No.	PGMA	Description	Weight (in Kg)
3	39102	Columns Frames Before Esp -Right	171479.7
4	39141	Cols Frames Near Id Fan-Left	183000.1
5	39142	Cols Frames Near Id Fan - Right	257202.1
6	39150	Col Frames Betn I.D.Fan And Chimney	115335.8
7	39300	Platforms - External Structure	148621.6
8	39301	Struc And Platform For Fans	5319.2
9	39302	Struc For Motor Hood Covering	5670.6

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10	39304	Fan Handling Structure For Fd Fan	12298.0
11	39305	Fan Handling Structure For Pa Fan	13302.0
12	39306	Fan Handling Structure For Id Fan	49173.7
13	39700	Hsfg Fasteners For Pg 39	1469.2
14	39810	Floor Grill	77455.4
15	39820	Stairs	13554.8
16	39850	Hand Rail And Hand Rail Posts	17809.6
17	48482	Rect Ducts-Elec Prptr/M.S To Inddraftf	267658.3
18	48484	Expn Pieceelec Prptr/M.S To Inddraftf	27721.5
19	48485	Supportsetelec Prptr/M.S To Inddraftf	23946.2
20	48492	Rect Duct Ind Draft Fan To Chimney	305638.2
21	48494	Expn Piecesind Draft Fan To Chimney	7674.4
22	48495	I.D.System Duct Supports	47048.5
SUB TOTAL (Non Pressure Parts (ESP Outlet funnel to chimney)- TRY SUPPLY)			1911783

Piping - AS (Rate Schedule Identifier SI No. 4.2 of Rate Schedule)			
1	24300	Boiler Trim Piping And Fittings	84503.9
2	24315	Spray Water System Cc Rh Blr	5984.3
SUB TOTAL (Piping - AS - TRY SUPPLY)			90488

Piping - CS (LP) (Rate Schedule Identifier SI No. 4.4 of Rate Schedule)			
1	24320	Safety Valve Esc Pipe&Drain - Cc Rh Bl	43965.2
2	24325	Silencer Support-Safety Valves	22202.2
3	24335	Sincr&Suprt-Starting Vent - Cc Rh Blr	3392.2
4	24340	Sample Cooler And Supports	916.8
5	24350	Boiler Filling Piping	2769.4
SUB TOTAL (Piping - CS (LP) - TRY SUPPLY)			73246

SI No.	PGMA	Description	Weight (in Kg)
Piping-Hangers and Supports (Rate Schedule Identifier SI No. 4.6 of Rate Schedule)			
1	24301	Boiler Trim Piping Supports	14587.7
2	24351	Hangers And Supports Of Blr Filling Pipe	518.1
SUB TOTAL (Piping-Hangers and Supports - TRY SUPPLY)			15106

Insulation - Insulation (Rate Schedule Identifier SI No. 5.1 of Rate Schedule)			
1	33924	Misc Eqpts Asbestos Materials	166.0
2	33975	Misc Eqpts Sealing Compound	200.0

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SUB TOTAL (Insulation - Insulation - TRY SUPPLY)	366.0
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Insulation - Pourable and Castable (Rate Schedule Identifier SI No. 5.2 of Rate Schedule)			
1	33201	Main Blr Formed Refractory Is8	731.3
2	33210	Main Blr Castable refractory	150000.0
3	33230	Main Blr Pourable Insulation	306000.0
SUB TOTAL (Insulation - Pourable and Castable - TRY SUPPLY)			456731.0

Insulation - Iron Parts (Rate Schedule Identifier SI No. 5.3 of Rate Schedule)			
1	33970	Misc Eqpts Expanded Metal	4770.8
2	33971	Misc Eqpts Woven Wire Cloth	939.2
SUB TOTAL (Insulation - Iron Parts - TRY SUPPLY)			5710.0

Insulation - Wool mattress (Rate Schedule Identifier SI No. 5.5 of Rate Schedule)			
1	33021	Blr Pr Parts Mineral Wool	215490.0
2	33121	Blr Mountings Mineral Wool	6804.0
3	33126	Sb Pipes Mineral Wool	2268.0
4	33321	Air Ducts Mineral Wool	349343.0
5	33421	Air Heater And Gas Ducts Mineral Wool	104942.5
6	33521	Id Ducts Mineral Wool	91825.0
7	33721	Oil System Mineral Wool	50
SUB TOTAL (Insulation - Wool mattress - TRY SUPPLY)			770722.0

TOTAL TRICHY SUPPLY	30248547
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SI No.	PGMA	Description	Weight (in Kg)
Pressure Parts (Rate Schedule Identifier SI No. 1.2 of Rate Schedule)			
1	50510	STEAM COIL APH	11308
2	50610	SCAPH-HORIZONTAL TYPE	10000
3	52000	SPECIAL TOOLS/CONTRA	471
4	52001	TOOLS/ CONT (SEC AH)	752
5	52010	LARG AH-ROTOR ASSY	393419
6	52011	LARG AH-ROTOR POST	15553
7	52012	LARG AH-ROTORPINRACK	3797
8	52013	LARG AH-ROTORSEALS	4590
9	52030	LARG AH-ROTORHOUSING	35750

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10	52041	HOT END CONN PLATE	31308
11	52042	COLD END CONN PLATE	51150
12	52054	LARG AH-AXIAL SEAL	416
13	52055	LARG AH-BY PASS SEAL	875
14	52100	LARGE AH ROTOR DRIVE	5540
15	52101	LARGE AH-AUX ROTOR DRIVE	18460
16	52211	LARG AH-AIRSEAL PIPE	673
17	52220	LARG AH-GENS DETAILS	2236
18	52261	LARG AH-GUIDE BEARNG	2920
19	52262	LARG AH-SUPRT BEARNG	4362
20	52271	OIL PIPING GUIDE BRG	516
21	52272	OIL PIPING SUPRT BRG	536
22	52274	LUB OIL CIRCULATION UN	1102
23	52275	LARGE AIR HEATER-LUBRI	1490
24	52301	WASH MANIFLD GAS INL	914
25	52302	WASH MANIFLD GAS OUT	568
26	52326	CLEANING EQPT GAS OUT	261
27	52329	CLW EQPT DRIVE UNIT	1392
28	52401	WASH MANIFOLD GI (SEC)	2087
29	52402	WASH MANIFOLD GO (SEC)	1266
30	52410	ROTAR ASSY (SEC)	630521
31	52411	ROTAR POST (SEC)	32602
32	52412	ROTOR PIN RACK (SEC)	4748
33	52413	ROTOR SEALS (SEC)	6797
34	52426	CLEANING EQPT GO (SEC)	382
35	52429	CLEAN EQPT DRIVE-SEC	822
36	52430	ROTOR HOUSING (SEC)	42182
37	52441	HOT END CONN PLATE -S	49672
38	52442	COLD END CONN PLATE-S	87909
39	52454	AXIAL SEAL (SEC)	518
40	52455	BY PASS SEAL (SEC)	1140
41	52500	ROTOR DRIVE (SEC)	8397
42	52511	AIR SEAL PIPING (SEC)	890
43	52520	AH GENERAL DETAILS-SEC	1908
44	52561	GUIDE BEARING (SEC)	4363
45	52562	SUPPORT BEARING (SEC)	11584
46	52571	OIL PPG GUIDE BRG (S)	516
47	52572	OIL PPG SUPRT BRG (S)	536
48	52574	LUB OIL CIRC UNIT (S)	1102

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49	52600	LARG AH E,C&I COMPONENT	150
SUB TOTAL (Pressure Parts - BAP RANIPET SUPPLY)			1490451

Non Pressure Parts (Upto ESP Inlet Funnel) (Rate Schedule Identifier SI No. 1.3 of Rate Schedule)

1	57010	GATE FAN OUTLET	16674
2	57033	SA SCAPH INLET DAMPER	8862
3	57063	DAMPER- SA SCAPH OUTLET	11656
4	57083	DAMPER- SA SCAPH BYPASS	11676
5	57110	GUILLOTENE GATE PA FAN	12661
6	57133	DAMPER PA FAN TO COL	7646
7	57141	SEAL AIR HAG AND ID FA	13000
8	57143	DAMPER COLD AIR BUS(TE	4224
9	57160	COLD AIRGATE, AIRBUS T	17000
SI No.	PGMA	Description	Weight (in Kg)
10	57163	DAMPER- PA SCAPH OUTLET	9216
11	57183	DAMPER-PA SCAPH BYPASS	9750
12	57203	DAMP APH TO WINDBOX DU	23641
13	57209	MTG BKT FOR CL DAMPER	7068
14	57223	DAMP APH PRIMARY SIDE	14129
15	57270	GUILLOTENE GATE DUCT T	35000
16	57273	DAMPER- HOT AIR TO MILLS	11668
17	57380	GATE PAPH/SAPH INLET	43757
18	57390	GATE PASS PAH INLET	28294
19	57403	DAMPER PRIMARY GAS O	17663
20	57410	ECONOMISER BYPASS GA	23249
21	57423	DAMPER CASCADE EVOP	13098
22	57433	DAMPER APH BOILER OUTL	28059
23	57460	GUILLOTENE GATE EP INL	44122
24	57466	PLATFORMS AND LADDERS	51827
25	57491	BLOWER WITH MOTOR	5500
26	57497	KNIFE GATE VALVE	5000
27	57577	ELECT ACTUATOR FOR GAT	22500
28	57578	ELECTRICAL ITEMS FOR G	50
SUB TOTAL (Non Pressure Parts (Upto ESP Inlet Funnel) - BAP RANIPET SUPPLY)			496990

Rotating Machine (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)

1	55011	FD FAN FOUNDATION MATL	1750
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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

2	55031	PA FAN FOUNDATION MATL	1700
3	55091	FISRT FILL LUBRICANTS	3780
4	55215	1 REACT FD FAN	28199
5	55334	2 REACT PA FAN	21065
6	55810	AXIAL FDFAN COUPLING	900
7	55830	AXL PAFAN COUPLING	1200
8	55910	AXL FDFAN ACCESSORY	2850
9	55911	AXIAL FDFAN SILENCER	62306
10	55930	AXL PAFAN ACCESSORY	2900
11	55931	PA FAN SILENCER	55999
12	56000	TOOLS & FIXTURE	780
13	56021	ID FAN FDN MATL	5170
14	56077	SEAL AIR FAN C&I ITEMS	30
15	56161	BAC 1 SUC SA FAN	1360
16	56173	BAC 1 SUC IGNTN FAN	5953
17	56228	BAC 2 SUC ID FAN	190363
SI No.	PGMA	Description	Weight (in Kg)
18	56670	IGNITR FAN MOTOR	1500
19	56820	RADL IDFAN COUPLING	110
20	56870	SEAL AIR FAN COUPLING	50
21	56920	RAD IDFAN ACCESSORY	3500
SUB TOTAL (Rotating Machine - BAP RANIPET SUPPLY)			391465

ESP (Rate Schedule Identifier SI No. 3.1 of Rate Schedule)			
1	79401	ROLL/SLIDE SUPPORTS	33800
2	79405	ESP-SUB-DELIVERY COMPO	601
3	79406	INSULATOR HOUSING AS	62015
4	79408	GAS DIST. ASSY	73907
5	79409	GD-RAPPING MECHANISM	13160
6	79410	GD_DRIVE ARRANGEMENT	915
7	79411	GAS SCREEN-EP	31988
8	79413	EMIT SYST SUSPENSION	19800
9	79414	SUPPORT INSULATORS	8640
10	79415	EMITTING ELECTRODES	29658
11	79416	EMIT ELECT RAPP MECH	38880
12	79417	DRIVE ARG. FOR EMIT.	38015
13	79419	COL ELEC SUSPENSION	134574
14	79420	COLLECTING ELECTRODE	1357861
15	79421	EMIT SYS FRAME-TOP	120761

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Tender Specification No: BHE/PW/PUR/VNT5-BLR(Vertical Pkg)U-13 /1091
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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

16	79422	EMIT SYS FRAME BOTOM	153959
17	79423	INSPECTION DOORS	21431
18	79424	SHOCK BARS	107012
19	79425	COLL ELECT RAPP MECH	101453
20	79426	COLL ELEC RAPP DRIVE	8239
21	79428	ESP ROOF PANELS	168767
22	79430	ELECTRICAL SD COMPTS	16560
23	79431	GEARED MOTORS FOR RAPP	22000
24	79432	EMIT SYS FRAME-MIDLE	211977
25	79437	JUNCTION BOX & PUSH BU	1900
26	79442	OUTER ROOF-EP	266358
27	79443	HOPPER RIDGES	85744
28	79444	HOPPER UPPER PART	347291
29	79445	HOP MLD&LOWER PART	578540
30	79446	INSULATOR SUPP PANEL	106019
SI No.	PGMA	Description	Weight (in Kg)
31	79447	ROOF PANEL ASSY	150608
32	79448	CASING STRUCTURE	435248
33	79449	CASING SHELL/PANEL	568802
34	79450	INLET-OUTLET FUNNEL	171610
35	79455	PENT HOUSE FOR E P	165000
36	79457	SPLITTER&GUIDE VANES	28825
37	79459	CONTROL ROOM-INSERTS	58000
38	79461	EP PERF TEST EQUIPT	850
39	79465	APP PLATFORM-HOPPER	104364
40	79466	WATER WASHING SYSTEM	5488
41	79472	INTERLOCKS-EP	2400
42	79473	ELECTRICALLY OPERATED HOIST	6800
43	79474	OPACITY MONITOR & ACCE	700
44	79478	BAPCON & ACCESSORIES	428
45	79480	FOUNDATION MATLS FOR E	25284
46	79481	SUPPOTING STRUCTURES F	814820
47	79490	HEATING ELEMENTS	1050
48	79491	PANEL TYPE HOPPER HE	25000
49	79996	TOOLS & TACKLES	91
SUB TOTAL (ESP - BAP RANIPET SUPPLY)			6727193

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

Non Pressure Parts (ESP Outlet funnel to chimney)(Rate Schedule Identifier SI No. 3.2 of Rate Schedule)			
1	57470	EP OUTLET GATE	44122
2	57480	ID FAN INLET GATE	59603
3	57490	GUILLOTENE GATE ID FAN	57981
4	89610	EP GALLERIES&STAIRS	69074
5	89611	ESP ROOF HANDRAILS	9484
6	89612	FLOOR GRILL AND STEP T	67935
7	89613	FLOOR GRILL AND MOBILE	147061
8	89614	PENT HOUSE ROOFING SHEET	6
9	89615	INSULATION CLADDING SHEET	73340
SUB TOTAL (Non Pressure Parts (ESP Outlet funnel to chimney) - BAP RANIPET)			528606
SI No.	PGMA	Description	Weight (in Kg)
Insulation -Aluminium Cladding Sheets (Rate Schedule Identifier SI No. 5.4 of Rate Schedule)			
1	79468	FIXING COMP. FOR ESP I	43658
SUB TOTAL (Insulation -Aluminium Cladding Sheets - BAP RANIPET SUPPLY)			43658
Insulation - Wool mattress (Rate Schedule Identifier SI No. 5.5 of Rate Schedule)			
1	79467	MIN WOOL FOR ESP INSUL	321030
SUB TOTAL (Insulation - Wool mattress - BAP RANIPET SUPPLY)			321030
TOTAL RANIPET SUPPLY			10406260

PC CHENNAI SUPPLY

Piping - P91 (Rate Schedule Identifier SI No. 4.1 of Rate Schedule)			WT/Boiler (Kgs)	IBR
1	80300	MS FROM SUPERHEATER TO BOILER STOP VALVE	34000	I
2	80301	MS FROM BOILER STOP VALVE TO ESV	104000	I
3	80304	MS HEADER TO HPBP VALVE	20000	I
4	80310	HRH FROM REHEATER TO INTERCEPTOR VALVE	167000	I
5	80311	HRH FROM INTERCEPTOR VALVE TO TURBINE	15000	I
6	80312	LPBP VALVE UPSTREAM & DOWNSTREAM	54000	I
SUB TOTAL (Piping - P91 - PC CHENNAI SUPPLY)			394000	
Piping - AS (Rate Schedule Identifier SI No. 4.2 of Rate Schedule)			WT/Boiler (Kgs)	IBR
1	80303	MS HEADER TO AUX PRDS	12000	I

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

2	80307	HP & LP BYPASS WARM UP	1900	I
3	80321	HPBP VALVE TO CRH PIPING	12000	I
4	80329	EXTRACTION STEAM TO BFP DRIVE TURBINE	9000	I
5	80336	EXTRACTION STEAM TO HP HEATER NO.1	7500	I
6	80339	AUX STEAM TO BFD TURBINE	1300	I
7	80901	SUB DELIVERY VALVES FOR LIGHT UP	10000	N
8	80992	IMPORTED ELECTRODES	5800	N
SUB TOTAL (Piping - AS - PC CHENNAI SUPPLY)			59500	
SI No.	PGMA	Description	Weight (in Kg)	IBR
Piping - CS (HP) (Rate Schedule Identifier SI No. 4.3 of Rate Schedule)				
	80320	CRH FROM TURBINE TO REHEATER	134000	
1	80322	CRH PIPING TO DEAERATING HEATER	7200	I
2	80323	STEAM TO BFP DRIVE TURBINE	2300	I
3	80324	CRH HEADER TO AUX.PRDS	1050	I
4	80331	EXTRACTION STEAM TO LP HEATER-2	4500	I
5	80332	EXTRACTION STEAM TO LP HEATER-3	4200	I
6	80335	EXTRACTION STEAM TO DEAERATING HEATER	18000	I
7	80337	EXTRACTION STEAM TO HP HEATER-2	3800	I
8	80340	AUX STEAM HEADER	4000	I
9	80341	AUX STEAM HEADER INTERCONN BETWEEN UNITS	150000	I
10	80342	AUX STEAM TO SCAPH	14000	I
11	80343	AUX STEAM TO AH SOOT BLOWERS	2600	I
12	80344	AUX STEAM TO FO SYSTEM TP	35000	I
13	80345	AUX STEAM TO DEAERATING HEATER	3200	I
14	80349	AUX STEAM TO GLAND SEALS - TG SCOPE	1200	I
15	80351	AUX STEAM TO UNLISTED	12300	I
16	80352	AUX STEAM TO UNLISTED	1500	I
17	80355	STEAM TRACING PIPING	11000	I
18	80395	AUX STEAM TO FUEL OIL ATOMISING	900	I
19	80418	ERECTION MATERIALS FOR INSTRUMENTS	450	N
20	80420	BOILER FEED PUMP SUCTION	23000	N
21	80421	BOILER FEED PUMP RECIRCULATION	22000	I
22	80423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	64000	I
23	80424	BFD BETWEEN HTRS & GROUP PROTECTION VLV	23000	I
24	80425	BFD FROM FINAL HPH TO SG TP	117000	I
25	80430	SPRAY WATER TO HPBP	4000	I
26	80431	SPRAY WATER TO AUX PRDS	2300	I
27	80432	SPRAY WATER TO BOILER DESH UPTO SG TP	17000	I

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OF WORK

28	80433	SPRAY WATER FROM BFP INTERSTAGE	4500	I
29	80450	CBD AND EMERGENCY DRUM DRAIN	3800	I
30	80451	BOILER INTEGRAL PIPING DRAINS	14000	I
31	80452	HP PIPING DRAINS - SG SCOPE	15500	I
32	80452	HP PIPING DRAINS - TG SCOPE	9000	
33	80454	SCAPH DRAINS	7000	N
34	80471	BOILER WASH WASH TO AND FROM UNIT	19500	
35	80480	FIRE WATER-OTHER AREA	20000	
36	80992	IMPORTED ELECTRODES	400	N
37	81128	HIGH PRESSURE DOSING SYSTEM	3500	N
38	81411	DIRECT GAUGES FOR STEAM LINES	1250	N
39	81421	SENSING ELEMENTS FOR STEAM LINES	3000	
40	81422	SENSING ELEMENTS FOR STEAM LINES	2500	
SUB TOTAL (Piping - CS (HP) - PC CHENNAI SUPPLY)			787450	
SI No.	PGMA	Description	Weight (in Kg)	IBR
Piping - CS (LP) (Rate Schedule Identifier SI No. 4.4 of Rate Schedule)				
1	80363	EXHAUST STEAM FROM PRIME MOVERS-TG SCOPE	23000	N
2	80364	CBD TANK VENT TO SYSTEM	3200	I
3	80365	CBD TANK VENT/SV EXHAUST TO ATMOSPHERE	1500	N
4	80366	IBD TANK VENT TO ATMOSPHERE	11000	N
5	80368	SCAPH DRAIN TANK VEN	2800	N
6	80371	DRAIN FLASH TANK VENT TO CONDENSER	12100	N
7	80373	AUX STEAM HEADER SV EXHAUST	4500	N
8	80375	UNLISTED SV EXHAUSTS - TG SCOPE	1500	N
9	80379	HPH SV EXHAUST TO FLASH TANK	3500	N
10	80381	HP HEATER VENTS - TG SCOPE	3400	N
11	80382	LP HEATER VENTS	1200	N
12	80385	VENT FROM UNLISTED PPG/EQPT TO COND	11400	N
13	80388	CONDENSER AIR EVACUATION PIPING	3600	N
14	80400	CONDENSATE SUCTION	7300	N
15	80401	CD FROM PUMP TO LPH1/DC INLET TEE&RECIR	30000	N
16	80402	CD FROM LPH1/DC INLET TEE TO TG TP	20000	N
17	80403	CD FROM TG TP TO DEAERATING HEATER	11000	N
18	80407	CONDENSATE FOR SEALING OF VACUUM	2200	N
19	80408	CONDENSATE DUMP FROM HEADER	700	N
20	80412	CONDENSATE TRANSFER	1200	N
21	80419	DEAERATOR SAFETY VALVE EXHAUST TO ATM	4000	N
22	80436	SPRAY WATER TO LPBP DESH	5000	N
23	80439	TURBINE FLASH TANK DRAIN TO CONDENSER	650	N

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24	80441	LP HEATER-2/3/4/5 DRAINS & DRIP PUMPINCL	6000	N
25	80442	GLAND STEAM COOLER DRAINS	250	N
26	80443	LP HEATER-1 TO CONDENSER	4000	N
27	80446	DEAERATING HEATER OVER FLOW AND DRAIN	4000	N
28	80447	HP HEATER DRAINS	13000	N
29	80448	DRAIN FROM UNLISTED EQPT/VESSEL-TG SCOPE	9000	N
30	80449	TG CYCLE PIPING DRAINS & VENTS	5200	N
31	80453	LP PIPING DRAINS - SG SCOPE	8500	I
32	80453	LP PIPING DRAINS-TG SCOPE	10000	
33	80455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	8100	N
34	80457	MANIFOLDS FOR HP FLASH BOX & CONDENSER	1500	N
35	80459	HP FLASH TANK DRAIN TO CONDENSER	1500	N
36	80460	SG AUX COOLING WATER UNIT SYSTEM	78000	N
37	80463	TG AUX COOLING WATER	83000	N
38	80468	MAIN CIRCULATION WATER PIPING	116000	N
39	80473	DEMINERALISED WATER SYSTEM	3000	N
SI No.	PGMA	Description	Weight (in Kg)	IBR
40	80477	SERVICE WATER PIPING-SG	2900	N
41	80477	SERVICE WATER PIPING-TG	5000	
42	80493	HP FLASH TANK VENT TO CONDENSER	3000	N
43	80494	LP FLASH TANK VENT TO CONDENSER	2500	N
44	80495	LP FLASH TANK DRAIN TO COND	2500	N
45	80610	SERVICE AIR-COMP SUCT & DIS TO RECEIVER	5000	N
46	80612	SERVICE AIR FOR INDIVIDUAL UNITS	17000	N
47	80614	INST AIR COMP SUC & DIS TO RECEIVER	3000	N
48	80616	INSTRUMENT AIR FOR INDIVIDUAL UNITS	15000	
49	80673	LUBE OIL PIPING SYSTEM	6000	N
50	80930	H&S FOR SYNCHRONISATION-TG	38000	N
51	80650	FUEL OIL SUPPLY AND RETURN PIPING	145000	N
52	80901	SUB DELIVERY VALVES FOR LIGHT UP	300	N
53	81110	COOLING WATER PUMP	400	N
54	81412	DIRECT GAUGES FOR NON-STEAM LINES	1000	N
55	81414	LOCAL CONTROL EQPT FOR NON-STEAM LINES	900	N
56	81415	TEST THERMOWELLS	500	N
57	81416	PERFORMANCE GUARANTEE TEST MATERIALS	1000	N
58	81435	JUNCTION BOXES	50	
SUB TOTAL (Piping - CS (LP) - CHENNAI SUPPLY)			764850	

Piping - SS (Rate Schedule Identifier SI No. 4.5 of Rate Schedule)

IBR

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Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

1	80600	HIGH PRESSURE DOSING PIPING	1000	N
2	80601	LOW PRESSURE DOSING PIPING	800	N
SUB TOTAL (Piping - SS - PC CHENNAI SUPPLY)			1,800	

Piping- Hangers and Supports (Rate Schedule Identifier SI No. 4.6 of Rate Schedule)				IBR
1	80940	AUX STRUCTURE FOR CRITICAL PIPING - SG	290000	N
2	80920	H&S FOR HYDRO TEST	9500	N
3	80921	H&S FOR LIGHT UP STEAM LINE	153000	N
4	80928	H&S FOR BOILER LIGHT UP - TG	96000	N
5	80934	STANDARD HANGER COMPONENTS-SG	19500	N
6	80934	STANDARD HANGER COMPONENTS-TG	20000	
7	80993	MISC ERECTION MATERIALS	1100	
8	81003	CONTINUOUS BLOW DOWN EXPANDER-D1500 MM	4000	I
9	81009	INTERMITTENT BLOW DOWN EXPANDER-D2500 MM	6500	N
10	81012	CLEAN DRAIN FLASH TANK-DIA 1500 MM	5000	N
11	81036	CW STORAGE TANK 16-25 CUM	6500	N
12	81041	IMPURE CONDENSATE TANK	4000	N
13	81042	MAKE UP WATER STORAGE TANK BELOW 300CUM	8200	N
14	81440	LOCAL INSTRUMENT RACKS	22000	
SUB TOTAL (Piping- Hangers and Supports - PC CHENNAI SUPPLY)			645300	

Insulation - Insulation (Rate Schedule Identifier SI No. 5.1 of Rate Schedule)				IBR
1	81341	SEALING COMPOUND FOR INSL	1200	N
SUB TOTAL (Insulation - Insulation - PC CHENNAI SUPPLY)			1200	

SI No.	PGMA	Description	Weight (in Kg)	IBR
Insulation - Iron Parts (Rate Schedule Identifier SI No. 5.3 of Rate Schedule)				
1	81318	FIX COM FOR MISCELLANEOUS PPG INSULATION	32000	N
SUB TOTAL (Insulation - Iron Parts - PC CHENNAI SUPPLY)			32000	

Insulation -Aluminium Cladding Sheets (Rate Schedule Identifier SI No. 5.4 of Rate Schedule)				IBR
1	81350	ALUMINIUM CLADDING FOR INSULATION	86000	N
SUB TOTAL (Insulation -Aluminium Cladding Sheets - PC CHENNAI SUPPLY)			86000	

Insulation - Wool mattress (Rate Schedule Identifier SI No. 5.5 of Rate Schedule)				IBR
1	81325	MINERAL WOOL MATTRESS	380000	N
SUB TOTAL (Insulation - Wool mattress - PC CHENNAI SUPPLY)			380000	

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

TOTAL CHENNAI SUPPLY	2675908
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HYDERABAD SUPPLY

Rotating Machines (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)			
1	61000	Journal Assembly	221850
2	61100	Mill Drive and Bowl Assembly	249750
3	61200	Mill Side and Liner Assembly	187020
4	61300	Classifier Assembly	407502
5	61400	MDV Assembly	51390
6	61700	Mill Motor Coupling	1278
7	61800	Lubricating Oil	13608
8	61900	Foundation Fastener Assembly	44955
9	67400	Seal Air Header Assembly	21708
SUB TOTAL (Rotating Machines - HYDERABAD SUPPLY)			1199061
TOTAL HYDERABAD SUPPLY			1199061

JHANSI SUPPLY

ESP (Rate Schedule Identifier SI No. 3.1 of Rate Schedule)		
1	HVR Transformer	120000
TOTAL JHANSI SUPPLY		120000

IS-MOTOR SUPPLY

Rotating Machines (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)		
1	ID Fan Motor-2 No.	63000
2	FD Fan Motor-2 No.	18300
3	PA Fan Motor-2 No.	30000
4	Mill Motors-10 No.	78500
TOTAL - IS MOTOR SUPPLY		189800

PEM SUPPLY

SI no.	Item	Weight (in KG)
Insulation - Wool Mattress (Rate Schedule Identifier SI No. 5.5 of Rate Schedule)		
1	Bonded mineral (Rock) wool mattresses Tonnage	225000
TOTAL PEM SUPPLY		225000

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

*** Rate Schedule Identified for PGMAs of Piping and Insulation are Indicative only and based on envisaged material specification. Payment shall be made on the basis of material specification of actual material received and erected at site.**

Estimated Weight (In KG) of Various System in The Scope of Work for Unit # 13

SN	Package	Trichy	PC - Chennai	BAP – RPT	Hyderabad	HERP - Varanasi	CBU	Jhansi	IS - Motor	PEM	Total
1.1	Structure	9257312									9257312
1.2	Pressure Parts	5932587		1490451							7423038
1.3	Non Pressure Parts (Upto ESP Inlet Funnel)	3291812		496990			-				3788802
2.1	Rotating Machines	262727		391465	1199061	-			189800		2043053
2.2	Handling Equipment of Rotating Machines	24380.0									24380
3.1	ESP			6727193				120000			6847193
3.2	Non Pressure Parts (ESP Outlet Funnel to Chimney)	1911783.0		528606							2440389
4.1	Piping - P91		394000								394000
4.2	Piping - AS	90488.0	59500								149988
4.3	Piping - CS (HP)		787450								787450
4.4	Piping - CS (LP)	73246.0	764850								838096
4.5	Piping - SS		1800								1800
4.6	Piping - Hangers and Support	15106.0	645300								660406
4.7	Piping - Temporary (Steam Blowing)										0
4.8	Piping - Temporary (Chemical Cleaning)										0
5.1	Insulation	366.0	1200								1566
5.2	Pourable and Castable	456731.0									456731.0
5.3	Iron Parts	5710.0	32000								37710
5.4	Aluminium Cladding Sheets		86000	43658							129658
5.5	Wool Mattress	770722.0	380000	321030						225000	1696752

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Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE
OF WORK

Total =	22092970	3152100	9999393	1199061	0	0	120000	189800	225000	36978324
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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-II LIST OF IBR WELD JOINTS

(Will be issued during Execution)

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
1.1	1AC	Drum(Except internals),Drum Suspension 04-114,116,118,124,126,128,210,212,214,270	SSPC-SP3/ Power tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base)to IS 12744	1 /DFT= 30um per coat	.....	.....	Synthetic Enamel paint (Long oil Alkyd) to IS 2932	2 DFT=20um per coat	International -Orange Shade No:592 of IS 5	70	
1.2	1AC	Drum Suspension 04-142,144,146,148	SSPC-SP3/ Power tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base)to IS 12744	1 /DFT= 30um per coat	.....	.....	Synthetic Enamel paint (Long oil Alkyd) to IS 2932	2 DFT=20um per coat	International -Orange Shade No:592 of IS 5	70	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
1.3	5	Drum internals 04-134,136,138 Other mechanical components 43-101,102,103,104,105,106,107	SSPC-SP1 / or SSPC – SP3 Solvent / Power Tool Cleaning	Rust Preventive Fluid to PR:CHEM: 09-04	1 DFT= 25um	.....	.....	.....	.....	.....	25	
1.4	1AE	Drum Transport Structures 04-194,196,35-391,810	SSPC-SP3/ Power tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base)to IS 12744	1 /DFT= 30um per coat	.....	.....	Synthetic Enamel paint (Long oil Alkyd) to IS 2932	2 DFT=20um per coat	Yellow Shade No:356 of IS 5	70	
2.1	11	Foundation Materials and Pinc 35-010,011,012,013,020,030,190 38-01039-010,011,012,020,03	.....	No paint	.....	.....	.....	No paint	.....	.....	.....

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		0,040 48-019 & columns below '0' level of pg 35,36,38 & 39										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
2.2	1A	Buck stays and structureal items Buck stays 08- 001,003,006,007,10 1,104,107,111,380,3 82,400,500,501,503, 700,900,901,904,90 7,910 Boiler supporting structures35- 100,110,111, 112,120,121,122,13 0,131,132,133,134,1 35,136,140,141,142, 143,144,150,151,15 2,153,160,161,162,1 71,172,173,174,181, 182,183,184,185,18 6,191,192,193,194,1 95,196,210,211,212, 213,214,220,221,22	SSPC-SP3/ Power tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base)to IS 12744	1 /DFT= 30um per coat	.....	.....	Synthetic Enamel paint (Long oil Alkyd) to IS 2932	2 DFT=2 0um per coat	Smoke Grey Shade No:692 of IS 5	70	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		2,230,231,232,240,250,310,311,312,320,321,322,330,331,332,340,341,342,343,351,352,360,361,362,380,381,382,383,390,392,410,420,430,440,441,442,443,451,452,453,461,462,463,471,472,473,481,482,483,500,510,511,512,513,514,520,521,522,523,524,530,531,532,533,540,541,542,550,551,552,561,562,563,571,572,573,581,582,583,591,592,593,594,595,596,597,598,599,610,612,613,710,711,712,713,715 36-										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		110,120,130,150,200,211,212,220,221,222,230,231,232,240,241,242,250,251,252,260,261,262,270,271,272,280,281,282,290,291,292,300,301,302,310,311,312,313,314,315,316,320,321,322,323,324,325,326,327,330,331,332,333,334,335,340,341,342,343,344,345,346,347,348,350,351,352,353,354,355,360,361,362,363,370,371,372,380,381,382,383,390,391,392,393,394,395,396,397,410,420,430,490,491,492,510,520,610,612,620,621,630,63										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		1,632 38- 110,120,130,210,21 1,299,310,311,380,3 81,390,410,510,511, 512,513,521,522,61 0,611,612,620,710,7 12,720,730 39- 100,101,102,110,12 0,121,130,140,141,1 42,143,150,160,200, 210,300,301,303,30 4,305,306,311,312,3 23,390,391,392,393, 901 Duct support 48- 005,015,025,045,05 5,065,085,105,115,1 25,145,155,185,195, 200,205,215,225,23										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		5,245,255,265,275,295,305,315,325,335,345,355,365,375,385,415,425,435,445,455,465,475,485,496,665,805,815,825,845,855,865,875,885,995, Piping Center 80-800 to 882,920 to 933,940										
<p># Out of 2 coats of Epoxy based finish paint, one coat of Epoxy finish paint shall be given at shop / subcontracting works and second coat of Epoxy finish and one coat of aliphatic Polyurethane paint shall be applied at site.</p>												

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
2.3	1A	Hangers : 36-740,741,742,743,744	SSPC-SP3/ Power tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	1 /DFT= 30um per coat	.....	.....	Synthetic Enamel paint (Long oil Alkyd) to IS 2932	2 DFT=20um per coat	Smoke grey Shade No:692 of IS 5	70	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
2.4	1AB	Hand Rails & Posts 35-850,851 36-850,851,852,853 38-850,851 39-850,851	SSPC-SP3/ Power tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	1 /DFT= 30um per coat	.....	.....	Synthetic Enamel paint (Long oil Alkyd) to IS 2932	2 DFT=20um per coat	Black	70	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
2.5	6	Floor grills, Guard plate 35-811 36-010,810,811,812,813,814,815,816,840 38-810,811 39-810,811,840,841	Floor grills: hot dip galvanizing to a coating weight of 610 gm per sq.m (minimum) and to a coating thickness of 85 microns minimum.									

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
2.6	1AB	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	Red Oxide Zinc Phosphate Primer (Alkyd Base)to IS 12744	1 /DFT= 30um per coat	.....	.....	Synthetic Enamel paint (Long oil Alkyd) to IS 2932	2 DFT=20um per coat	Black	70	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
3.1	PS1 A1	Components < 95° C 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	SSPCSP3/ Power Cleaning Tool	Heat Resistant Aluminium Paint to IS 13183 Grade-1	1 (DFT= 20 microns)	....	....	Heat Resistant Aluminium Paint to IS 13183 Grade-1	1 (DFT=20 um per coat)	Aluminium	40	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
3.2	3	Components < 95° C Insulated 05- 137,139,147,153,154,155,158,159,175,188,195,220,227,229,231,236,241,246,251,265,281,283,296,30340,341,350,493,879,900 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- 100,120,122,135,136,140,141,151,170,174,178,179,180,191,195,218,220,222,23	SSPCSP3/ Power Cleaning Tool	Red oxide zinc Phosphate Primer (Alkyd Base) To IS 12744	2 (DFT= 30 um per coat )	....	....	.....	....	Red oxide	60	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		5,236,240,241,251,270,274,278,279,280,283,284,291,295,315,687 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-										

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		020,021,025,030,031,032,033,036,037,038,128,150,153,158,159,48-032,034,035,132,135,202,204,207,208,212,214,217,221,222,224,227,228,229,232,234,242,244,252,254,261,262,264,267,272,274,276,282,284,292,294,302,304,307,308,309,311,312,314,318,319,322,324,332,334,342,352,362,364,372,374,381,382,384,386,388,389,392,412,414,422,424,426,432,434,438,439,442,444,452,454,462,464,467,468,4										

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		69,472,474,482,484,486,487,488,489,491,492,494,496,497,498,499,602,612,622,632,646,652,654,656,662,664,666,667,668,669,676,686,696										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
3.3	2	Heat Exchanger coils : (SH,RH & Economiser coils) 11- 036,037,038,074,077,078,095,135,136,138,170,174,175,178,179,235,237,238,248,250,251,271,272,274,275,277,278,279,280,336,337,338,340,342,356,358,370,374,377,378,395,585,587,591,606,608,616,618,682,683,684,685,686,687,688,691,694,716,717,718,767,768,769,787,791,882,883,884,885,887,916,917,918,967,968,969,986,987,988,991,994,999	SSPC-SP2 Or SSPC-SP3 Hand tool/ Power tool clearing	Red OxideZinc phosphate Dip coat primer to PR-CHEM:09-03	1 DFT=35 um per coat	....	....	....	....	....	35	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		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- 077,079,132,235,236,237,238,2586,275,277,279,281,377,379 19- 001,104,105,114,124,184,802,814,824,884,914,924,984										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
3.4	3	Components coming in gas path other than coils 06-033,036,037,041,043,046,047,052,054,089,090,091,092,093,094,130,133,136,137,141,143,146,147,152,154,189,190,191,192,193,194,231,331,350,400,430,466,467,500,530,609,611,613,614,616,620,621,623,624,630,631,633,634,636,637,639,640,641,643,644,646,647,649,650,651,652,653,654,655,657,658,659,670,689,690,691,692,693,694,695,709,713,714,715,7	SSPC-SP3/ Power clearing tool	Red OxideZinc phosphate primer (Alkyd base) To IS 12744	2 DFT=300 um per coat	....	....	....	....	Red oxide	60	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		16,720,723,730,731,733,734,737,740,741,743,744,747,749,750,751,753,755,789,790,830,840,850,851,857,895,896,897 10-182,183,184,185 15-988,999 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, 32-001,002,005,006,00										

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Tender Specification No: BHE/PW/PUR/VNT5-BLR(Vertical Pkg)U-13 /1091
Technical Conditions of Contract –Volume I A (Part I : Contract Specific Details)

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		7,008,009,011,012,0 21,022,023,024,025, 026,027,031,033,04 1,042,043,044,050,0 55,061,073,110,120, 210,620,720,810,91 0,993 42-129										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
3.5	8A	Uninsulated 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 clearing tool	General Purpose Aluminium Paints to IS 2339	2	...	...	...	...	Aluminium	40	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				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	Abrasive blast cleaning to Sa 2 & half 35-50 microns	Epoxy zinc rich primer to IS 14589 Gr.II %vs =35 (min)	1 DFT=40 um/coat	..	...	Aliphatic acrylic polyurethane paint %vs=40 (min) t	1 Dft=30 Um per coat	Phirozi Blue Shade no. 176 of IS5	70	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
5.1	1A	Miscellaneous and casing sheets 07-500,501,600,601,997,999 19-101,102,21-601,987 24-101,125,130,135,140,201225,230,235,240,301,325,335,340,350,370,374,400,401,425,430,435,440,470,471,473,501,525,535,540,570,601,625,635,640,800,801,815,825,987,989,996,998 35-994,995 36-613,903,999 37-010,110,210,310,41	SSPC-SP3/ Power clearing tool	Red OxideZinc phosphate primer (Alkyd base) To IS 12744	1 DFT=300 um per coat	Synthetic enamel paint (Long Alkyd)to IS 2932	2 DFT=200	Smoke grey Shade no. 692 Of IS 5	70	

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		0,510,610 39-302,924 Fuel firing 41- 100,110,200,310,32 0,330,340,350,390,4 10,420,430,450,460, 470,997 Steam blowing piping 42-002,003,005,010 42- 040,045,050,055,06 0,065,070,111,112,1 13,114,118,119,120, 121,122,123,124,13 0,131,132,151,152,1 54,155,156,157,160, 165,170,176,180,19 5,196,989,997,998 43- 000,001,002,003,00										

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		4,005,006,007,008,997,999,45-050,120,160,161,180,181,220,221,260,261,321,325,326,40147-121,122,123,124,125,129,140,141,142,143,144,145,146,149,161,162,163,164,165,169,180,181,182,183,184,185,189,200,201,202,203,204,205,209,221,222,223,224,225,241,242,243,244,245,246,247,248,249,261,262,263,264,647,648,649,650,746,953,959,963 Duct plates and expansion joints										

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
		48- 002,004,007,011,01 2,014,017,018,022,0 24,028,032,034,040, 042,044,052,054,06 2,064,066,072,074,0 82,084,092,094,102, 104,107,112,114,11 6,122,124,132,142,1 44,152,154,162,172, 182,184,192,194 Coal handling 65- 051,060,070,260,40 2,403,460,724,736,7 38,786 67- 204,251,256,261,26 6,271,272,276,277,2 83,286,400,801,802, 803,804,999 99-201,299										

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
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 clearing tool	Red OxideZinc phosphate primer (Alkyd base) To IS 12744	2 DFT = 30 um per coat	....	....	....	....	Red oxide	60	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
6.1	10	Cast carbon steel valves (Conventional) Cast alloy steel valves (conventional) All API valves QCNRV,SV & SRV Silencer, Water level gauge HP/LP system 22-101,889	SSPC-SP3/ Power clearing tool	Heat resistant Aluminium Paint to IS 13183 Gr-1	2	....	....	....	....	....	40	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
6.2	...	Forged valves	Phosphate	Coating Weight of 1500 mg per sq.ft	....	.....	....	....	.....	....	....

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
6.3	1AS	Soot blower components 20-001,003,004,021,051,054,201,204,301,304,331,511,794,801,821,831,962,972	SSPC-SP3/ Power clearing tool	Red OxideZinc phosphate primer (Alkyd base) To IS 12744	1 DFT=300 um per coat	....	....	Synthetic Enamel paint (long oil alkyd) To IS 2932	2 DFT=200	Verdigri s Green Shade no.280 of IS 5	70	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
6.4	36	On shore components OFE	SSPC-SP3/ Power clearing tool	HB Chlorinated rubber based Zinc Phosphate Primer DFT=50 um Per coat	2	....	....	Chlorinated Rubber based Finish paint DFT=30 um Per coat	2	French Blue Shade no. 166 Of IS 5	160	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
6.5	35	Off shore components	SSPC-SP /power cleaning tool	High build Epoxy mastic aluminum primer	1 DFT=100 um per coat	Aliphatic acrylic Poly urethane paint %VS=40 (min) IS 13213	1 DFT=300 um per coat	French blue Shade no. 166 Of IS 5	130	

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

SN	Scheme No.	PGMA Description /	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total um (min)	DF
				Paint	No. of Coats	Paint	No. of Coats	Paint	No. of Coats	Shade		
6.6	8A	Hand wheels	SSPC-sp3/power tool cleaning	General purpose Aluminum Paint to IS 2339	2 DFT = 100 um per coat	...	....	....	....	....	40	

NOTES:-

This painting scheme covers a comprehensive list of PGMA's being used in 125/210/250/500/600MW and industrial boilers

TECHNICAL CONDITIONS OF CONTRACT (TCC) Annexure-III PAINTING SCHEME

under fossil boilers working in normal environment, in an effort to standardize the painting scheme. Therefore, the entire list of PGMA's will not be applicable for any specific project and only those PGMA's applicable for the project may be used, while choosing the painting scheme applicable.

- . Rust Preventive Coating should be given on HSFG Bolt and nut threads.
 - . All threaded and machined surfaces and all retainers 'A' & 'C' types are to be applied with a coating of Temporary Rust Preventive oil.
 - . 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 solvent.
- . PGMA's under Sub-Vendor items are not indicated Please refer respective Engineering document for all sub-vendor items. Wherever it is not specified, it shall be as per the painting scheme of the applicable PGMA.
 - . No painting is required for Aluminium, Stainless Steel components & galvanized items. Abrasive blast clearing to SSPC-SP6 (Sa 2) grade shall be done to prepare the surface of hot worked pipes prior to application of primer.
 - . 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. For items meant for Spares and subcontracting where no further processing is involved, the painting scheme selected shall be the same as that of similar product configuration description.
 - . The Temporary Rust Preventive coating that already been applied on any components, tubes, pipes etc., shall 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).
 - . All currently active PGMA's are covered. Requirement for missing /new PGMA's will be included under the relevant

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section, following the appropriate paint logic.

0. 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.

In components, wherever plates / sheets of thickness less than or equal to 5 mm and rods/tubes/drain pipes are used, power tool / hand tool cleaning to SSPC – SP3 / SP2 shall be followed and the painting shall be done as described in SI.No.5.1.

1. Touch-up painting of damaged areas shall be carried out as per clause applicable painting scheme.
2. Only weldable primer shall be applied on surface , which require to be welded subsequently at site .

At those locations no other Paint shall be applied.

4. DUs coming under constant load hangers (CLH) shall be painting 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)
5. For internal protection of pipes ,tubes ,headers and other pressure parts ,volatile corrosion inhibitor (VCI) pellets shall be put (after sponge testing/ draining/or drying) and subsequently end capped .The dosage of VCI pellets shall be approximately 100 gm/Cu.m. For tubes typically 4-5 tablets per end are to be put . For C & I items the dosage of self indicating silica gel (colorless)shall be 250 gm/cu.m.(About 2-3 bags weighing approximately each) VCI pellates shall not be used for stainless steel components & its composite associates.

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Annexure-III PAINTING SCHEME

6. All threaded components of spring assemblies and tumbuckles shall be galvanized and achromatized to 15 microns minimum thickness.
7. Painting scheme for all temporary structures shall be PS 1AE i.e. 1 coat of Red Oxide Zinc Phosphate primer (Alkyd Bse) to IS 12744-30 microns and 2 coats of Synthetic Enamel paint (Long oil Alkyd)to IS 2932-DFT-2X20 microns shade yellow-shade No.356 of IS 5-Total DFT 70 microns.

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Annexure-III PAINTING SCHEME

Painting Scheme – Details for procurement & application purposes

Material 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.
120016131800	Heat resistant Aluminium paint to IS 13183 Grade I	10	1	....	...	Aluminum	....	Brush/Spray	24
120011111900	Red oxide Zinc Phosphate primer paint to IS 12744	10	1	...	...	Red oxide	...	Brush/Spray	12
120011121900	Red oxide zinc phosphate dip coat primer paint to PR:CHEM:09-03	10	1	...	...	Red oxide	.....	Dip	12
120011311200	Long oil alkyd synthetic enamel finish paint to IS 2932	10	1	Reqd.shade	Compdg. Shade no.	Brush/Spray	12

BHEL-PSWR

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120011140000	Temporary Rust preventive fluid to PR:CHE:09-04	10	1	Amber	...	Brush Spray /	12
120012141700	Epoxy zinc rich primer to IS14589 Gr. II	8	2	35	40	Grey	...	Spray	24
120013310200	Aliphatic acrylic polyurethane paint to IS13213	10	2	40	30	Phirozi-Blue/French Blue	176/166	Spray	24
120017101800	De oxy Aluminates Weldable primer-colour Aluminium	10	1	...	...	Aluminium	....	Brush Spray /	24
120014111700	HB CR Based Zinc Phosphate primer	10	1	40	50	Grey	...	Brush/Spray	12
120014300100	CR Based Finish Paint	10	1	30	30	French blue	166	Brush/Spray	12
12001213800	High Build Epoxy Mastic Aluminium Primer	8	2	80	100	Aluminium	....	Spray	24

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/VNT5-BLR(Vertical Pkg)U-13 /1091
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GENERAL REQUIREMENTS – COMMON TO ALL WORK

11.1

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.

11.2

The terminal points decided by BHEL shall be final and binding on the Contractor for deciding the scope of work and effecting payment for the work done.

11.3

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.

11.4

The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and 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.

11.5

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.

11.6

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.

11.7

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

11.8

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

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effected from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.

11.9

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

11.10

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

11.11

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

11.12

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.

11.13

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

11.14

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

11.15

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

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11.16

The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel for such usage. Only the steel for making temporary structure (cat head) for drum lifting will be provided by BHEL in random sizes materials available at site.

11.17

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

11.18

The distance between storage area and erection site is approx. 5 KM. However one yard is also located nearby erection site within proximity of 1 KM approx. Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as incidental to work.

11.19

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

11.20

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

11.21

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.

11.22

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.

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11.23

Layout of field routed/ small bore piping shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the Contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection.

11.24

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

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

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

11.25

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

11.26

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

11.27

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.

11.28

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.

11.29

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.

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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.

11.30

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.

11.31

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 desposing, 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.

11.32

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

11.33

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

11.34

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

11.35

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.

11.36

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

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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 reactivated/normalized.

11.37

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

11.38

Nitrogen gas, if required, for preservation of boiler and nitrogen capping during chemical cleaning process, will be provided by BHEL free of charge. Contractor shall arrange necessary connector, nipple, regulator, header and piping for usage of such gas from cylinders.

11.39

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

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

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

12.1 PRESSURE PARTS

- A) Installation of temporary structure for drum lifting is in the scope of the Contractor's work. The required steel for the purpose will be provided in random sizes by BHEL free of charge. These shall be fabricated to suit the requirement, erected and welded as part of work. NDT has to be carried out as per instructions. These structures have to be dismantled at appropriate stage and returned to BHEL as per the instructions of BHEL engineer. Also, the relevant areas of permanent structures have to be finished as instructed/ as per relevant codes of practice. Payment for above 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 boxing up and application of refractory. Seal boxes need to be partially cut open in order to pour refractory. Contractor shall carry out necessary cutting and seal welding of such cutouts. 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.

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- H) The drum internals, if already installed, may have to be removed to facilitate inspection by statutory authorities and chemical cleaning. The drum internals are to be preserved properly and re-fitted at appropriate stage as part of work.
- I) Superheater and/or reheater system will have HP butt weld joints of T-91 material. Welding of these HP joints shall involve pre-heating and post heating by resistance heating, argon purging of joints during welding process and full TIG weld. Contractor should follow required procedure for T91 welding NDT, etc.
- J) **BOILER DRUM:** Boiler drum may need to be led from the point of unloading to the cavity of boiler. The same is in the Contractor's scope and shall make all arrangements, including fabrication of saddle if required. Structural materials required for the same will be provided by BHEL on free-returnable basis.
- ~~Boiler drum is to be lifted using **strand jack method**. Contractor will provide Strand Jack arrangement for Drum Lifting. Contractor has to engage services of all other resources and arrangements well in time to suit the milestone requirement.~~
- 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.

12.2 TRIM & INTEGRAL PIPING OF BOILER AND POWER CYCLE PIPING

12.2.1

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.

12.2.2

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.

12.2.3

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.

12.2.4

Connection (either 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

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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.

12.2.5

It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipments. Necessary protocols have to be prepared for such fit-up alongwith 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.

12.2.6

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

12.2.7

The above provisions shall be applicable, mutatis - mutandis, to other piping systems e.g. Fuel oil piping, Lub oil piping of rotating M/c ACW lines etc.

12.2.8

Main steam piping upto turbine stop valve released in PG 80 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.

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

- a. 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.
- b. Matching of flanges for achieving parallelism and alignment resorting to heat correction or other suitable methods as per instructions of BHEL Engineers.
- c. 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.
- d. Fabrication and erection of racks and steel supports for all the piping including critical piping. Steel for this purpose will be supplied by BHEL.
- e. Erection, welding, NDE and stress relieving of certain equipments, e.g. 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. No separate/ additional payment is envisaged for cutting, welding and edge preparation in this regard. The removed pieces of pipes shall be returned to BHEL stores with proper cleaning, dressing and identification marking.

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- f. Welding of root valves with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping.
- g. Opening of valve actuators, dismantling of actuators from the valves, refitting and rendering assistance connected with the electrical and mechanical problems.
- h. Fixing and welding including due NDE & PWHT etc of carrier plates on to the pipes.

12.2.10

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 certain completion commitments.

12.2.11

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.

12.2.12

The rate quoted in rate schedule is also inclusive of pre-heating, welding, post heating, post weld heat treatment/ stress relieving and NDE of piping.

12.2.13

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 Engineer and BHEL Engineer may direct the Contractor to reschedule his work to suit the status of the site work.

12.2.14

While erecting the field run pipes, the Contractor shall check the accessibility of valves, instruments tapping points and maintain minimum head room requirement and other necessary clearance from the adjoining work areas to avoid interferences.

12.2.15

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 to achieve the slope.

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12.2.16

All pipelines shall be provided, as per the instructions of BHEL Engineer, with suitable Vent and the drain points with valve (s) on the highest and lower points of the pipe run although may not be specifically mentioned in the drawing.

12.2.17

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.

12.2.18

In pipelines like CRH lines, extraction lines, etc., the NRVS, strainers etc will be erected by other erection agency. Alignment of these valves to match the pipe ends (both sides), welding, heat treatment and NDE etc is in the scope as incidental to work.

12.2.19

Normally, hangers setting in cold condition are 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 to be treated as part of job. Hanger settings have to be repeated for achieving free-floating joints. 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.

12.3 ROTATING MACHINERY

- a Specifications covered under the following para and also other relevant specifications contained in other paras elsewhere in this tender 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.

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- d Trial run of the drives in un-coupled state and then coupled with equipment has to be done after necessary alignment.
- e 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 are in the scope of work. Where required cooler may have to be dismantled for hydraulic test and re-erected thereafter as part of work.
- f Certain rotating machinery, after testing, pre-commissioning may have to be re-aligned/hot aligned and vital clearances re-set. This may necessitate disconnection of cabling, removal of certain instruments etc and restoration thereafter.
- g Protective lubricant coats / fill provided on / in the critical area of equipments have to be removed 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.
- h Chemical cleaning, steam blowing and air drying of the connecting pipes for the lube oil system has 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.
- i Eventhough 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 8 nos of XRP 1043 Mills per Unit with Planetary Gear Box

12.4 ERECTION OF ELECTROSTATIC PRECIPITATOR

12.4.1

Wherever called for, pre-assembly of supporting structures, casing walls, inlet outlet funnels, hoppers etc have to be done, on ground.

12.12

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

12.4.3

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

12.4.4

Bundle of collecting electrodes should be handled only with special lifting beam and slings supplied for the purpose.

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12.4.5

BHEL will supply Huck bolting M/c with necessary auxiliaries free of charges. However, electrical connections, operation etc shall be arranged by the Contractor.

12.4.6

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.

12.4.7

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.

12.4.8

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

12.4.9

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.

12.4.10 **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 and instrumentation etc. will be provided by BHEL free of charges. Handling at stores, transport, erection, commissioning and carrying out the leakage test, attending to the leakages till satisfactory sealing / leak proofness shall be 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 above.

12.5 MAIN SUPPORTING STRUCTURES, EXTERNAL STRUCTURES, ELEVATOR STRUCTURES, STAIRWAYS, GALLERIES & PLATFORMS & HANDLING ARRANGEMENT

12.5.1

Contractor shall supply and erect one number passenger cum goods elevator of 1.5 MT capacity to reach upto the boiler drum level to facilitate erection, movement of person and goods etc. the arrangement shall conform to applicable safety norms. Contractor shall dismantle and take the elevator back after completion of work. The elevator shall be made ready at the time of drum lifting.

12.5.2

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

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12.5.3

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

12.5.4

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.

If the deviations are attributable to Contractor, the materials required for Rectification / Stiffening / Strengthening, fabrication, erection of the same shall be to the Contractors account.

12.5.5

Each of the ceiling girders will be sent in 2 to 3 pieces and will have to be assembled, welded and NDE & PWHT (SR) done on ground prior to their erection in position.

12.5.6

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.

12.5.7

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.

12.5.8

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.

12.5.9

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

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indicated in the erection drawings. The weld joints of hand rails shall be ground smooth to flush finish.

12.5.10

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

Fixing of floor grills shall be done by self-tapping screws **and not by weldable studs**. Special purpose electrically operated hand tools are available in the market for this, which drills, taps and fixes the screws in a single operation. 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.

12.5.11

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 be indicated in the erection drawings. Materials required for such platforms will be supplied by BHEL in random sizes on free issue basis. These have to be fabricated to suit the requirement. Payment only for erected weight as certified by BHEL engineer shall be made at the rate applicable for structures. No payment is envisaged for fabrication of structures.

12.5.12

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.

12.6 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 to chimney, hot and cold secondary air ducting from FD fans outlet to wind box, hot and cold primary air ducting from PA fans to mills including interconnections, flowmeters, dampers/gates and their drives, supports and suspensions etc for these systems.
- b) Ducts / expansion bellows (metallic & non-metallic) are normally supplied in loose components / segments and these are to be assembled and welded/ jointed at site before erection. The fabric portion of non-metallic expansion joints (NMEJ) namely bolster, fabric belt and canopy shall be installed by Contractor under supervision/guidance of equipment supplier/BHEL for the first few cases. Contractor shall ensure that all subsequent NMEJ are assembled with due care and proper procedure. In similar manner all joints, connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be made leak proof and tested as per technical instruction / requirement.

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- c) Certain structural items like silencer supports, roof cladding structure, platform etc will be supplied in running lengths which shall be cut to required suitable sizes and adjusted/trimmed as part of work.
- d) Contractor has to make canopies for motors, actuators, lub oil units, control valves, etc. material for this will be supplied in random lengths / sizes. No separate payment for fabrication is envisaged. Only the erection tonnage rate applicable for structure will be paid for this work.
- e) Boiler roof sheets shall be erected on boiler roof structure. Payment shall be made as per the tonnage rate quoted for boiler STRUCTURES.
- f) ID fans are provided with variable frequency drives. Contractor has to erect & commission the only the motor and other mechanical components like coupling etc. Panels, transformers, cabling etc are not in this work specification.
- g) Actuator / drives of dampers, gates etc may have to be serviced, lubricated before erection, during precommissioning 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.

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Chapter-III FOUNDATIONS & GROUTINGS

13 PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENT OF BOILER & AUXILIARIES

13.1

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

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

13.2

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

Neutralisation pit for EDTA cleaning is to be made by the Contractor. After completion of job pit has to be dismantled and area is to be levelled before handing over of area to owner.

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

13.3

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

13.4

BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting / chiseling / grinding and de-burr the same. However, machining of the packers wherever necessary, shall be arranged by contractor.

13.5

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

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Chapter-III FOUNDATIONS & GROUTINGS

- non-shrink grout mix (e.g. conbextra gp1/gp2), form work, shuttering, and any other requirements is in the Contractor's scope. Contractor shall obtain approval of BHEL for cement (Ordinary Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use. Cleaning of foundation surfaces, pocket holes and anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods are within the scope of this specification/ work.

13.6

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV WELDING, RADIOGRAPHY, NDT, PWHT

14 WELDING, RADIOGRAPHY AND OTHER NON-DESTRUCTIVE TESTING, POST WELD HEAT TREATMENT

14.1 WELDING

14.1.1

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.

14.1.2

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.

14.1.3

Welding of high pressure joints shall be done by IBR certified high pressure welders who have been permitted by CIB of state concerned for deployment at the site of work.

14.1.4

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

14.1.5

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.

14.1.6

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

14.1.7

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.

14.1.8

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.

14.1.9

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.

14.1.10

In the case of P-91 pipe welding, Contractor shall deploy welders having experience in welding of P-91 material. The welders engaged by Contractor if not qualified for P-91 welding will be

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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, traveling expenses, stay etc., shall be borne by the Contractor.

14.1.11

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.

14.1.12 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 tenderer 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.

14.1.13

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

14.1.14

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.

14.2 HEAT TREATMENT:

14.2.1

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.

14.2.2

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.

14.2.3

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.

14.2.4

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

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Chapter-IV WELDING, RADIOGRAPHY, NDT, PWHT

14.2.5

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

14.2.6

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.

14.2.7

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 chinks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

BHEL will provide the induction heating equipment set for SA 335 P-91 materials piping only. The set will comprise of following:

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

Contractor shall provide the input electrical power connection including arrangements such as DB, cables etc, thermocouple pads, thermocouples and compensating cables, induction heating annealing cables (from the capacitor panel to joint and for wrapping around the weld joint) (spec: single core 240 sq mm, 1200a, 3khz), ceramic wool and other consumables etc as may be required. Quantum of annealing cable requirement will depend on many parameters e.g. weld joint size, heat input, type of connection i.e. series or parallel etc.

Likely supplier: Mansfield Cable Co. Noida (UP).

14.2.8

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

14.2.9

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

14.2.10

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV WELDING, RADIOGRAPHY, NDT, PWHT

14.3 NON DESTRUCTIVE EXAMINATION:

14.3.1

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.

14.3.2

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.

14.3.3

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.

14.3.4

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

14.3.5

Wherever 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 NDT method/procedure will be decided by BHEL engineer at site.

14.3.6

Tenderer shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found by BHEL Engineers to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. 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.

14.3.7

100% radiograph of certain sizes in piping have to be taken as per BHEL standards/ drawings.

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14.3.8

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 a smooth finish and contour as necessary. The Contractor's scope of work includes such preparation as incidental to work.

14.3.9

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.

14.3.10

Contractor may have to undertake radiography with cobalt-60 isotope camera in certain cases. However, for any reason if use of Cobalt-60 is not possible then these joints shall be checked by radiography after completion of welding up to suitable part of thickness with IR-192 other suitable source subsequently after completing the joint UT to be done. For this Contractor has to deploy level-II operator certified by BARC.

14.3.11

In the case of P-91 piping wherever radiography is not possible, alternatively ultrasonic test has to be carried out apart from other nde checks.

14.3.12

For piping of 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.

14.3.13

No separate payment for any NDE activities (including radiography) will be made.

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Chapter-V LINING & INSULATION

15 LINING AND INSULATION

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

1. Main boiler
2. Boiler auxiliaries including, but not limited to, ESP, ducts, fuel oil Equipments, fans etc
3. Boiler integral piping and tanks & vessels
4. Power cycle piping and critical piping including vessels and tanks & other equipments
5. LP piping and other equipments
6. Other equipments including BOIs, though not listed above but required for completion

15.1

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.

15.2

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

15.3

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.

15.4

The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during all stages of work. Scaffolding materials (poles, gratings etc) shall be of light weight construction. Contractor shall arrange steel pipes & clamps with accessories like base plate attachment, fixing pins, struts etc for scaffolding required for this work. However, BHEL's decision in this regard shall be final and binding. Contractor shall arrange the scaffolding materials in sufficient quantity.

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

15.5

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

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Chapter-V LINING & INSULATION

15.6

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.

15.6

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

15.7

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

15.8

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.

15.9

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

15.10

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

15.11

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.

15.12

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.

15.13

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

15.14

Wastage allowances for the material issued are envisaged as follows:

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Chapter-V LINING & INSULATION

➤ a	Pourable & castable insulation	-	2%
➤ b	Insulation bricks and mortar	-	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.

15.15

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

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

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

15.16

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.

15.17

In certain instances, co-ordinated/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.

15.18

Prior to application of refractory bituminous painting on the pressure parts and other area is under Contractor scope. The bituminous paint will be supplied by Contractor. No separate payment will be made for application of paint.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI PAINTING

16 PAINTING

16.1

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

16.2 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.

Primer coat of touch-up primer to be applied by brush immediately after the surface preparation.

Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.

Tentative Painting scheme is enclosed for information at **Annexure-III**. However, for execution only the latest document shall be applicable and no claim whatsoever shall be entertained in case of any variance between such documents. Similarly, documents as provided progressively during the execution of work for all other products/ equipments etc shall be applicable.

16.3

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

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

16.4

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. Applicable paints and primer shall be supplied by BHEL.

16.5

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI PAINTING

All exposed metal parts of the equipment including piping, structures, hand railing, grating etc shall be thoroughly cleaned off dust, rust, scales and other foreign materials by manual or mechanised wire brushing, scrapping, sand blasting etc and the same being inspected and approved by BHEL/customer engineer before application of primer. Afterwards, the above parts shall be finish painted with specified number of coats as per specification.

16.6

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.

16.7

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.

16.8

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.

16.9

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

16.10

This work requires working at higher altitudes from ground level to as high as 90 m and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of standard quality for safe and smooth execution of work.

16.11

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.

16.12

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.

16.13

In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipments inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. For the purpose of spray painting, air at one

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI PAINTING

point will be made available by BHEL free. Laying of air hose pipe and any other line required shall be done by Contractor at his cost. The Contractor shall provide spray equipment set.

16.14

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

16.15

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

16.16 PRIMER AND PAINTS FOR FINAL PAINTING

All primer and paints required for final painting shall be **supplied by Contractor**.

~~The Contractor, however, shall provide account of all the items issued to him and return all primer, paints etc remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores. In case of any misuse or excess use over the normal requirement, BHEL reserves the right to recover the cost of such misuse/ excess use. Decision of BHEL Engineer in this regard will be final and binding on the Contractor.~~

SOME OF THE RENOWNED AGENCIES WHO PROVIDE PAINT ARE AS FOLLOWS:

SL NO	VENDOR NAME & PLACE	PGPTC	PGDIP	PGPTP	PGPTE	PGPTF	PGPH1	PGPH2	PGPH3
1	ADVANCE PAINTS PVT LTD, CHENNAI	APPD	-	-	-	-	-	-	-
2	AKZO NOBEL COATINGS INDIA PVT LTD, BANGALORE	-	-	APPD	APPD	APPD	-	-	-
3	ASIAN PAINTS LTD, CHENNAI	APPD	-	APPD	APPD	APPD	-	APPD	APPD
4	BERGER PAINTS INDIA LTD, CHENNAI	APPD	-	APPD	APPD	APPD	APPD	APPD	APPD
5	CHEMECOAT PAINTS, TIRUCHY	APPD	-	-	-	-	-	-	-
6	GRAND POLYCOATS Co Pvt Ltd, VADODRA	-	-	APPD	APPD	APPD	-	-	-
7	GRAUER & WEIL (INDIA) LTD, CHENNAI	APPD	APPD	APPD	APPD	APPD	-	-	APPD
8	KANSAI NEROLAC PAINTS LTD, CHENNAI	APPD	-	-	-	-	-	APPD	APPD
9	NOVAA PAINTS, TIRUCHY	APPD	APPD	-	-	-	-	-	-
10	PASU MEENA PAINT INDUSTRIES, THIRUPPUVANAM	APPD	APPD	-	-	-	-	-	-

BHEL-PSWR

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI PAINTING

11	SHALIMAR PAINTS LTD, CHENNAI	APPD	APPD	APPD	APPD	APPD	APPD	APPD	APPD
12	SRI MEENAKSHI PAINT INDUSTRIES, PUDUKKOTTAI	APPD	APPD	-	-	-	-	-	-
13	STAR PAINTS & OIL INDUSTRIES, MUMBAI	-	-	-	-	-	APPD	APPD	APPD
14	SUNDARAM PAINTS PVT LTD, THANJAVUR	APPD	APPD	-	-	-	-	-	-
15	WESTERN INDIA PAINT & COLOUR CO.PVT LTD, CHENNAI	APPD	APPD	-	-	-	-	-	-
Item Code	Item Description								
PGPTC	CONVENTIONAL PAINTS & THINNERS : SYNTHETIC ENAMEL (IS : 2932); ZINC PHOSPHATE PRIMER (IS:12744)								
	GENERAL PURPOSE ALUMINIUM PAINT								
PGDIP	DIP COAT PAINT & THINNER								
PGPTP	SPECIAL PRIMER PAINTS & THINNER								
	ETHYL ZINC SILICATE PRIMER TO IS : 14946 ; EPOXY ZINC PHOSPHATE PRIMER to IS : 13238 ;								
	EPOXY ZINC RICH PRIMER to IS : 14589 ; CHLORINATED RUBBER BASED PRIMER								
PGPTE	EPOXY BASED PAINTS & THINNER								
	TiO2 INTERMEDIATE PAINT to IS : 14209 ; POLYAMIDE CURED PAINT TO IS : 14209								
	M I O INTERMEDIATE PAINT; COAL TAR PAINT to IS : 14948;								
PGPTF	FINISH PAINTS & THINNER								
	ALIPHATIC ACRYLIC POLYURETHANE PAINT TO IS : 13213 & CHLORINATED RUBBER BASED FINISH PAINTS								
PGPH1	H.R. ALUMINIUM PAINT GRADE I TO IS : 13183								
PGPH2	H.R. ALUMINIUM PAINT GRADE II TO IS : 13183								
PGPH3	H.R. ALUMINIUM PAINT GRADE III TO IS : 13183								

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-VI PAINTING

Tentative Quantity of Paint required for painting:

Paint Qty for 1x500 MW NTPC Vindhyachal					
S. No	Paint Description	Shade	DFT in microns (µm) per coat	Volume of solid VOS (%)	Qty (Litre)
1	Epoxy Finish paint	Grey shade to RAL 9002	35	40	15740
2	Ali.Acrylic Polyurethene Paint IS 13213	Grey shade to RAL 9002	30	40	15880
3	Ali.Acrylic Polyurethene Paint IS 13213	Phirozi Blue Shade no-176 of IS 5	30	40	160
4	Ali.Acrylic Polyurethene Paint IS 13213	BLUE RAL 5012	30	40	320
5	Ali.Acrylic Polyurethene Paint IS 13214	Brown	20	35	20
6	Heat resistant Aluminium paint (IS 13183 Grade-I)	Not applicable	As per IS 13183	As per IS 13183	3560
7	General purpose Aluminium paint (IS 2339)	Aluminium	20	As per IS 2339	600
8	Inorganic Ethyl Zinc silicate primer (IS 14946)	Grey	75	60	2740
9	Epoxy Zinc Rich primer IS 14589 Gr-II	Grey	40	35	30
10	Synthetic Enamel paint (Long alkyd based to IS 2932)	International orange Shade no-592 of IS 5	20	35	350
11	Synthetic Enamel paint (Long alkyd based to IS 2932)	Smoke grey Shade no-692 of IS 5	20	35	2270
12	Synthetic Enamel paint (Long alkyd based to IS 2932)	Grey shade to RAL 9002	20	35	1310
13	Synthetic Enamel paint (Long alkyd based to IS 2932)	Golden yellow	20	35	500

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-VI PAINTING

14	Canary yellow IS 5-309	Canary yellow		35	100
15	Black Rail 9011	Black Rail		35	100
16	Sea green ISC 217	Sea green	20	35	20
17	Light Brown ISC 410	Light brown	20	35	20
19	Red Oxide Zinc Phosphate primer (Alkyd Base to IS 12744)	Not applicable	As per IS 12744	As per IS 12744	1070
20	Thinner				10 % of respective paint
21	Coal Tar IS 10221				20
Note:					
	Paints conforming the relevant standard to be supplied only.				
	Thinner and primer should be compatible with the paints.				

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII TESTING, PRE-COMMISSIONING, COMMISSIONING

17.1

Testing, pre-commissioning, & 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 & alkali boil out 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.

17.2

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.

17.3

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.

17.4

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.

17.5

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII TESTING, PRE-COMMISSIONING, COMMISSIONING

17.6

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.

17.7

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.

17.8

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.

17.9

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.

17.10

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.

17.11

- ✓ Contractor shall cut / open / dismantle work, if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.
- ✓ Similarly, during the course of erection, if certain portion of equipments erected by the Contractor has to be undone for enabling other Contractors / agencies of BHEL / customer to carry out their work, Contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other Contractors / agencies of BHEL / customer as per BHEL engineer's / agencies of BHEL / customers instructions. Claims, if any, in this regard shall be governed as relevant clauses of 'General Conditions of Contract

17.12

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII TESTING, PRE-COMMISSIONING, COMMISSIONING

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.

17.13

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 alongwith necessary tools and plants, consumables etc.

17.14

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

17.15

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.

17.16

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 N₂ 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.

17.17

Commissioning activities will continue till the completion of trial run, trial operation. During this period Contractor shall make available the services of separate dedicated labor force comprising of suitable skilled and semi/un-skilled hands along with necessary tools and plants, consumables etc.

17.18

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.

17.19

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII TESTING, PRE-COMMISSIONING, COMMISSIONING

Conducting of performance guarantee test is in the scope of work. Contractor shall install all necessary tapping points; instruments etc and provide necessary assistance in this regard.

In case PG test is getting delayed beyond the contract period (normal plus extension if any) due to reasons not attributable to the Contractor, PG test issue will be mutually discussed and decided. However installation of necessary tapping points, impulse pipes, approaches etc are to be completed by the Contractor.

17.20

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII PRESERVATION & PROTECTION OF COMPONENTS

18.1 PRESERVATION & PROTECTION OF COMPONENTS

At all stages of work, equipments/materials in the custody of Contractor, including those erected, will have to be preserved as per the instructions of BHEL. Necessary preservation agents including the primer & paint, for the above work shall be provided by the Contractor.

18.2

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

18.3

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

18.4

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

18.5

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

18.6

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