T E N D E R S P E C I F I C A T I O N No.

NO: BHE/PW/PUR/AMRT-BAL BLR U#3&5/1253

HANDLING & COLLECTION OF MATERIALS AT BHEL/CLIENT'S STORAGE YARD/ STORES, TRANSPORTATION TO SITE, ERECTION, TESTING & ASSISTANCE FOR COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF BOILER AND ITS AUXILIARIES, AIR PREHEATERS, DUCTS AND DAMPERS, FUEL PIPING, BOILER INTEGRAL PIPING & ASSOCIATED VALVES, ELECTROSTATIC PRECIPITATOR, FANS, POWER CYCLE PIPING, COAL MILLS AND COAL FEEDERS, INSULATION, FINAL PAINTING ETC. OF Unit # 3 & 5 OF 5x270 MW AMRAVATI THERMAL POWER PROJECT PHASE I.

AT

ADDITIONAL AMRAVATI INDUSTRIAL AREA,

INDIABULLS POWER LTD

NANDGAONPETH,

DIST- AMRAVATI

MAHARASHTRA

VOLUME – I-TECHNICAL BID

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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Tender Specification Issue Details

NO: BHE/PW/PUR/AMRT-BAL BLR U#3&5/1253

HANDLING & COLLECTION OF MATERIALS AT BHEL/CLIENT'S STORAGE YARD/ STORES, TRANSPORTATION TO SITE, ERECTION, TESTING & ASSISTANCE FOR COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF BOILER AND ITS AUXILIARIES, AIR PREHEATERS, DUCTS AND DAMPERS, FUEL PIPING, BOILER INTEGRAL PIPING & ASSOCIATED VALVES, ELECTROSTATIC PRECIPITATOR, FANS, POWER CYCLE PIPING, COAL MILLS AND COAL FEEDERS, INSULATION, FINAL PAINTING ETC. OF Unit # 3 & 5 OF 5x270 MW AMRAVATI THERMAL POWER PROJECT PHASE I.

AT

ADDITIONAL AMRAVATI INDUSTRIAL AREA,

INDIABULLS POWER LTD

NANDGAONPETH,

DIST- AMRAVATI

MAHARASHTRA

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION: Refer Notice Inviting Tender

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

M/s. ……

……

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date:

1253

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/AMRT-BAL BLR U#3&5/1253 Date: 11/04/2014

NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES OR PURCHASE TENDERS FROM THIS OFFICE ALSO

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To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	BHE/PW/PUR/AMRT-BAL BLR U#3&5/1253	
ii	**Broad Scope of job**	HANDLING & COLLECTION OF MATERIALS AT BHEL/CLIENT'S STORAGE YARD/ STORES, TRANSPORTATION TO SITE, **ERECTION, TESTING & ASSISTANCE FOR COMMISSIONING**, TRIAL OPERATION AND HANDING OVER OF **BOILER AND ITS AUXILIARIES**, AIR PREHEATERS, DUCTS AND DAMPERS, FUEL PIPING, BOILER INTEGRAL PIPING & ASSOCIATED VALVES, ELECTROSTATIC PRECIPITATOR, FANS, POWER CYCLE PIPING, COAL MILLS AND COAL FEEDERS, INSULATION, FINAL PAINTING ETC. OF **Unit # 3 & 5 OF 5x270 MW AMRAVATI THERMAL POWER PROJECT PHASE I** AT ADDITIONAL AMRAVATI INDUSTRIAL AREA, INDIABULLS POWER LTD NANDGAONPETH, DIST- AMRAVATI, MAHARASHTRA.	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :*** ***Start : 11/04/2014 ,*** ***Closes: 20/04/2014 , Time : 16.00 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents will be available for downloading from website till due date of submission	*Applicable/ Not applicable*
v	**DUE DATE & TIME**	***Date : 21/04/2014, Time 15.00 Hrs***	*Applicable*

	OF OFFER SUBMISSION	***Place : <u>BHEL PS Regional office at :Nagpur</u>*** Tenders being submitted through representative shall be submitted at dispatch section of of PSWR HQ Office after making entry/registration at the reception. For any assistance on the matter kindly contact following officials: • Pratish Gee Varghese/Sr Engineer(Purchase • Shivkesh Meena / Engineer (Purchase)	
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, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the opening of tender*	*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**	*Five 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.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	**Being appointed; will be advised separately**	*Applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **<u>and not in the newspapers</u>**. Bidders to keep themselves updated with all such information	

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

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Nagpur issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Nagpur, Sundays and second/ last Saturdays

4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Nagpur. For other details and for 'One Time EMD' please refer General Conditions of Contract.

5.0 **Procedure for Submission of Tenders**: The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:

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

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender **OR** Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender 2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)	

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

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

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

7.0 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, excepting packages which are on HOLD due to reasons not attributable to Bidder..

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (**under execution**/ executed during the 'Period of Assessment' in all the Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

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

i). Calculation of Overall 'Performance Rating' for 'similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':
This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) $P_1, P_2, P_3, P_4, P_5, \ldots P_N$ 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 = $\mathbf{P_T}$ (ie $P_T = P_1 + P_2 + P_3 + P_4 + .. P_N$)

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

c) Sum 'S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$,.... $S_{1\text{-}N}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}N}$). 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 '$\mathbf{P_T}$' for all Regions (i.e 'S_T'= S_1+ S_2+ S_3+ S_4+ S_5+…. S_N.)

d) **Overall Performance Rating 'R_{BEHL}' 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 → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No of similar packages for all Regions = $\mathbf{P_T}$ ie Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$
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) = $\mathbf{S_T}$

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

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

a) 'Period of Assessment.
b) 12 months preceding the cut-off month
c) 24 months preceding the cut-off month
d) 36 months preceding the cut-off month

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

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

Sl no	Overall Performance Rating (R_{BHEL})	Corresponding value of 'L'
1	=60	NA
2	> 60 and ≤ 65	0.4
3	> 65 and ≤ 70	0.35
4	> 70 and ≤ 75	0.25
5	> 75 and < 80	0.2
6	≥ 80	NA

III. 'Assessment of Capacity of Bidder':

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages P_{Max}= (R_{BHEL}- 60) divided by corresponding value of 'L'
i.e. (R_{BHEL}- 60)/L

Note:

i. In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number
ii. For R_{BHEL} = 60 , P_{Max} = '1'
iii. For R_{BHEL} ≥ 80, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$
(where P is calculated as per clause 9.I)

IV. **Explanatory note**:

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

Table-1

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

c) Bidders who have not been evaluated for at least six package months in the last 36 months in the online BHEL system for contractor performance evaluation in BHEL PS Regions, wef July'2010 shall be considered "NEW VENDOR".

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

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

The "FIRST TIMER" tag shall remain till execution of work for a period of not less than 09 months, from the commencement of work of first package

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

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

d) 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' or due to non-approval by Customer, then BHEL at its discretion reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating** '$\mathbf{R_{BHEL}}$**'** only, starting from the upper band.

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

i. up to Boiler Steam Blowing in case of Steam Generator and Auxiliaries

ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)

iii. Upto execution of at least 90% of anticipated contract value in case of Civil & Structures (unit wise), Enabling works and upto 90% of material unloading (in tonnage) as per the original contract in case of MM Package.

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.

f) Performance evaluation in CL 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work

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

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

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

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

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

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

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

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

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

19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .

However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDs' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.

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

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

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

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

23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.

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

23.3 Number of partners for a consortium Bidding (or Technical Tie up) shall be as specified in the PQR

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

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

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

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

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

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

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

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

23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.

23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.

23.14 The consortium partner shall submit SD equivalent to 2% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.

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

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

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

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

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

It may please be noted that guidelines/rules in respect of suspension of business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', etc may undergo change from time to time and the latest one shall be followed

for BHARAT HEAVY ELECTRICALS LTD

AGM Pur

Enclosure

1. Annexure-1: Pre Qualifying criteria.
2. Annexure-2: Check List.
3. Annexure-3: Integrity Pact
4. Annexure-4: Important Information.
5. Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING REQUIREMENTS

JOB	HANDLING & COLLECTION OF MATERIALS AT BHEL/CLIENT'S STORAGE YARD/ STORES, TRANSPORTATION TO SITE, **ERECTION, TESTING & ASSISTANCE FOR COMMISSIONING**, TRIAL OPERATION AND HANDING OVER OF **BOILER AND ITS AUXILIARIES**, AIR PREHEATERS, DUCTS AND DAMPERS, FUEL PIPING, BOILER INTEGRAL PIPING & ASSOCIATED VALVES, ELECTROSTATIC PRECIPITATOR, FANS, POWER CYCLE PIPING, COAL MILLS AND COAL FEEDERS, INSULATION, FINAL PAINTING ETC. OF **Unit # 3 & 5 OF 5x270 MW AMRAVATI THERMAL POWER PROJECT PHASE I** AT ADDITIONAL AMRAVATI INDUSTRIAL AREA, INDIABULLS POWER LTD NANDGAONPETH, DIST- AMRAVATI, MAHARASHTRA.
TENDER NO	**BHE/PW/PUR/AMRT-BAL BLR U#3&5/1253**

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. **Bidder must fill up this column as per applicability**
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder & Consortium/Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	APPLICABLE	
B	**Technical** **B.1** Erection Testing & Commissioning (E T & C) 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 rating 200 TPH or above. OR **B.2** E T & C of ESP and Power Cycle Piping of One Unit of Rating 100 MW or above OR **B.3** E T and C of ESP or Power Cycle Piping of a Unit of rating 100 MW or above subject to: Entering into a Technical Tie Up with another agency who has experience of Boiler & Power Cycle Piping OR Boiler & ESP respectively, of a unit of rating 100 MW or above OR **B.4** E T & C of Atleast One STG of 190 MW or higher, under direct order of BHEL subject to:- **a)** Experience of E T & C of Boiler (Consisting of Pressure Parts, Structures/ESP and IBR/Power Cycle Piping, of the same Unit as a Stand alone bidder) of atleast 100 TPH OR **b)** Entering into a Technical Tie Up with an agency who has experience of E T & C of Boiler	APPLICABLE	

	Structures and Pressure Parts or IBR/Power Cycle Piping of 100 MW or above with his own T&Ps and consumables		
C-1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (Audited) of Rs 600 Lakhs or more over last three Financial Years (FY) i.e. 2011-2012, 2012-2013, 2013-14 OR 2010-2011, 2011-12 and 2012-13 if Annual Accounts for FY 2013-14 are not audited.	APPLICABLE	
C-2	NETWORTH (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive	APPLICABLE	
C-3	PROFIT Bidder must have earned 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	
D	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	APPLICABLE	By BHEL
E	Approval of Customer (if applicable) **Note:** Names of bidders (including consortium/Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.	APPLICABLE	BY BHEL
F	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E	APPLICABLE	BY BHEL
F	Technical Tie up criteria (if applicable)	APPLICABLE	

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

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 :~~
   1. ~~Bidder should have executed similar work of any one of the following:~~
      a. ~~One (1) work of value not less than Rs XXX~~
      ~~OR~~
      b. ~~Two (2) works of not less than Rs YYY~~
      ~~OR~~

~~c. Three (3) works of not less than Rs ZZZ~~
~~(Value XXX, YYY, ZZZ shall be as indicated by BHEL~~

~~2. 'Similar' work for criteria 5 above means~~
~~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:
    1. Term 'Commissioning' indicated in PQR referrers to 'assistance to commissioning' / 'commissioning'
    2. "BOILER LIGHT UP" in respect of Boiler & Aux and ESP
    3. "SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG
    4. "STEAM BLOWING COMPLETION" in respect of at least Main Steam Line of Power Cycle Piping
    5. "HYDRAULIC TEST" of the system in respect of Structures, Pressure parts/IBR Piping
    ~~6. "CHARGING" in respect of power Transformers, Bus ducts, HT/LT switchgears~~
    ~~7. "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.~~
    ~~8. Achievement of physical Quantities as per respective PQRs in respect of Civil & Structures and Piling Works~~
    ~~9. '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/PO/WO 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.~~
~~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~~.~~
15. The value of work (Experience submitted against PQR B) shall be updated as per the PVC indices for "All India Avg. Consumer Price Index for Industrial Workers" with base month as date of execution (completion of contract/work) and indexed upto two months prior to bid opening month.

16. Explanatory Notes for PQR 'B.3 & B.4'

a. Prime bidder and Tie-up Partner shall meet their respective technical Pre qualifying Criteria.
b. Prime bidder shall meet all other Pre-Qualifying Criteria of the Tender
c. Prime Bidder shall be responsible for overall execution of the Contract.
d. Tie-up partner shall provide Technical Supervision and support to the Prime Bidder for execution of job.
e. Tie-up Partner shall submit Security Deposit (SD) equivalent to 2 % of Total contract value in addition to the SD to be submitted by the Prime Bidder for the Contract Value.
f. Prime bidder and the Tie-up partner are required to enter into a Tie-up Agreement with a validity period of Six months initially (During submission of tender). Thereafter both the agencies shall extend the validity of the agreement for the entire contract period, if the work is awarded.

	g. In case Tie-up partner backs out, another Tie-up partner meeting the QR shall be engaged by the Prime Bidder. h. In case Prime bidder backs out, the whole contract shall be considered cancelled and short closed

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

ANNEXURE - 2

CHECK LIST

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

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

15	Non Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO
16	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/~~Not Applicable~~	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	~~Applicable~~/Not Applicable	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable/~~Not Applicable~~	YES/NO
20	Analysis of Unit rates	Applicable/~~Not Applicable~~	YES/NO

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Annexure-3

INTEGRITY PACT

Between

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

And

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

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____

_____

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

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

Section 1 - Commitments of the Principal

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

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

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

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

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

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

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

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

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

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

2.1.4 The Bidders (s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

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

Section 3 – Disqualification from tender process and execution from future contracts

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

Section 4 – Compensation for Damages

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

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

Section 5 – Previous Transgression

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

5.2 If the Bidder makes incorrect statement on his subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-Contractors

a. 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).

b. The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.

c. The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section -7 Criminal Charges against violating Bidders/ Contractors/ Sub-contractors

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

Section – 8 Independent External Monitor(s)

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

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

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

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

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

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

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC/PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

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

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

Section 9 – Pact Duration

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

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

Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

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

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

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

10.5 Only those Bidders/ Contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

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

anexure-IV

IMPORTANT INFORMATION

1. TENDER SCOPE

The Boiler works in Unit # 3&5 at 5x270 MW INDIABULLS AMARAVATI THERMAL POWER PROJECT Phase I was under execution by other agency. The works from this agency are being withdrawn on as is where is basis. The scope of work under this tender specification also include works leftover by the earlier agency on as is where basis.
Annexure i 'weight details' of this specification indicates the balance tonnage of work to be executed under this contract. Bidder has to submit their rates only for the balance leftover jobs.
Some portion of balance left over job is in various stages and those portion is specifically indicated in part B of annexure i. Rates of these items are fixed by BHEL in VOL II Price Bid and bidder shall not quote separate rate for these items.

2. **All Bidders shall make site visits on working day to familiarize with the site conditions and to get exact details of extent of work completed.**

3. **Any clause in this specification which is not pertaining to the balance works of these specification shall be treated as deleted at the sole discretion**

4. **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)**

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

6. **Please take note of following Revised Tender Clauses:**

   i. Notice Inviting Tender: Sl No 9

   ii. General conditions of Contract: Clause No 1.15.13 (New), Clause No 2.8.3, 2.8.4 and 2.8.5

7. Following Notes are added to Form F- 15 of Volume I D 'Forms & procedures'

   i. It is only indicative and shall be as per the online format issued by BHEL time to time.

ii. No request will be entertained after specified date of the current month w.r.t the changes requested in the scores of immediate previous month.

8. PRICE VARIATION CLAUSE

Price Variation Compensation Clause no. 2.17 of Vol I C GCC shall not be Applicable:

9. OVER RUN COMPENSATION

Over Run Compensation Clause no. 2.12 of Vol I C GCC shall not be Applicable

10. Broad Terms & Conditions of Reverse Auction

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

10.1. Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

10.2. BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids. In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid" in the Reverse Auction. Non-submission of „online sealed bid" by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

10.3. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

10.4. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-submission of 'online sealed bid' by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

10.5. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

10.6. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

10.7. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

10.8. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

10.9. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for noncompliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

10.10. Reverse auction will be conducted on scheduled date & time.

10.11. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

10.12. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.

10.13. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL"s standard practice.

10.14. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the "Business Rules of Reverse Auction", which will be communicated before the Reverse Auction.

10.15. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

10.16. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

10.17. In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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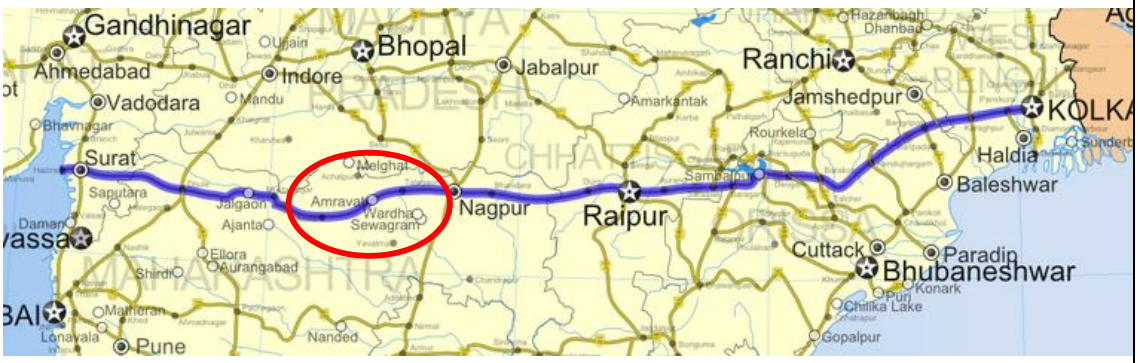
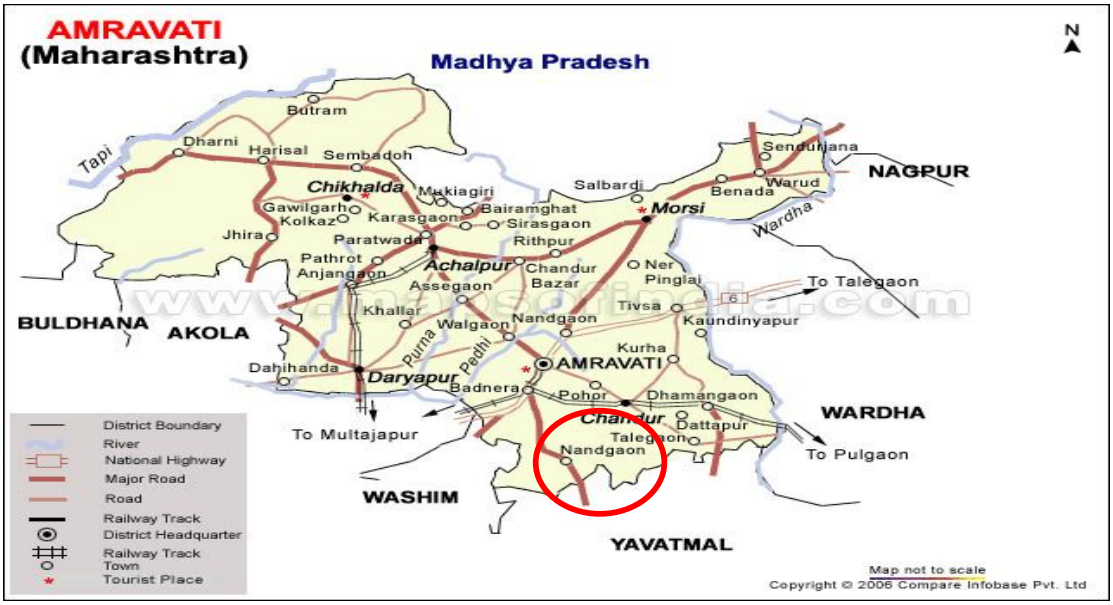
1.0	**Project Information**
1.1	**BACKGROUND** INDIABULLS POWER LTD. is setting up a coal based 5x270 MW Thermal Power Project at Nandgaonpeth, Additional Amravati Industrial Area, Dist: Amravati, Maharashtra. Project Site is located at a distance of 22 KM from Amravati District on NH-6 near Nandgaonpeth. Nearest Railwaiy Station : Badnera about 20 KM from project site. Badnera is located at a distance of 175 KM from Nagpur on Howrah - Mumbai main line of Central Railways passing through Sevagram, Wardha, Pulgaon, Dhamangaon, Badnera. Nearest Highway : National Highway No NH-6 (Surat to Kolkata). Highway passes through Jagaon, Amravati, Nagpur, Raipur  

	Nearest Airport : Nagpur 150 KM (By road) **CLIMATE** Amravati is located between 20°56′N 77°45′E to 20.93°N 77.75°E. It has an average elevation of 343 metres. Amravati has a tropical wet and dry climate with hot, dry summers from March to June, the monsoon season from July to October and warm winters from November to March. As far as the climate of the city is concerned, one can notice extreme variations in the temperatures. The summers in Amravati are very hot. The maximum as well as continuous rainfall is received, from the South Westerly monsoons, in the months of July and August. Max Temp : 44.5 Deg. C. Min Temp : 12.4 Deg. C Rainfall : 841.80 MM (Average) Seismic Zone : Zone III as per IS : 1893

The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.

2.0 SCOPE OF WORK

The work to be carried out under the scope of these specifications is broadly as under:
The Boiler works in Unit # 3 & 5 at 5x270 MW INDIABULLS AMARAVATI THERMAL POWER PROJECT Phase I was under execution by other agency. The works from this agency are being withdrawn on as is where is basis. The scope of work under this tender specification also include works leftover by the earlier agency on as is where basis.

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, Insulation & Final Painting etc. of Unit # 3 & 5 OF 5x270 MW AMRAVATI THERMAL POWER PROJECT PHASE I.

2) Erection, alignment and welding, bolting, fastening, grouting as applicable of :
   - ✓ Boiler Supporting Structures
   - ✓ Boiler Pressure Parts
   - ✓ Boiler Trim & Integral Piping and Mountings
   - ✓ Fuel Oil Piping
   - ✓ Non-Pressure Parts, Ducts, Dampers
   - ✓ Rotating Machines (e.g. Air Heaters, Coal Mills, Coal Feeders, Fans, Blowers etc. with their drives & Lube Oil System etc.)
   - ✓ Pulverized Fuel Piping
   - ✓ External structures (e.g. Duct supporting, pipe rack structures etc.) Including elevator structure.
   - ✓ Handling arrangements for Rotating Machines
   - ✓ Power Cycle Piping (Main Steam, HRH, CRH etc) and valves including HP/LP Bypass
   - ✓ Electrostatic Precipitator and Stairways & Galleries
   - ✓ Piping supplied by PC Chennai (SG piping, TG piping, LP piping)
   - ✓ Deareator platform structure.

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

4) Non-Destructive Examination & post weld heat treatment.

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

8) Surface preparation and Final Painting of erected items.

9) Trial Operation and associated tests

10) Making the units ready for PG test and assistance for conductance.

11) Completion of all facilities/systems including completion of all pending works / punch points.

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

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Open space for labour colony (as per availability)	Yes		Space will be provided if available; Location will be finalized after joint survey with owner.
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			FREE
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc of the bidder**			CHARGEABLE as per standard rates

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**			CHARGEABLE
a	Single point source		**YES**	Power may be drawn from owner's given point within plant boundary.
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:**			FREE

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Making the water available at single point	Yes		In case of inadequate supply / non-availability of construction water from customer, contractor shall have to arrange construction water at his own expenses.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			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	**Water supply for Living Purpose**			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	**LIGHTING**			

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Telephone, fax, internet, intranet, e-mail etc		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**			
3.7.0	**Demobilization of all the above facilities**		**YES**	
3.8.0	**TRANSPORTATION**			

Sl.No	Description **PART I**	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl.No	Description **PART II** **3.9.0 ERECTION FACILITIES**	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	Engineering works for construction:			
a	Providing the erection 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	"

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	

				For Both Unit 3 & 5
SN	**DESCRIPTION**	**CAPACITY (MINIMUM)**	***MINIMUM* QUANTITY**	***REMARKS***
1.	Crawler Crane	150 MT	1	For 2 months (Deployment as per site instruction)
2.	Crawler Crane	90 MT	1	6 months
3.	Tyre Mounted Crane	40 MT	1	
4.	Pick & Carry Crane	12-18 MT	3	
5.	Trailer with Prime Mover	30 MT	1	
5.	Trailer with Prime Mover	20 MT	1	
6.	Truck	9 MT	1	
7.	Passenger cum Goods Elevator	1.5 MT	1	
8.	Air Compressor (Electric/Diesel operated)	140 CFM, 7 Kg/cm^2	1	
9.	Huck Installation Tool (Guns)	For fastening 12 mm and 16 mm diameter Huck Bolts in ESP	12 mm – 2 sets, 16 mm – 1 set	If necessary
10.	TIG Welding Set	As required	As required	
11.	Plasma Cutting M/c.	For cutting up to 10 mm thick Stainless Steel	As required	
12.	3-Phase Distribution Board with Complete Set Up for Drawl of Construction Power	As required	As required	
13.	Power Cable for drawl of Construction Power	As required	As required	
14.	Pre Heating / Stress Relieving Set (Heating Control Panel, Cables, Heating Elements, Thermometers etc.)	As required	As required	
15.	Radiography Arrangement with Radioactive Isotope Source	Iridium-192	2 sets	
16.	Radiography Arrangement with Radioactive Isotope Source	Cobalt-60	1 set	

17.	Self Drilling Cum Tapping Machine for Screws of Boiler Roof Sheets	As required	4	
18.	Chemical circulation pumps to handle acid solution, opr temp 80 deg cel, with drive motors, starter panel, cable, switch fuse unit etc. Suggested rating: 150 m^3, 120 – 150m WC, with 90 KW, 3000 Rpm, 150 amps motor. However, Contractor shall deploy the required capacity pump with accessories after obtaining written approval of BHEL.	As required	3 sets	
19.	Arrangement for UT of higher thickness joints with recording facility	Type USN 50 or equivalent/ upgraded type	1 Set	
20.	Electro-hydraulic pipe bending machine	Up to 2" Nb and 12 mm thick pipes	3 Sets	
21.	Welding Generator (Electrical)	300 Ampere rating	30 sets	
22.	Welding Generator (Diesel Operated)	300 Ampere rating	4 sets	
23.	Radiography Film Viewer	As required	4 nos.	
24.	Hydraulic Pipe Bending Machine (manual)	For bending of pipes up to 50 mm Nb size	4 sets	
25.	Baking Oven (Master) with thermostat and temperature gauge for welding electrodes	As required	4	
26.	Holding Oven with thermostat and temperature gauge for welding electrodes	As required	2	
27.	Portable Oven for welding electrodes	As required	30	
28.	Electric Winch	3 Ton Capacity	10	

29.	Electric Winch	1 Ton Capacity	6	
30.	FILLING PUMP AND PRESSURIZING PUMP FOR HYDRO TEST	600 Kg per cm^2	01 No	For Hydraulic test of Boiler and HP pipelines.
31.	Small HT Pump	0 - 30 Kg per cm2	02 No	For HT of L/O Coolers & L/O Piping
32.	Furnace Maintenance Platform (Sky Climber)	0.5 MT	2	
33.	Hand Winch	0.5 Ton Capacity	3	
	Scaffolding Materials	Suitable for working at various heights	4000 nos pipe with 8000 nos. clamps	
	Profile making M/c	for aluminium sheet cladding work	3 sets	
	Nibbling M/c	for aluminium sheet cladding work	2 sets	
	Shearing M/c	for aluminium sheet cladding work	2 sets	
34.	Suitable Water Pump to lift water to top of boiler	for refractory and other required activities	1 Set	
35.	Portable Grinding M/c	As required	4 nos.	
36.	Portable Drilling M/c	As required	4 nos.	
37.	Chain Pulley Blocks	Up to 15 MT Capacity	40 nos	
38.	Fire retardant Tarpaulins	As required	As required	
39.	Fire Extinguisher	As required	As required	
40.	De-watering pump	To remove clogged rain water	1 set	

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 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.

MEASURING AND MONITORING DEVICES (MMD):

AS PER REQUIREMENT TO BE FINALIZED AT SITE, SHALL MEET THE REQUIREMENTS AS PER

FIELD QUALITY PLAN AND OTHER ERECTION, TESTING RELATED ACTIVITIES.

NOTE:

1. The above list specifies only major T&P/MMD (may not be complete) to be deployed by the contractor. All additional/ other tools and plants which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate/ price.
2. IF 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.

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

SL NO	DESCRIPTION & CAPACITY OF T&P	QUANTITY	REMARKS
1	INDUCTION HEATING M/C	As required	FOR WELDING OF P-91 pipeline.
2	HUCK BOLTING MACHINE COMPLETE SET	01 SET	For ESP work. If required.
3	AIR LEAK TEST EQUIPMENTS WITH ALL AUXILIARIES	01 SET	For leakage test of ESP.

Note:

T&P mention above, Contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores.

6. 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 1 week 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 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

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

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

SL No.	Milestones	UNIT - 3	UNIT - 5
1.	Start of work on as is where is basis	May'14	May'14
2.	Boiler Light Up	Already Completed.	Aug'14
3.	Steam Blowing completion	Jun'14	Sep'14
4.	Synchronization with coal firing	July'14	Oct'14
5.	Trial run Operation	Aug'14	Nov'14
6.	PG Test completion and punch point completion.	Sept'14	Dec'14

The milestones above shown is tentative and may change based on the actual site condition. 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.

6.1.4 CONTRACT PERIOD

The contract period for completion of entire work under scope shall be 8 months **(Eight Months)** from the "start of contract period" as specified earlier.

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

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

TERMS OF PAYMENT FOR STEAM GENERATOR

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

1.6	On Drum Lifting	--	--	--	--	--	--	--	--	--	--	--
1.7	COMPLETION OF ATTACHMENT WELDING, FIN WELDING, SUPPORTS	--	5	--	--	--	--	--	--	--	--	--
1.8	COMPLETION OF ROOF SKIN CASING	--	5	--	--	--	--	--	--	--	--	--
1.9	INSTALLATION OF TEMPORARY PIPING	--	--	--	--	--	--	--	--	--	60	--
1.10	DISMANTLING OF TEMPORARY PIPING, EDGE PREPARATION AND RETURN TO BHEL STORES, AREA CLEANING	--	--	--	--	--	--	--	--	--	25	--
1.11	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	--	--	25	--	--	--	15	10	--	--	--
1.12	COMPLETION OF FURNACE ALIGNMENT AND FIRE BALL CHECKING	5	--	--	--	--	--	--	--	--	--	--
1.13	COMPLETION OF BACK PASS ALIGNMENT	5	--	--	--	--	--	--	--	--	--	--
1.14	COMPLETION OF VIBRATION SNUBBERS, MECHANICAL SPACERS, CASSETTE BAFFLES, STEAM COOLED SPACERS	5	--	--	--	--	--	--	--	--	--	--
1.15	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC	--	--	--	--	--	5	--	--			--
1.16	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC	--	--	--	--	--	5	--	--	--	--	--
1.17	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES	--	--	--	--	--	5	--	--	--	--	--
1.18	EQUIPMENT TRIAL OPERATION	--	--	--	--	10	--	--	--	--	--	--

1.19	HYDRAULIC TEST OR PNEUMATIC TEST	--	--	--	--	--	--	--	3	--	--	--
1.20	FLOATING OF LINES, FINAL ADJUSTMENT OF SUPPORTS FOR COLD AND HOT VALUES (if not applicable, this portion to be clubbed along with hydraulic test/pneumatic test)	--	--	--	--	--	--	--	2	--	--	--
1.21	**AIR PRE HEATERS (PG 52)From the total amount payable for the PGMA weight at tonnage rates, payment will be regulated as under:**											
1.21.1	Completion of Support steel squareness and levelling, Expansion arrangement, Housing panel erection and alignment, Erection, alignment and welding of pedestals	--	--	--	11	--	--	--	--	--	--	--
1.21.2	Completion of Erection, alignment and welding of Support Bearing, Guide Bearing, Rotor post, Bottom and Top centre sections, Hot and cold end connecting plates	--	--	--	14	--	--	--	--	--	--	--
1.21.3	Completion of erection and alignment of modules	--	--	--	15	--	--	--	--	--	--	--
1.21.4	Completion of erection, alignment and welding of Pin Rack assembly and Drive assembly	--	--	--	12	--	--	--	--	--	--	--
1.21.5	Completion of seals setting	--	--	--	17	--	--	--	--	--	--	--
1.21.6	Erection, alignment and welding of Lube oil systems, Cleaning Device, Fire sensing device, Deluge and water wash lines, Observation port and lighting assemblies and other accessories	--	--	--	13	--	--	--	--	--	--	--
1.21.7	Completion of PGMA	--	--	--	1	--	--	--	--	--	--	--

1.21.8	Air preheater Trial Run	--	--	--	2	--	--	--	--	--	--	--
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	**85**	**85**	**85**	**85**	**85**	**85**	**85**	**85**	**85**	**85**	**85**
II	**STAGE/MILESTONE PAYMENTS (15%)**											
2.1	AIR & GAS TIGHTNESS TEST	--	--	5		--	1	5	--	--	--	--
2.2	GAS DISTRIBUTION TEST	--	--	--		--	1	--	--			--
2.3	CHARGING OF ESP FIELDS	--	--	--	--	--	4	--	--	--	--	--
2.4	COMPLETION OF AIR & GAS TIGHTNESS TEST FOR FURNACE	--	2	--	--	--	--	--	--	--	--	--
2.5	BOILER HYDRAULIC TEST (DRAINABLE)	--	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	--	1		2	1	--	--	1	1	--	1
2.10	ABO	--	1	1	2	1		1	1	1		1
2.11	Steam Blowing	--	--	2	1	1	--	--	1	1	--	1
2.12.	SVF	--	2	--	2	--	--	--	1	1	--	1

2.13	Oil Flushing (TG)	--	--	--	--	--	--	--	--	--	--	--
2.14	Barring Gear (TG)	--	--	--	--	--	--	--	--	--	--	--
2.15	Rolling and Synchronisation	--	--	--	--	--	--	--	--	1	--	--
2.16	Coal Firing	--	--	2	2	2	2	2	--	1	--	1
2.17	Full Load	--	--	--	--	1	--	--	1	1	--	1
2.18	Trial Operation of Unit	--				2	1	2	2	2	--	2
2.19	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	3	--	--	--	--	--	--	--	--	--	--
2.20	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing	--	--	--	--	--	--	--	2	--	--	--
2.21	Painting	6	--	1	1	2	2	1	2	1	--	--
2.22	Area cleaning, temporary structures cutting/removal and return of scrap	1	1	1	1	1	1	1	1	2	--	3
2.23	Punch List points/pending points liquidation	2	1	1	2	1	1	1	1	1	--	1
2.24	Submission of 'As Built Drawings'	--	--	--	--	--	--	--	--	--	--	--
2.25	Material Reconciliation	2	1	1	1	1	1	1	1	1	15	2
2.26	Completion of Contractual Obligation	1	1	1	1	1	1	1	1	1		1

	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**
	TOTAL I + II	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
	*INCLUDING NDE AND SR/HT WHERE EVER APPLICABLE (IF APPLICABLE, WEIGHTAGE OF 10%)											

8.0 TAXES, DUTIES, LEVIES (Consolidated Rev 03 dated 09/04/2013)

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

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

Not Applicable

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) Supply of primer and paints for final painting
Viii) Pneumatic copper tubing and fittings thereof.
Ix) Testing and commissioning of heating elements, thermostats, HV rectifier transformers.
X) Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.

Part A: WEIGHT DETAILS for COMPLETE ERECTION, ALIGNMENT, NDT & WELDING etc.					
S No.	**PGMA**	**Description**	**WT. (MT)**		**S No. of rate schedule**
			Unit # 5	**Unit # 3**	
1.1 STRUCTURE					
1	30-105	Fur bootom encl fram		4.251	1.1
2	30-212	Fur extd bot encl		0.127	1.1
3	30-215	Main boiler encl		3.948	1.1
4	30-219	Vent roof encl		0.338	1.1
5	30-220	Deck sprt and seals		0.43	1.1
6	30-224	Anti vibration baff		7.064	1.1
7	35-010	Foundation Materials	7.808	7.832	1.1
8	35-110	Main columns left		0.157	1.1
9	35-120	Main columns right		0.157	1.1
10	35-160	Airheater columns	29.791		1.1
11	35-210	Boiler ceiling structure (Fabricated)	0.047	0.094	1.1
12	35-220	Boiler ceiling structure (RB'S)	3.625	0.942	1.1
13	35-230	Boiler ceiling structure	2.772		1.1
14	35-320	Horizontal bracing II		0.033	1.1
15	35-350	Horizontal bracing V	4.111		1.1
16	35-360	Horizontal bracing VI	3.703		1.1
17	35-380	Landing platforms Lower	5.207		1.1
18	35-381	Land platform Upper	1.669		1.1
19	35-390	Platform At Drum floor	10.424		1.1
20	35-441	Horizontal beams -lower	9.801		1.1
21	35-443	Horizontal beams -upper	2.477		1.1
22	35-521	Side bracing -lower	1.020		1.1
23	35-531	Rear bracing -lower	17.333	2.701	1.1
24	35-700	HSFG Fasteners for P	3.308		1.1
25	35-811	Floor grills and guard plate	11.924	7.515	1.1
26	35-821	Stairs -lower	4.028		1.1
27	35-823	Stairs -upper		0.054	1.1
28	35-851	Hand rails and posts	14.394	13.090	1.1
29	35-993	Consumables & Erection materials	19.414	19.696	1.1
30	36-310	Main Mbl floor 11th	87.469	19.426	1.1
31	36-311	Main floor I Mbl 1st	58.251	13.498	1.1
32	36-320	Main floor 12th level	53.530	5.602	1.1
33	36-321	Main floor II Mbl Is	42.121	1.663	1.1

34	36-322	Main floor II Mbl 2N & NS 2 Supply	46.718	3.193	1.1
35	36-330	Main floor 13th level	4.425	0.058	1.1
36	36-331	Main floor III Mbl 1	14.203	1.826	1.1
37	36-332	Floor plan AT EL_34550	0.976	3.441	1.1
38	36-340	Main floor 14th level	1.016	1.627	1.1
39	36-341	Main floor IV Mbl 1S		1.217	1.1
40	36-350	Main floor 15th level	6.693	1.434	1.1
41	36-351	Main floor V Mbl Ist	6.107	2.953	1.1
42	36-352	Main floor V Mbl IInd	0.177	1.163	1.1
43	36-360	Main floor 16th level	1.530		1.1
44	36-361	Main floor VI Mbl 1S	4.028	5.051	1.1
45	36-391	Miscellaneous platform	12.451	5.203	1.1
46	36-392	Miscellaneous platform	25.900	7.835	1.1
47	36-393	Miscellaneous platform	12.134	12.134	1.1
48	36-610	Boiler roof Structure	17.365	12.958	1.1
49	36-611	Boiler roof sheeting	19.036	12.745	1.1
50	36-612	Weather protection F	23.787	16.973	1.1
51	36-620	Boiler side cladding	35.935	35.952	1.1
52	36-621	Boiler side cladding sheeting	10.220	10.220	1.1
53	36-740	Posts and hangers	5.353		1.1
54	36-811	Foor grills and guard plate	6.359	2.520	1.1
55	36-813	Foor grills and guard plate	43.454	7.684	1.1
56	36-820	Stairs and ladders	11.284	10.742	1.1
57	36-851	Handraills and posts lower	20.602	11.183	1.1
58	36-853	Handraills and posts upper	12.528	9.937	1.1
59	38-299	Mill handling monorails	38.432	27.066	1.1
60	38-310	Conn. Platforms to Mill	9.613	0.902	1.1
61	38-410	Mill maintanance platform	63.505	3.511	1.1
62	38-810	Floor grills and guard plate	24.465	4.976	1.1
63	38-820	Stairs and ladders	0.648	0.088	1.1
64	38-820	Stairs	5.640	3.941	1.1
65	38-850	Hand rails and hand	12.122	12.122	1.1
66	38-993	Consumables and erection	12.578	12.578	1.1
67	39-012	Foundation Materials	10.578	8.011	1.1
68	39-101	Columns frames befor.	179.150	12.581	1.1
69	39-140	Cols. Frames near I.D.	211.405	14.016	1.1
70	39-150	Col. Frames betn. I.D.	33.456	1.063	1.1
71	39-300	Platform -External	75.391	3.624	1.1
72	39-301	Struc. and platform F	4.773	4.773	1.1
73	39-302	Struc. for motor hood	7.437	7.512	1.1
74	39-303	Monorail beams for Fan	10.618	10.618	1.1

75	39-304	Fan handling Structure	15.565	4.677	1.1
76	39-305	Fan handling Structure	24.640	3.890	1.1
77	39-700	HSFG Fasteners for P	0.479	0.479	1.1
78	39-810	Floor grills	11.366	4.895	1.1
79	39-850	Hand rail and hand Raills	6.799	6.799	1.1
80	39-993	Consumables and erection	12.726	12.726	1.1
81	Deaer.	Dearator Approch platform (Str. Steel Lot)	10.000	6.370	1.1
		SUB-TOTAL STRUCTURE (1.1)	**1517.894**	**453.885**	
1.2 PRESSURE PARTS					
1	04-136	Upr Drum interls	4.057	4.057	1.2
2	05-137	Front Ww Lwr Inl Hdr	0.016		1.2
3	05-147	Rear Ww Lwr Inl Hdr	0.016	0.001	1.2
4	05-155	Side Ww Lwr Inl Hdr	0.053		1.2
5	05-175	Ext Ww Lwr Inl Hdr	0.031		1.2
6	06-400	Burner Panel	0.197		1.2
7	06-637	Front lower Ww panel	0.262	0.262	1.2
8	06-651	Side upper Ww panel	0.051		1.2
9	06-655	Side lower Ww panel	0.203		1.2
10	07-108	Downcomer upper Ppg	0.084		1.2
11	07-109	Downcomer lower Ppg	0.011		1.2
12	07-216	Hanger relief tubes	0.163		1.2
13	07-218	Front relief tubes	0.296		1.2
14	07-226	Furn rear arch tubes	0.576		1.2
15	07-401	Ww hdr suspension	2.531	1.340	1.2
16	07-410	Downcomer suspension	0.801		1.2
17	07-420	Dc seismic guides	3.306		1.2
18	07-431	Riser tube support	2.232		1.2
19	07-500	Misc Pr. Part components	0.690		1.2
20	07-601	Pressure part seals	0.772		1.2
21	07-700	Bulked BPS items	0.896		1.2
22	07-992	Imported Electrodes	0.084	0.084	1.2
23	07-993	Erection materials, consumables	0.438	0.438	1.2
24	10-135	Hor space Sh Inl Hdr	0.016		1.2
25	11-686	Sh roof Pnl	0.101		1.2
26	11-691	Rad roof Sh panel	0.309		1.2
27	11-694	Ext bottom Sh panel	0.231		1.2
28	12-174	Ver space Sh Inl link	8.140		1.2
29	12-184	Side wall Sh Inl tube	0.592		1.2
30	12-187	Rear roof Sh Inl tube	0.152		1.2

31	12-803	Sh sc spacer tubes	0.750		1.2
32	12-850	Sh conn pipes satur	0.112		1.2
33	12-852	Sh desh links	0.041		1.2
34	12-900	Sh desh	2.325		1.2
35	12-903	Sh Miscl Components	2.970	2.642	1.2
36	12-906	Sh link Supports	4.834		1.2
37	12-914	Expn-Sh rad roof hdr	0.024		1.2
38	12-924	Suspn-Sh bakpass hdr	0.180	0.006	1.2
39	12-944	Suspn-sh platen hdrs	1.953		1.2
40	12-948	Susp-vert spacd assy	0.001	0.065	1.2
41	12-954	Susp-vert spaced hdrs	2.712		1.2
42	12-968	Suspn of platen assy	0.046	0.095	1.2
43	12-992	Imported electrodes	0.091	0.091	1.2
44	12-993	Erection materials, consumables	0.252	0.252	1.2
45	17-904	Rh hdr suprt Above roof	3.134		1.2
46	17-919	Rh front suspension	0.171		1.2
47	17-929	Rh rear suspension	0.206		1.2
48	17-992	Imported electrodes	0.070	3.151	1.2
49	19-701	Eco inlet headers	0.020		1.2
50	19-850	Eco feed pipe	0.029	0.029	1.2
51	19-851	Eco links to Drum	0.107	0.002	1.2
52	19-904	Eco Hdr supt Ab roof	4.767		1.2
53	19-906	Eco line & link suport	0.545		1.2
54	19-907			0.283	1.2
55	19-992	Imported electrodes	0.022	0.022	1.2
56	21-600	S.B. Ppg & fittings	7.213	7.213	1.2
57	21-601	S.B. Piping supports	5.715	5.715	1.2
58	21-700	Bulked Bps comp	0.839	0.839	1.2
59	21-800	Sb Valves (Bhel)	0.354	0.354	1.2
60	21-825	Sb Valves (Subdey)	0.325	0.325	1.2
61	21-850	Sb safety valve Bhel	0.023	0.023	1.2
62	21-992	Imported electrodes	0.049	0.049	1.2
63	24-200	Trim Pipes & Fittings	35.145	14.518	1.2
64	24-201	Trim piping supports	7.126	2.621	1.2
65	24-215	Sprwat syst Rh Uty	3.464	0.094	1.2
66	24-260	Valves Bhel	4.500	0.657	1.2
67	24-265	Valves & Fittings Sd	5.626	5.626	1.2
68	24-273	Direct Wrt Lvl Gauge	0.247	0.247	1.2
69	24-280	Safety Val & Erv-Bhel	3.094	0.104	1.2
70	24-316	Rh Desh	1.458	0.518	1.2
71	24-350	Blr filling piping	0.518		1.2

72	24-351	H&S Blr filling Ppg	0.644	0.644	1.2
73	24-700	Bulked Bps Comp	0.366	0.366	1.2
74	24-955	Lap tool SV & ERV	0.093	0.093	1.2
75	24-960	Lap tool-Con val (Bhel)	0.034	0.034	1.2
76	24-987	BHEL-SV/ERV Comgspar	0.001	0.001	1.2
77	24-989	Bhel valve comg spar	0.022	0.022	1.2
78	24-992	Imported electrodes	0.031	0.031	1.2
79	24-993	Erec Matls, Consumes	0.017	0.017	1.2
80	42-001	Pneumatic Fittings	0.147	0.147	1.2
81	42-002	Steam Blow Materials	1.013		1.2
82	42-005	Instrument Fittings	0.219	0.345	1.2
83	42-046	Drain Oil Pump-Motor	0.200	0.200	1.2
84	42-065	Drain Oil Tank	0.758	0.758	1.2
85	42-070	Burner Station Skid	4.759	2.851	1.2
86	42-120	Piping, Ph Fuel Oil	13.077		1.2
87	42-128	Piping,P.House Stm	1.311		1.2
88	42-150	Piping,, Oflr Hfo/Trc	5.133	3.584	1.2
89	42-152	Piping, Op Flr Lfo	1.018		1.2
90	42-154	Piping, Op Flr Do	1.594	1.376	1.2
91	42-157	Piping, Op Flr Air	0.875		1.2
92	42-158	Piping, Op Flr Stm	2.260	1.808	1.2
93	42-200	Sub Del FO System	0.874	0.874	1.2
94	42-300	BHEL Valve, F.O. Sys	0.816	0.816	1.2
95	42-358	B.Valve, Op.Flr Stm	0.232	0.232	1.2
96	42-700	Bulked Bps Component	0.354	0.354	1.2
97	42-992	Imported electrodes	0.007	0.007	1.2
98	Deaer.	Dearator FST Sections & Heater with associated items	3.319		1.2
		SUB-TOTAL PRESSURE PARTS (1.2)	**167.539**	**66.283**	
1.3 NON PRESSURE PARTS (Up to ESP inlet funnel)					
1	08-101	Furnace upper buckstay	3.683	0.016	1.3
2	08-104	Furnace intermediate	13.257	0.719	1.3
3	08-107	Furnace lower buckstay	4.854	0.047	1.3
4	08-111	Furnace rear arch buckstay	1.330		1.3
5	08-380	Furnace bottom support	1.778		1.3
6	08-400	Furnace guide	10.944		1.3
7	08-500	Furnace back pass buckstay	12.087	0.154	1.3
8	08-700	Ex. Movement measurem	0.487	0.487	1.3
9	08-900	Furnace key buckstay	0.194	0.011	1.3
10	09-001	Seal box furn opening	1.412	0.191	1.3

11	09-002	Seal box Inst opening	1.005	0.182	1.3
12	09-003	Matl for Inst Tapping	0.175	0.175	1.3
13	18-001	Fur Roof Skin Casing	10.479	0.126	1.3
14	18-010	Pr Parts Attach-Casg	2.078	0.065	1.3
15	18-020	Vibration snubbers	0.301		1.3
16	20-051	Long Rectract Sb M11E	23.840	0.780	1.3
17	20-054	Wall Box Npr Lrsb Mi	0.557	0.557	1.3
18	20-201	Wall Deslagger Rw5E	9.574	1.305	1.3
19	20-204	Wall Box Npr - Rw5E	1.107		1.3
20	20-511	Da Head Valve Assy	0.111	0.111	1.3
21	20-794	Wall Box Npr for Tp	0.063	0.063	1.3
22	20-972	Temp Probe Dupltc	1.562	1.562	1.3
23	24-220	Sv Escape pipes	11.923	11.923	1.3
24	24-240	Sample cooler & suprt	0.654	0.654	1.3
25	24-994	Name Plates	0.224	0.224	1.3
26	28-220	Doors	5.876	0.411	1.3
27	28-700	Bps Fasteners	0.666	0.666	1.3
28	30-103	Seal plate assy	2.697		1.3
29	30-105	Fur bootom encl fram	4.945		1.3
30	30-211	Fur rear arch encl	1.818		1.3
31	30-212	Fur extd bot encl	7.980		1.3
32	30-215	Main boiler encl	3.948		1.3
33	30-219	Vent roof encl	41.822		1.3
34	30-220	Deck sprt and seals	24.483		1.3
35	30-224	Anti vibration baff.	0.214		1.3
36	31-010	Skin Casing Comps We	3.357	0.369	1.3
37	31-102	Furnace Bottom Skin	1.035	0.079	1.3
38	31-104	Furnace Rear Arch Sk	5.435		1.3
39	31-105	Second Pass Skin Casing	0.307		1.3
40	37-010	BLR OUTER CSG COMPS	18.988	7.315	1.3
41	37-810	BLT OUTER CASING	18.738	5.229	1.3
42	41-350	Acoil Gun Assy	0.800	0.105	1.3
43	41-390	Oil Gun Vice & Rack	0.830	0.830	1.3
44	41-500	Hea Ignitor	0.569	0.569	1.3
45	43-004	Assy Scnr&Gun Air Sy	1.622		1.3
46	43-005	Assy Mill Air System	2.501	2.501	1.3
47	43-104	M/C Scnr&Gun Air Sy	10.927		1.3
48	43-105	M/C Mill Air System	16.569	15.713	1.3
49	43-200	Subdel,Ignr,Scnr Air	1.715	0.106	1.3
50	45-221	Wbox Suprt 22-in	6.374	1.259	1.3
51	47-221	Fuel Pipe Suprt 22In	24.973	24.973	1.3

52	47-223	Coupling,Orifice Etc	25.227	13.098	1.3
53	47-229	St Pipes,Shop Bends		185.307	1.3
54	48-012	Sq.Duct-FD fan To A.H	41.386	2.680	1.3
55	48-014	Exp.Pcs-FD fan To A.H	6.271		1.3
56	48-015	Support- FD fan To A.H	10.716	2.846	1.3
57	48-019	Airduct Sup Fdn Matl	2.631	2.631	1.3
58	48-022	Sqduct FD fan Intrcon	26.723		1.3
59	48-112	Sq.Duct-Pafan-Pri-Ah	49.102	3.942	1.3
60	48-114	Exp.Pcs-Pafan-Pti-Ah	1.735		1.3
61	48-115	Support-Pafan-Pri-Ah	5.210	5.210	1.3
62	48-141	Seal air Hag&Id Gate	3.470	3.470	1.3
63	48-142	Sq.Duct-Coldairbus	28.464	28.463	1.3
64	48-144	Exp.Pcs-Coldairbus	1.334	1.334	1.3
65	48-145	Support-Coldairbus	4.202	4.202	1.3
66	48-200	Ins Tappings on Duct	3.082	3.082	1.3
67	48-202	Sqduct Ah-Wind Box	57.571		1.3
68	48-204	Exppos Ah-Wind Box	12.487		1.3
69	48-205	Suporrt Ah-Wind Box	5.024	0.782	1.3
70	48-207	Flowmtr-Sec Airblow	8.217	0.008	1.3
71	48-212	Sqduct Wind Box Conn	14.642		1.3
72	48-214	Exppos Wind Box Conn	3.811		1.3
73	48-222	Sqduct Ah-Hotairbus	38.374	30.320	1.3
74	48-224	Exppos Ah-Hotairbus	6.126	4.887	1.3
75	48-225	Suport Ah-Hotairbus	9.256	9.256	1.3
76	48-382	Sq Duct Eco-Airheater	74.775	0.271	1.3
77	48-384	Expnpcs Eco-Airheater	15.302		1.3
78	48-385	Support Eco-Airheater	4.104	0.435	1.3
79	48-432	Sqduct Ah-Blroutfl	81.537	11.690	1.3
80	48-434	Exppcs Ah-Blroutfl	14.914	1.552	1.3
81	48-435	Support Ah-Blroutfl	9.876	7.782	1.3
82	48-462	Sqduct Biroutfl-Ep	119.293		1.3
83	48-464	Exppcs Biroutfl-Ep	19.455		1.3
84	48-465	Support Biroutfl-Ep	14.421	6.714	1.3
85	48-662	Sq.Duct Hotbus-Mills	47.707	47.707	1.3
86	48-664	Expnpcs Hotbus-Mills	6.802	6.802	1.3
87	48-665	Supports for Hot Pa	7.671	7.525	1.3
88	48-667	Venturi.Pri Air Flow	10.319	10.319	1.3
89	48-700	Bulked Bps Component	2.031	0.967	1.3
90	48-993	Erection-Materials	2.789	2.789	1.3
91	57-013	DAMPERS BET FD FAN & APH	3.509		1.3
92	57-033	SA SCAPH INLET DAMPER	2.173	0.001	1.3

93	57-063	SA SCAPH OUTLET DAMPER	6.121		1.3
94	57-110	GUILLOTENE GATE PA FAN	10.831	10.831	1.3
95	57-113	DAMPERS BETWEEN PA FAN	3.875		1.3
96	57-143	DAMPERS COLD AIR BUS(TE	1.626	1.626	1.3
97	57-160	COLD AIR GATE, AIRBUS T	6.962	6.962	1.3
98	57-203	DAMP APH TO WIND BOX DU	7.629		1.3
99	57-209	MTG BKT FOR CL DAMPER	3.262	3.262	1.3
100	57-223	DAMPER APH PRIMARY SIDE	4.332		1.3
101	57-270	GUILLOTENE GATE DUCT T	16.585	16.585	1.3
102	57-273	DAMPER BOILER OUTLET	5.837	5.837	1.3
103	57-383	FLUE GAS SAH INLET DAM	15.178		1.3
104	57-433	DAMPER APH BOILER OUTL	17.346		1.3
105	57-460	GUILLOTENE GATE EP INL	18.305		1.3
106	57-466	PLATFORMS AND LADDERS	20.226	15.870	1.3
107	57-470	EP OUTLET GATE	18.309		1.3
108	57-491	BLOWER WITH MOTOR	0.600	0.600	1.3
109	57-577	ELECT ACTUATOR FOR GAT	5.146	1.790	1.3
110	CERA	CERAMIC COAL PIPE BEND	74.038	60.978	1.3
111	COAL	CERAMIC LINED VENTURY VANE	0.322	0.322	1.3
112	FIE	FUEL INLET ELBOW	66.328		1.3
113	MILLS	CERAMIC LINED INNER CONE FOR MILLS	14.928	201.989	1.3
114	ORIF	ORIFICES ID	1.530	1.530	1.3
115	PEM	LP DOSING SYSTEM	7.355		1.3
116	PEM	PEM SUPPLY VALVES	5.550		1.3
		SUB-TOTAL NON PRESSURE PARTS (1.3)	**1456.828**	**813.731**	
2.1 ROTATING MACHINES					
1	52-000	SPECIAL TOOLS/CONTRA	0.421	0.421	2.1
2	52-010	LARG AH ROTOR ASSY	343.230	0.568	2.1
3	52-011	LARG AH ROTOR POST	15.553		2.1
4	52-012	LARG AH ROTOR PIN RACK	3.797		2.1
5	52-013	LARG AH ROTOR SEALS	4.580	2.290	2.1
6	52-030	LARG AH ROTOR HOUSING	42.762	0.102	2.1
7	52-041	HOT END CONNC. PLATE	39.664	0.108	2.1
8	52-042	COLD END CONNC PLATE	60.065	0.223	2.1
9	52-054	LARG AH AXIAL SEAL	0.416	0.208	2.1
10	52-055	LARG AH BY PASS SEAL	0.875	0.438	2.1
11	52-100	LARGE AH ROTOR DRIVE	3.535	0.582	2.1
12	52-211	LARG AH AIR SEAL PIPE	0.673	0.336	2.1
13	52-220	LARG AH GENS DETAILS	2.325	0.837	2.1

14	52-261	LARG AH GUIDE BEARING	2.924	0.225	2.1
15	52-262	LARG AH SUPPORT BEARING	4.258	0.431	2.1
16	52-271	OIL PIPE GUIDE BRG	0.516	0.422	2.1
17	52-272	OIL PIPE SUPPORT BRG	0.536	0.421	2.1
18	52-274	LUB OIL CIRCULATION UNIT	1.102		2.1
19	52-301	WASH MANIFLD GAS INL	0.600	0.631	2.1
20	52-302	WASH MANIFLD GAS OUT	0.568	0.437	2.1
21	52-326	CLEANG EQPT GAS OUT	0.261	0.261	2.1
22	52-329	CLE EQPT DRIVE UNIT	1.634	0.863	2.1
23	52-600	LARGE AHE, C&I COMPONE	0.124	0.062	2.1
24	55-011	FD FAN FOUNDATION MATL.	1.576		2.1
25	55-017	FD FAN C&I ITEMS	0.021	0.021	2.1
26	55-031	PA FAN FOUNDATION MATL	1.621		2.1
27	55-037	PA FAN C&I ITEMS	0.021	0.021	2.1
28	55-214	1 REAC FD FAN 1600-2000	13.748	0.248	2.1
29	55-334	2 REAC PA FAN	18.678	3.523	2.1
30	55-810	AXIAL FD FAN COUPLING	0.555	0.018	2.1
31	55-830	AXL PA FAN COUPLING	1.160	0.044	2.1
32	55-910	AXL FD FAN ACCESSORY	2.592	0.392	2.1
33	55-911	AXIAL FD FAN SILENCER	25.681	6.765	2.1
34	55-930	AXL PA FAN ACCESSORY	2.592	1.492	2.1
35	55-931	PA FAN SILENCER	30.576	8.389	2.1
36	56-000	TOOLS & FIXTURE/CONT		0.696	2.1
37	56-021	ID FAN FOUNDATION MATERIALS	3.925		2.1
38	56-027	ID FAN C&I ITEMS	0.028	0.028	2.1
39	56-091	RAD FAN-FIRST FILL LUBE	4.830	4.830	2.1
40	56-161	BAC 1 SUC SA FAN	0.500	0.500	2.1
41	56-171	SEAL AIR FAN BCSS <1000	6.011	6.011	2.1
42	56-228	BAC 2 SUC ID FAN	88.432	0.622	2.1
43	56-670	IGNITR FAN MOTOR	0.048		2.1
44	56-820	RADL ID FAN COUPLING	11.673	0.144	2.1
45	56-870	SEAL AIR FAN COUPLING	0.081		2.1
46	56-920	RAD ID FAN ACCESSORY	2.317	0.263	2.1
47	60-088	FABRICATED ITEMS FOR XRP-883/903/043	9.568		2.1
48	60-188	BOWL AND BOWL HUB ASSEMBLY	90.111		2.1
49	60-288	GASKET CERAMIC FIBRE 51X15X6	0.012		2.1
50	60-388	SPRING ASSEMBLY (MODULAR)	26.728		2.1
51	60-488	VICTAULIC COUPLING 23"PIPE	0.669		2.1
52	61-001	JOURNAL HEAD & TRUNNION ASSY FOR XRP 883	44.010		2.1
53	61-088	JOURNAL ASSEMBLY	70.380		2.1
54	61-188	MILL DRIVE AND BOWI ASSEMBLY	66.600		2.1

55	61-288	MILL SIDE AND LINER ASSEMBLY	106.140		2.1
56	61-388	CLASIFIER ASSEMBLY	166.476		2.1
57	61-488	MDV ASSEMBLY	36.000		2.1
58	61-788	MILL MOTOR COUPLING	0.960		2.1
59	61-888	MILL HANDLING SYSTEM (PER UNIT)	19.900		2.1
60	61-888	LUBRICATING OIL (PER UNIT)	9.334	9.334	2.1
61	61-988	COMMISSIONING SPARES (PER UNIT)	0.387		2.1
62	65-736	36GRAVIMETRIC FEEDER	43.434	23.119	2.1
63	67-272	Coalvalve-36 Mot Opr	5.693	5.693	2.1
64	67-276	Raw Coal Gate-Chain 36	5.951	5.951	2.1
65	67-283	Fdr Isolation Gate	7.243	7.243	2.1
66	67-801	Down Spout	15.647	15.647	2.1
67	67-802	Bunker Emptying chute	15.111	15.182	2.1
68	67-803	Feed Pipe To Mill	8.110	8.110	2.1
69	FD	FD FAN MOTOR (2 NOS)	11.650		2.1
70	HERP	HERP SUPPLY MATERIALS FOR MILLS	44.834		2.1
71	ID	ID FAN MOTOR (2 NOS)	33.680		2.1
72	MILL	MILL MOTOR (6 NOS)	36.652		2.1
73	PA	PA FAN MOTOR (2 NOS)	27.607		2.1
		SUB TOTAL ROTATING MACHINES (2.1)	**1649.972**	**134.152**	
2.2 Handling Equipments of Rotating Machine					
1	99-100	Fan Handling Equipt	11.100	11.100	2.2
2	99-400	Scaph, Raph Handlg Eq	1.000	1.000	2.2
3	99-512	Furn Cradl- 2Walc	1.100	1.100	2.2
		SUB TOTAL Handling Equipments of Rotating Machine (2.2)	**13.200**	**13.200**	
3.1 ESP					
1	78-405	ESP-SUB DELIVERY COMPO.	0.248	0.047	3.1
2	78-406	INSULATOR HOUSING ASSY	20.718	0.008	3.1
3	78-408	GAS DIST ASSY		0.259	3.1
4	78-409	GD RAPPING MECHANISM	8.304		3.1
5	78-410	GD DRIVE ARRANGEMENT	0.457	0.068	3.1
6	78-411	GAS SCREEN EP	3.772		3.1
7	78-416	EMITING ELECTRODE RAPP MECH.	19.789		3.1
8	78-417	DRIVE ARRGT. FOR EMIT	14.787		3.1
9	78-420	COLLECTING ELECTRODE		1.283	3.1
10	78-421	EMITING FRAME SYS. TOP		0.382	3.1
11	78-424	SHOCK BARS		0.001	3.1
12	78-426	COLL ELECTRODE RAPP. DRIVE	3.204		3.1

13	78-430	ELECTRICAL SD COMPTS	6.449	2.143	3.1
14	78-431	GEARED MOTORS FOR RAPP.	10.668	0.534	3.1
15	78-432	EMIT SYS FRAME-MIDDLE		0.175	3.1
16	78-442	OUTER ROOF -EP	134.695		3.1
17	78-449	CASING SHELL / PANEL		0.274	3.1
18	78-450	INLET-OUTLET FUNNEL		1.759	3.1
19	78-455	PENT HOUSE FOR E P	88.509	3.107	3.1
20	78-461	EP PERF TEST EQUIPT		0.422	3.1
21	78-465	APP PLATFORM-HOPPER		0.215	3.1
22	78-466	WATER WASHING SYSTEM	3.390	3.390	3.1
23	78-472	INTERLOCKS EP	0.975	0.975	3.1
24	78-473	ELECTRICALLY OPERTD HO	3.207	0.004	3.1
25	78-490	HEATING ELEMENTS	1.724	1.724	3.1
26	89-611	ESP ROOF HANDRAILS	4.212		3.1
27		HVR TRASFORMER (ESP) WITH ELE. CONT.	59.920		3.1
		SUB TOTAL ESP (3.1)	**385.028**	**16.770**	
3.2 NON PRESSURE PARTS (ESP outlet funnel to chimney)					
1	48-482	Sq.Duct-Ep/Mp-Idfan	78.945		3.2
2	48-484	Expnpcs-Ep/Mp-Idfan	12.186		3.2
3	48-485	Support -Ep/Mp-Idfan	8.643	2.492	3.2
4	48-492	Sq.Duct Idfan-Chimny	73.730		3.2
5	48-494	Expnpcs Idfan-Chimny	5.723		3.2
6	48-495	Support Idfan-Chimny	8.327	0.773	3.2
7	57-480	ID FAN INLET GATE	13.854		3.2
8	57-490	GUILLOTENE GATE ID FAN	14.736		3.2
SUB TOTAL NON PRESSURE PARTS (ESP outlet funnel to chimney) 3.2			**216.144**	**3.265**	
4.1 P-91 PIPING					
1	80-300	MS FROM SUPERHEATERTO BOILER STOP VALVE	8.838		4.1
2	80-301	MS FROM BOILER STOP VALVE TO ESV	67.800	23.137	4.1
3	80-304	MS HEADER TO HPBP VALVE	5.258	2.351	4.1
4	80-310	HRH FROM REHEATER TO INTERCEPTER VALVE	119.526	3.909	4.1
5	80-311	HRH FROM INTERCEPTER VALVE TO TURBINE	0.000		4.1
6	80-312	LPBP VALVE UPSTREAM & DOWNSTREAM	31.686	0.055	4.1
7	80-320	CRH FROM TURBINE TO REHEATER	45.474	3.663	4.1
		SUB TOTAL P-91 PIPING	**278.582**	**33.115**	
4.2 ALLOY STEEL (AS) PIPING					
1	80-303	MS HEADER TO AUX PRDS	8.051	0.773	4.2

2	80-307	HP & LP BYPASS WARM UP	1.416	1.416	4.2
3	80-321	HPBP VALVE TO CRH PIPING	5.198	0.093	4.2
4	80-336	EXTRACTION STEAM TO HP HEATER NO.1	2.902	0.845	4.2
5	80-901	SUB DELIVERY VALVES FOR LIGHT UP	3.649		4.2
7	80-913	PIPING VALVES	114.877		4.2
8	80-914	ROOT VALVES	3.769		4.2
9	80-918	PIPING VALVES	14.306		4.2
		SUB TOTAL AS PIPING (4.2)	**154.168**	**3.127**	
4.3 CS (HP) PIPING					
1	80-322	CRH PIPING TO DEAERATING HEATER	4.661	0.235	4.3
2	80-324	CRH HEATER TO AUX PRDS	0.941	0.045	4.3
3	80-325	SMALL BORE FITTINGS	2.283	2.198	4.3
4	80-330	EXTRACTION STEAM TO LP HEATER-1	6.812	0.672	4.3
5	80-331	EXTRACTION STEAM TO LP HEATER-2	3.175		4.3
6	80-332	EXTRACTION STEAM TO LP HEATER-3	3.166	0.530	4.3
7	80-335	EXTRACTION STEAM TO DEAERATING HEATER	9.059		4.3
8	80-337	EXTRACTION STEAM TO HP HEATER NO.2	1.440	0.584	4.3
9	80-340	AUX STEAM HEADER	4.004	0.165	4.3
10	80-341	HT&LT AUX STEAM INTE CONNE HDR B/W U1TOU2	19.379	12.846	4.3
11	80-343	AUX STEAM TO AH SOOT BLOWERS	0.828	0.828	4.3
12	80-344	AUX STEAM TO FO SYSTEM TP	15.530	1.249	4.3
13	80-345	AUX STEAM TO DEAERATING HEATER	3.955	0.583	4.3
14	80-348	AUX STEAM TO GLAND SEALS-SG SCOPE	0.556	0.067	4.3
15	80-351	AUX STEAM TO UNLISTEM USERS-SG ACOPE	5.826	5.826	4.3
16	80-355	STEAM TRACING PIPING	2.500	2.000	4.3
17	80-395	AUX STEAM TO FUEL OIL ATOMISING	0.524	0.524	4.3
18	80-418	ERECTION MATERIALS FOR INSTRUMENTS	0.222	0.222	4.3
19	80-420	BOILER FEED PUMP SUCTION	7.254	0.435	4.3
20	80-421	BOILER FEED PUMP RECIRCULATION	8.969		4.3
21	80-423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	34.098	0.558	4.3
22	80-424	BFD BETWEEN HTRS & GROUP PROTECTION VLV	24.196	0.015	4.3
23	80-425	BFD FROM FINAL HPH TO SG TP	38.191	0.034	4.3
24	80-430	SPRAY WATER TO HPBP	0.604	0.301	4.3
25	80-431	SPRAY WATER TO AUX PRDS	1.560	1.560	4.3
26	80-432	SPRAY WATER TO BOILER DESH UPTO SG TP	0.891	0.046	4.3
27	80-450	CBD AND EMERGENCY DRUM DRAIN	5.515	5.515	4.3
28	80-451	BOILER INTEGRAL PIPING DRAINS	4.542	3.674	4.3
29	80-452	HP PIPING DRAINS -SG SCOPE	3.631	3.631	4.3
30	81-128	HIGH PRESSURE DOSING SYSTEM	3.000		4.3

31		Valves and fittings, FD, CD, AS,DM, DR, CRH, DPCV, DESH-1 etc		20.846	4.3
32		Valves		48.913	4.3
		SUB TOTAL CS (HP) PIPING (4.3)	**217.312**	**114.102**	
4.4 CS (LP) PIPING					
1	80-364	CBD TANK VENT TO SYSTEM	0.599	0.599	4.4
2	80-365	CBD TANK VENT/SV EXHAUST TO ATMOSPHERE	0.310	0.310	4.4
3	80-366	IBD TANK VENT TO ATMOSPHERE	8.534	3.457	4.4
4	80-369	HP DRAIN FLASH TANK VENT TO SYSTEM	3.769		4.4
5	80-373	AUX STEAM HEADER SV EXHAUST	7.237	7.237	4.4
6	80-375	HP & LP HEATER SRV EXHAUST PIPING		0.829	4.4
7	80-381	HP HEATER VENTS		1.776	4.4
8	80-382	LP HEATER VENTS		0.149	4.4
9	80-385	VENT FROM UNLISTED PPG/EQPT TO COND	3.626	0.339	4.4
10	80-387	CONDENSATE PUMP VENT	0.224	0.224	4.4
11	80-388	CONDENSER AIR EVACUATION PIPING	2.914	2.914	4.4
12	80-400	CONDENSATE SUCTION	2.956		4.4
13	80-401	CD FROM PUMP TO LPH1/DC INLET TEE & RECIR	2.446		4.4
14	80-402	CD FROM LPH1/DC INLET TEE TO TG TP	16.066	0.146	4.4
15	80-407	CONDENSATE FOR SEALING OF VACUUM		1.558	4.4
16	80-408	CONDENSATE DUMP FROM HEADER	0.847	0.019	4.4
17	80-413	UNLISTED CONDENSATE	2.866		4.4
18	80-440	CONDENSER DRAINS	1.992	1.992	4.4
19	80-442	GLAND STEAM COOLER DRAINS	1.190	1.190	4.4
20	80-443	LP HEATER -1 TO CONDENSER	1.848	0.881	4.4
21	80-444	LP HEATER-2/3/4/5 DRAINS AND DRIP PUMP I		2.295	4.4
22	80-446	DEAERATING HEATER OVER FLOW AND DRAIN	1.141		4.4
23	80-447	HP HEATER DRAINS		3.324	4.4
24	80-449	TG CYCLE PIPING DRAINS & VENTS		6.897	4.4
25	80-453	LP PIPING DRAINS-SG SCOPE	7.661	7.661	4.4
26	80-455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	1.991	1.461	4.4
27	80-457	MANIFOLDS FOR HP FLASH BOX & CONDENSER	0.627	0.747	4.4
28	80-460	SG AUX COOLING WATER UNIT SYSTEM	29.232	16.615	4.4
29	80-463	TG AUX COOLING WATER	109.421	16.011	4.4
30	80-468	MAIN CIRCULATION WATER PIPING	49.668	26.798	4.4
31	80-471	BOILER WATER WASH TO & FROM UNIT	7.361	4.925	4.4
32	80-480	FIRE WATER - OTHER AREAS	7.606	4.725	4.4
33	80-610	SERVICE AIR-COMP SUCT & DIS TO RECEIVER		3.442	4.4
34	80-612	SERVICE AIR FOR INDIVIDUAL UNITS	4.782	1.801	4.4
35	80-614	INST AIR COMP SUC & DIS TO RECEIVER	3.521	3.207	4.4

36	80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	5.337	3.169	4.4
37	80-650	FUEL OIL SUPPLY AND RETURN PIPING	8.000	58.387	4.4
38	80-673	LUBE OIL PIPING SYSTEM	2.000	6.266	4.4
39	80-901	SUB DELIVERY VALVES FOR LIGHT UP		0.588	4.4
40	81-411	DIRECT GAUGES FOR STEAM LINES	0.670	0.670	4.4
41	81-412	DIRECT GAUGES FOR NON-STEAM LINES	0.603	0.603	4.4
42	81-415	TEST THERMOWELLS	0.454	0.454	4.4
43	81-416	PERFORMANCE GUARANTEE TEST MATERIALS	0.990	0.990	4.4
44	81-437	SUPERVISORY CONTROL PANEL	0.400		4.4
45	80-905	INSTRUMENT & SERVICE AIR TAPPING VALVES	1.141		4.4
46		Misc. Chemical skids,	5.6	5.6	4.4
47		Bellows, Ball Sep. Flange etc	7.65	7.65	4.4
48		IPL Supply valves for ACW & DMCW	5.746	5.746	4.4
		SUB TOTAL CS (LP) PIPING (4.4)	**319.026**	**213.652**	
4.5 STAINLESS STEEL (SS) PIPING					
1	80-600	HIGH PRESSURE DOSING PIPING	0.500	0.500	4.5
2	80-601	LOW PRESSURE DOSING PIPING	0.712	0.801	4.5
		SUB TOTAL SS PIPING (4.5)	**1.212**	**1.301**	
4.6 HANGERS AND SUPPORTS					
1	80-920	H&S FOR HYDRO TEST	1.025	0.171	4.6
2	80-921	H&S FOR LIGHT-UP STEAM LINE	2.485	3.538	4.6
3	80-923	H&S FOR STEAM BLOWING	176.879	135.252	4.6
4	80-928	H&S FOR BOILER LIGHT UP -TG	12.306	5.421	4.6
5	80-930	H&S FOR SYNCHRONIZATION -TG	7.279	7.699	4.6
6	80-933	H & S FOR LP PIPING	44.393	34.727	4.6
7	80-934	STANDARD HANGER COMPONENTS	34.867	32.481	4.6
8	80-992	IMPORTED ELECTRODES	2.378	2.408	4.6
9	80-993	MISC ERECTION MATERIALS	2.735	2.739	4.6
10	81-003	CONTINUOUS BLOW DOWN EXPANDER-D5100MM	2.382	0.006	4.6
11	81-009	INTERMITTENT BLOW DOWN EXPANDER-D2500MM	6.671	0.015	4.6
		SUB TOTAL HANGERS AND SUPPORTS (4.6)	**293.400**	**224.457**	
4.7 Piping-Temporary (Steam Blowing)					
1		Temporary Piping	**25.000**	**25.000**	4.7
4.8 Piping-Temporary (Chemical Cleaning)					
1		Temporary Piping	**20.000**	**20.000**	4.8

5.2 Insulation-Pourable & Castable					
1	33-201	MAIN BLR REF IS8	0.439	0.439	5.2
2	33-212	MAIN BLR CAST REF GR	70.000	1.000	5.2
3	33-230	MAIN BLR POUR INSULATION	140.000	8.000	5.2
		SUB TOTAL Insulation-Pourable & Castable (5.2)	**210.439**	**9.439**	
5.3 Insulation- Fixing Components Iron Parts					
1	32-010	FICOM BLR PP INSULATION	5.574	4.571	5.3
2	32-110	FICOM BLR MNTG INSULATION	4.623	4.623	5.3
3	32-120	FICOM SB PIPES INSULATION	1.375	1.375	5.3
4	32-310	FICOM AIR DUCTS INSULATION	25.129	25.129	5.3
5	32-410	FICOM AH GAS DUCTS INSULATION	6.750	6.750	5.3
6	32-510	FICOM ID DUCTS INSULATION	37.285	37.285	5.3
7	32-710	FICOM OIL SUST INSULATION	1.400	1.400	5.3
8	33-924	MISC EQPTS ASB MATLS	0.166	0.166	5.3
9	33-970	MISC EQPTS EXP METAL	1.886	1.886	5.3
10	33-971	MISC EQPTS WW CLOTH	0.558	0.558	5.3
11	33-975	MISC EQPTS SEAL COMP.	0.200	0.200	5.3
12	81-318	FIX COM FOR MISELLANEOUS PPG INSULATION	8.771	0.956	5.3
13	81-341	SEALING COMPOUND FOR INSL	0.800	0.105	5.3
14	PEM	PEM Supplied Insulation Iron Parts	15.000		5.3
15	78-468	FIXING COMP. FOR ESP I	10.000	5.000	5.3
		SUB TOTAL Insulation-Fixing Components Iron Parts (5.3)	**119.517**	**90.004**	
5.4 Insulation- Aluminum Cladding Sheets					
1	81-350	ALUMINIUM CLADDING FOR INSULATION	29.832	3.729	5.4
2		PEM Supplied Aluminum Cladding materials	25.000		5.4
3	78-468	FIXING COMP. FOR ESP I	51.224	20.072	5.4
		SUB TOTAL Insulation-Aluminum Cladding sheets (5.4)	**106.056**	**23.801**	
5.5 Insulation- Wool Mattress					
1	33-021	BLR PP MINRL WOOL	79.393	29.293	5.5
2	33-121	BLR MNTNGS MINRL WOOL	8.250	8.250	5.5
3	33-126	SB PIPES MINRL WOOL	2.613	2.613	5.5
4	33-321	AIR DUCTS MINRL WOOL	101.905	101.905	5.5
5	33-421	AH GAS DUCT MINRL WOOL	24.805	24.805	5.5
6	33-521	ID DUCTS MINRL WOOL	29.813	29.813	5.5
7	33-721	OIL SYST MINRL WOOL	2.200	2.200	5.5
8	81-325	MINERAL WOOL MATTRESS	64.130	10.003	5.5

9		PEM Supplied Wool Mattress	188.000		5.5
10	78-467	MIN WOOL FOR ESP INSULATOR	86.128	24.998	5.5
		SUB TOTAL Insulation- Wool Mattress (5.5)	**587.237**	**233.880**	
		Total	**7738.554**	**2493.164**	

Part B: Weight Details for which Erection has already been completed by other agency

S N.	PGMA	Description	Allignment, Bolting, Grouting & Welding (MT)	Leak Test, NDT, Heat Treatment, equipment trial run (MT)	Allignment, Bolting, Grouting & Welding (MT)	Leak Test, NDT, Heat Treatment, equipment trial run (MT)
			Unit # 5		Unit # 3	
A. STRUCTURE						
1	30-219	Vent roof encl			1.780	1.780
2	30-224	Anti vibration baff.	0.000	6.851		
3	35-310	Horizontal bracing I	0.000	0.733		
4	35-320	Horizontal bracing II	0.000	0.765		
5	35-330	Horizontal bracing III	0.000	0.740		
6	35-350	Horizontal bracing V	0.000	0.414		
7	35-360	Horizontal bracing VI	0.000	1.293		
8	35-380	Landing platforms Lower	0.000	1.258	0.060	0.060
9	35-381	Land platform Upper	0.392	0.780		
10	35-390	Platform At Drum floor	0.000	0.903		
11	35-441	Horizontal beams -lower	0.000	0.680		
12	35-533	Rear bracing -upper	0.000	1.950		
13	35-811	Floor grills and guard plate	2.606	10.184	10.721	10.721
14	35-851	Hand rails and posts	2.937	5.895	7.969	7.969
15	36-310	Main Mbl floor 11th			3.351	9.288
16	36-311	Main floor I Mbl 1st	0.000	2.055	1.447	5.683
17	36-320	Main floor 12th level	0.305	7.773	0.82	0.82
18	36-321	Main floor II Mbl Is	0.639	1.592	0	2.647
19	36-322	Main floor II Mbl 2N & NS 2 Supply	1.518	4.488	0.584	1.029
20	36-330	Main floor 13th level	0.652	1.596	1.736	3.688
21	36-331	Main floor III Mbl 1	0.451	1.014	0.792	3.199

22	36-332	Floor plan AT EL_34550	0.710	0.710	0.399	0.399
23	36-340	Main floor 14th level			0.229	0.871
24	36-341	Main floor IV Mbl 1S			2.222	2.222
25	36-361	Main floor VI Mbl 1S	0.720	2.225	0	0.124
26	36-391	Miscellaneous platform			2.243	7.248
27	36-392	Miscellaneous platform	1.574	11.507	1.574	3.672
28	36-610	Boiler roof Structure	1.191	4.268		
29	36-611	Boiler roof sheeting			4.771	4.771
30	36-612	Weather protection F			6.814	6.814
31	36-811	Foor grills and guard plate	1.226	9.568	7.201	7.201
32	36-813	Foor grills and guard plate	3.897	8.212	13.031	13.031
33	36-851	Handraills and posts lower	1.619	1.619	6.018	6.018
34	36-853	Handraills and posts upper	0.829	0.829		
35	38-299	Mill handling monorails			11.366	11.366
36	38-410	Mill maintanance platform			1.474	4.726
37	38-810	Floor grills and guard plate			3.967	3.967
38	39-101	Columns frames befor.			2.204	5.152
39	39-140	Cols. Frames near I.D.			5.12	9.764
40	39-300	Platform -External			3.357	6.121
41	39-305	Fan handling Structure			3.88	3.88
42	39-810	Floor grills			3.426	3.426
43	Deaer.	Dearator FST Sections & Heater with associated items	72.320	72.320		
		SUB TOTAL : STRUCTURE	**93.586**	**162.222**	**108.556**	**147.657**
B. PRESSURE PARTS						
1	05-137	Front Ww Lwr Inl Hdr	0.000	13.682		
2	05-147	Rear Ww Lwr Inl Hdr	0.000	13.682		
3	05-155	Side Ww Lwr Inl Hdr	0.000	16.384		
4	05-227	Rear Ww hang out Hdr	2.888	2.888		
5	06-400	Burner Panel	15.699	15.699		
6	07-108	Downcomer upper Ppg	0.000	64.678		
7	07-109	Downcomer lower Ppg	18.533	86.276		
8	07-215	Side relief tubes	0.000	21.076		
9	07-216	Hanger relief tubes	0.000	21.452		
10	07-218	Front relief tubes	0.000	5.820		
11	07-223	Furn screen tubes	22.505	22.505		
12	07-225	Furn rear Hgr tubes	0.000	9.152		
13	07-226	Furn rear arch tubes	15.866	15.866		
14	07-231	Lwr corner trns tube	0.000	1.706		
15	07-232	Upr corner trns tube	0.000	0.518		
16	07-410	Downcomer suspension	6.863	6.863		
17	07-420	Dc seismic guides			0.272	3.306

18	07-501	Furn Insert tubes	0.000	2.009		
19	10-174	Ver space Sh Inl Hdr	11.024	11.024		
20	10-178	Ver platn Sh Inl Hdr	6.896	6.896		
21	10-184	Extsidewal Sh In Hdr	0.599	0.599		
22	10-274	Ver spac e Sh out Hdr	17.386	17.386		
23	10-278	Ver platn Sh out Hdr	7.802	7.802		
24	10-687	Roof Sh Juction Hdr	3.048	3.048		
25	11-236	Hor Spc Sh Upr Coil	110.486	110.486		
26	11-274	Ver spaces Sh coil	134.426	134.426		
27	11-278	Ver platen Sh coil	95.695	95.695		
28	11-694	Ext bottom Sh panel	2.461	2.461		
29	12-184	Side wall Sh Inl tube	1.668	1.668		
30	12-187	Rear roof Sh Inl tube	1.086	1.086		
31	12-805	Sh front hanger tube	0.000	4.628		
32	12-850	Sh conn pipes satur	0.603	5.182		
33	12-852	Sh desh links	11.047	11.047		
34	15-174	Ver space Rh Inl hdr	4.696	4.696		
35	15-274	Ver space Rh out hdr	16.869	16.869		
36	16-275	Verspc Rh front coil	62.718	62.718		
37	16-277	Verspc Rh rear coil	76.093	76.093		
38	19-753	Eco inlet rear hdr	0.000	0.242		
39	19-763	Eco inlet front hdr	0.000	0.241		
40	19-783	Eco inlet center hdr	0.000	0.234		
41	19-850	Eco feed pipe	2.954	2.954		
42	19-851	Eco links to Drum	9.936	9.936		
43	19-904	Eco Hdr supt Ab roof	5.132	5.132		
44	19-905	Eco Hdr supt Bl roof	6.817	6.817		
45	24-200	Trim Pipes & Fittings	1.792	11.610	0.003	1.061
46	24-201	Trim piping supports			4.504	4.504
47	24-215	Sprwat syst Rh Uty			3.37	3.37
48	24-260	Valves Bhel	7.984	7.984		
49	24-280	Safety Val & Erv-Bhel	0.723	0.723		
50	24-316	Rh Desh			0	1.458
		SUB TOTAL PRESSURE PARTS	**682.295**	**939.939**	**8.149**	**13.699**
C. NON PRESSURE PARTS						
1	08-101	Furnace upper buckstay	13.693	34.994	2.032	2.032
2	08-104	Furnace intermediate	0.709	18.968	3.194	3.194
3	08-107	Furnace lower buckstay	0.000	31.079	1.718	1.718
4	08-111	Furnace rear arch buckstay	0.864	0.864		
5	08-380	Furnace bottom support	1.491	32.353		
6	08-500	Furnace back pass buckstay	3.169	36.954		
7	08-900	Furnace key buckstay	0.340	3.136		

8	18-001	Fur Roof Skin Casing			2.235	2.235
9	18-010	Pr Parts Attach-Casg			0.975	0.975
10	20-051	Long Rectract Sb M11E			23.06	23.06
11	20-201	Wall Deslagger Rw5E			8.268	8.268
12	28-220	Doors			0.305	0.305
13	31-010	Skin Casing Comps We			0.953	0.953
14	31-102	Furnace Bottom Skin			0.955	0.955
15	41-350	Acoil Gun Assy			0.695	0.695
16	42-030	HFO Heater Set			0	1.547
17	42-150	Piping,, Oflr Hfo/Trc			0	1.549
18	42-152	Piping, Op Flr Lfo			0	0.148
19	42-154	Piping, Op Flr Do			0	0.217
20	42-157	Piping, Op Flr Air			0	0.213
21	42-158	Piping, Op Flr Stm			0	0.452
22	43-105	M/C Mill Air System			0.856	0.856
23	43-200	Subdel,Ignr,Scnr Air			0.3	0.3
24	45-220	Wbox Assy 22-in	64.188	64.188		
25	45-221	Wbox Suprt 22-in			1.398	1.398
26	47-223	Coupling,Orifice Etc			3.839	3.839
27	47-229	St Pipes,Shop Bends	56.079	56.079		
28	47-229	St Pipes,Shop Bends			72.326	72.326
29	48-012	Sq.Duct-FD fan To A.H			0	38.706
30	48-014	Exp.Pcs-FD fan To A.H			0	6.271
31	48-015	Support- FD fan To A.H			1.183	7.871
32	48-019	Airduct Sup Fdn Matl			0	0
33	48-022	Sqduct FD fan Intrcon			0	26.723
34	48-112	Sq.Duct-Pafan-Pri-Ah			20.608	45.126
35	48-114	Exp.Pcs-Pafan-Pti-Ah			0	1.735
36	48-202	Sqduct Ah-Wind Box			0	57.581
37	48-204	Exppos Ah-Wind Box			0	12.487
38	48-205	Suporrt Ah-Wind Box			0.805	4.243
39	48-207	Flowmtr-Sec Airblow			0	8.209
40	48-212	Sqduct Wind Box Conn			0	14.642
41	48-214	Exppos Wind Box Conn			0	3.811
42	48-222	Sqduct Ah-Hotairbus			0	8.054
43	48-224	Exppos Ah-Hotairbus			0.619	1.239
44	48-382	Sq Duct Eco-Airheater			3.233	74.504
45	48-384	Expnpcs Eco-Airheater			0	15.302
46	48-385	Support Eco-Airheater			1.107	3.669
47	48-432	Sqduct Ah-Blroutfl			0.982	69.847
48	48-434	Exppcs Ah-Blroutfl			5.067	13.362
49	48-435	Support Ah-Blroutfl			0	2.094
50	48-462	Sqduct Biroutfl-Ep			0	59.646

51	48-464	Exppcs Biroutfl-Ep			1.622	9.727
52	48-465	Support Biroutfl-Ep			4.624	4.624
53	48-482	Sq.Duct-Ep/Mp-Idfan			5.329	78.945
54	48-484	Expnpcs-Ep/Mp-Idfan			0.83	12.186
55	48-485	Support -Ep/Mp-Idfan			2.732	2.732
56	48-492	Sq.Duct Idfan-Chimny			0	144.06
57	48-494	Expnpcs Idfan-Chimny			0	9.344
58	48-495	Support Idfan-Chimny			3.069	16.793
59	48-700	Bulked Bps Component			0	1.064
60	57-013	DAMPERS BET FD FAN & APH			0	3.509
61	57-033	SA SCAPH INLET DAMPER			0	2.173
62	57-063	SA SCAPH OUTLET DAMPER			0	6.121
63	57-113	DAMPERS BETWEEN PA FAN			0	3.875
64	57-203	DAMP APH TO WIND BOX DU			0	7.629
65	57-209	MTG BKT FOR CL DAMPER			0	0
66	57-223	DAMPER APH PRIMARY SIDE			0	4.332
67	57-383	FLUE GAS SAH INLET DAM			0	15.178
68	57-433	DAMPER APH BOILER OUTL			0	17.346
69	57-460	GUILLOTENE GATE EP INL			0	9.128
70	57-470	EP OUTLET GATE			0	9.154
71	57-480	ID FAN INLET GATE			0	13.854
72	57-490	GUILLOTENE GATE ID FAN			0	14.736
73	57-577	ELECT ACTUATOR FOR GAT			0	3.356
74	CERA	CERAMIC COAL PIPE BEND			7.3	7.3
		SUB TOTAL NON PRESSURE PARTS	**140.533**	**278.615**	**182.219**	**999.523**
D. ROTATING MACHINES						
1	52-010	LARG AH ROTOR ASSY			171.331	171.331
2	52-011	LARG AH ROTOR POST			0	7.777
3	52-012	LARG AH ROTOR PIN RACK			1.899	1.899
4	52-030	LARG AH ROTOR HOUSING			0	21.179
5	52-041	HOT END CONNC. PLATE			0	19.74
6	52-042	COLD END CONNC PLATE			0	29.809
7	52-100	LARGE AH ROTOR DRIVE			2.372	2.372
8	52-220	LARG AH GENS DETAILS			0.544	0.544
9	52-261	LARG AH GUIDE BEARING			1.349	1.349
10	52-262	LARG AH SUPPORT BEARING			1.783	1.783
11	52-274	LUB OIL CIRCULATION UNIT			0.551	0.551
12	55-011	FD FAN FOUNDATION MATL.			0.788	0.788
13	55-031	PA FAN FOUNDATION MATL			1.621	1.621
14	55-214	1 REAC FD FAN 1600-2000			6.751	6.751
15	55-334	2 REAC PA FAN			15.155	15.155
16	55-810	AXIAL FD FAN COUPLING			0.26	0.26

17	55-830	AXL PA FAN COUPLING			1.14	1.14
18	55-910	AXL FD FAN ACCESSORY			1.1	1.1
19	55-911	AXIAL FD FAN SILENCER			9.673	9.673
20	55-930	AXL PA FAN ACCESSORY			1.1	1.1
21	55-931	PA FAN SILENCER			11.825	22.187
22	56-021	ID FAN FOUNDATION MATERIALS			0	3.925
23	56-228	BAC 2 SUC ID FAN			20.517	87.81
24	56-820	RADL ID FAN COUPLING			0	11.529
25	56-920	RAD ID FAN ACCESSORY			0.9	2.063
26	65-736	36GRAVIMETRIC FEEDER			20.293	20.293
27	FD	FD FAN MOTOR (2 NOS)			5.825	5.825
28	ID	ID FAN MOTOR (2 NOS)			0	33.002
29	MILL	MILL MOTOR (6 NOS)			5.9	35.4
30	MILLS	CERAMIC LINED INNER CONE FOR MILLS			270.442	505.048
31	PA	PA FAN MOTOR (2 NOS)			27.6	27.6
		SUB TOTAL ROTATING MACHINES	**0.000**	**0.000**	**580.719**	**1050.604**
E. ESP						
1	78-401	ROLL/SLIDE SUPPORTS	0.000	11.808		
2	78-405	ESP-SUB DELIVERY COMPO.			0.201	0.201
3	78-406	INSULATOR HOUSING ASSY			0.004	0.004
4	78-408	GAS DIST ASSY	0.000	30.154	10.133	22.013
5	78-409	GD RAPPING MECHANISM			0	1.313
6	78-410	GD DRIVE ARRANGEMENT			0.161	0.161
7	78-413	EMIT SYS SUSPENSION	3.852	3.852		
8	78-414	SUPPORT INSULATORS	1.680	1.680		
9	78-415	EMITTING ELECTRODES	1.888	1.888	2.072	2.072
10	78-416	EMITING ELECTRODE RAPP MECH.			0.824	0.824
11	78-417	DRIVE ARRGT. FOR EMIT			1.971	1.971
12	78-419	COLECTING ELECTRODE SUSPN.	7.523	66.961		
13	78-420	COLLECTING ELECTRODE	473.480	662.104	55.956	55.956
14	78-421	EMITING FRAME SYS. TOP	2.394	64.962	2.151	2.151
15	78-422	EMITING FRAME SYS- BOTTOM	0.663	82.909		
16	78-423	INSPECTION DOORS	0.784	0.784		
17	78-424	SHOCK BARS	44.431	44.431	8.208	8.208
18	78-425	COLL. ELECT RAPP MECH	21.006	29.148		
19	78-428	ESP ROOF PANELS	0.000	88.635	0.189	0.189
20	78-432	EMIT SYS FRAME-MIDDLE	1.551	107.230		
21	78-442	OUTER ROOF -EP			1.01	1.01
22	78-443	HOPPER RIDGES	28.237	28.237		
23	78-444	HOPPER UPPER PART	164.475	164.475		

24	78-445	HOP MLD & LOWER PART	184.012	184.012	3.798	3.798
25	78-446	INSULATOR SUPP PANEL	0.038	44.864		
26	78-447	ROOF PANEL ASSY	40.249	40.249		
27	78-448	CASING STRUCTURE	0.000	166.200		
28	78-449	CASING SHELL / PANEL	0.000	249.088		
29	78-450	INLET-OUTLET FUNNEL	43.830	100.398		
30	78-455	PENT HOUSE FOR E P			4.639	4.639
31	78-457	SPLITTER & GUIDE VANES	0.000	13.895		
32	78-461	EP PERF TEST EQUIPT	0.000	0.000		
33	78-465	APP PLATFORM-HOPPER	45.442	60.984	1.051	1.051
34	78-473	ELECTRICALLY OPERTD HO			2.503	2.503
35	78-481	SUPPORTING STRUCTURES F	35.909	217.891		
36	89-610	ESP GALLERIES & STAIRS	18.431	29.404	2.001	2.001
37	89-611	ESP ROOF HANDRAILS			0.212	0.212
38	HVR	HVR TRASFORMER (ESP) WITH ELE. CONT.			4.28	4.28
		SUB TOTAL ESP	**1119.875**	**2496.243**	**101.364**	**114.557**
F. PIPING						
1	80-300	MS FROM SUPERHEATER TO BOILER STOP VALVE			3.484	3.484
2	80-301	MS FROM BOILER STOP VALVE TO ESV			41.237	41.237
3	80-303	MS HEADER TO AUX PRDS			3.002	8.051
4	80-304	MS HEADER TO HPBP VALVE			2.907	2.907
5	80-310	HRH FROM REHEATER TO INTERCEPTOR VALVE			13.211	101.108
6	80-312	LPBP VALVE UPSTREAM AND DOWNSTREAM			16.449	31.623
7	80-320	CRH FROM TURBINE TO REHEATER			4.233	27.597
8	80-321	HPBP VALVE TO CRH PIPING			2.971	5.276
9	80-322	CRH PIPING TO DEAERATING HEATER			0.803	4.297
10	80-324	CRH HEADER TO AUX.PRDS			0	0.896
11	80-330	EXTRACTION STEAM TO LP HEATER-1			1.687	6.14
12	80-331	EXTRACTION STEAM TO LP HEATER-2			0.714	3.175
13	80-332	EXTRACTION STEAM TO LP HEATER-3			0.19	2.636
14	80-335	EXTRACTION STEAM TO DEAERATING HEATER			1.014	9.059
15	80-336	EXTRACTION STEAM TO HP HEATER NO.1			0	2.057
16	80-337	EXTRACTION STEAM TO HP HEATER-2			0.525	0.856
17	80-340	AUX STEAM HEADER			0.805	3.839
18	80-344	AUX STEAM TO FO SYSTEM TP			6.649	6.649
19	80-345	AUX STEAM TO DEAERATING HEATER			0.947	3.372
20	80-348	AUX STEAM TO GLAND SEALS - SG SCOPE			0	0.49

21	80-366	IBD TANK VENT TO ATMOSPHERE			0.089	5.078
22	80-369	HP DRAIN FLASH TANK VENT TO SYSTEM			2.527	3.768
23	80-385	VENT FROM UNLISTED PPG/EQPT TO COND			0	3.287
24	80-400	CONDENSATE SUCTION			0	2.956
25	80-401	CD FROM PUMP TO LPH1/DC INLET TEE AND RE			0.013	2.446
26	80-402	CD FROM LPH1/DC INLET TEE TO TG TP			0.399	15.994
27	80-408	CONDENSATE DUMP FROM HEADER			0	0.828
28	80-413	UNLISTED CONDENSATE			0	2.866
29	80-420	BOILER FEED PUMP SUCTION			1.004	6.819
30	80-421	BOILER FEED PUMP RECIRCULATION			0.6	8.969
31	80-423	BOILER FEED PUMP TO HPH INCLUDING BYPASS			0.777	21.453
32	80-424	BFD BETWEEN HTRS AND GROUP PROTECTION			0	7.35
33	80-425	BFD FROM FINAL HPH TO SG TP			0	29.314
34	80-430	SPRAY WATER TO HPBP			0.303	0.303
35	80-432	SPRAY WATER TO BOILER DESH UPTO SG TP			0	0.845
36	80-443	LP HEATER-1 TO CONDENSER			0	0.967
37	80-446	DEAERATING HEATER OVER FLOW AND DRAIN			0	1.141
38	80-447	HP HEATER DRAINS			1.543	1.543
39	80-451	BOILER INTEGRAL PIPING DRAINS			0.868	0.868
40	80-455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE			0	0.531
41	80-460	SG AUX COOLING WATER UNIT SYSTEM			0.267	12.644
42	80-463	TG AUX COOLING WATER			8.211	70.02
43	80-468	MAIN CIRCULATION WATER PIPING			0	32.526
44	80-471	BOILER WATER WASH TO AND FROM UNIT			0	2.436
45	80-480	FIRE WATER-OTHER AREAS			0	2.983
46	80-612	SERVICE AIR FOR INDIVIDUAL UNITS			0	2.981
47	80-614	INST AIR-COMP SUCT & DIS TO RECEIVER			0	0.314
48	80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT			0	2.168
49	80-650	FUEL OIL SUPPLY AND RETURN PIPING			4.239	4.411
50	80-673	LUBE OIL PIPING SYSTEM			0.36	0.777
51	80-920	H&S FOR HYDRO TEST			0	0.854
52	80-923	H AND S FOR STEAM BLOWING			7.481	40.538
53	80-928	H&S FOR BOILER LIGHT UP- TG			0	6.885
54	80-933	H&S FOR LP PIPING			0	0.053
55	80-934	STANDARD HANGER COMPONENTS			0	8.68

56		Valves			0	6.097
57		Valves			0	31.107
		SUB TOTAL PIPING	**0.000**	**0.000**	**129.509**	**607.549**
G. LINING & INSULATION						
1	32-010	FICOM BLR PP INSULATION			0	1.004
2	33-021	BLR PP MINRL WOOL			0	50.1
3	33-212	MAIN BLR CAST REF GR			0	69
4	33-230	MAIN BLR POUR INSULATION			0	132
5	37-010	BLR OUTER CSG COMPS			0	11.673
6	37-810	BLT OUTER CASING			0	13.43
		SUB TOTAL LINING & INSULATION	**0.000**	**0.000**	**0.000**	**277.207**
		Total	**2036.289**	**3877.019**	**1110.516**	**3210.796**

Summarry of Weight Details

Part: A (Other than partly executed Job)

S No.	Description	Weight (In MT)		
		Unit # 5	**Unit # 3**	**Total**
1.1	Structures	1518	454	1972
1.2	Pressure Parts	168	66	234
1.3	NON PRESSURE PARTS (Up to ESP inlet funnel)	1457	814	2271
2.1	Rotating Machines	1650	134	1784
2.2	Handling Equipments of Rotating Machine	13	13	26
3.1	ESP	385	17	402
3.2	NON PRESSURE PARTS (ESP outlet funnel to chimney)	216	3	219
4.1	Piping-P91	279	33	312
4.2	Piping-AS	154	3	157
4.3	Piping-CS (HP)	217	114	331
4.4	Piping-CS (LP)	319	214	533
4.5	Piping-SS	1	1	3
4.6	Piping-Hangers and Supports	293	224	518
4.7	Piping-Temporary (Steam Blowing)	25	25	50

4.8	Piping-Temporary (Chemical Cleaning)	20	20	40
5.2	Insulation-Pourable & Castable	210	9	220
5.3	Insulation- Fixing Components Iron Parts	120	90	210
5.4	Insulation- Aluminum Cladding Sheets	106	24	130
5.5	Insulation- Wool Mattress	587	234	821
				0
		7739	**2493**	**10232**

Part: B (Fixed part for partly executed job)

S No.	Description	Allignment, Bolting, Grouting & Welding (MT)	Leak Test, NDT, Heat Treatment, equipment trial run (MT)	Allignment, Bolting, Grouting & Welding (MT)	Leak Test, NDT, Heat Treatment, equipment trial run (MT)
		Unit # 5		**Unit # 3**	
1	Structures	94	162	109	148
2	Pressure Parts	682	940	8	14
3	Non Pressure Parts	141	279	182	1000
4	Rotating M/c including trial run	0	0	581	1051
5	ESP	1120	2496	101	115
6	PIPING including HT	0	0	130	608
7	LINING & INSULATION	0	0	0	277
	Total	**2037**	**3877**	**1111**	**3213**

NOTES:

1. Besides product groups indicated herein, there is likelihood of addition of new product groups by BHEL' s unit for release of some items, integral to this work. Tenderers' quoted unit rates shall be applicable for such product groups also.
2. The weights given against PGMA's listed above are tentative. It may change after detailed engineering is done. Rate quoted by the Contractor shall not change due to variation in weight.
3. Rate Schedule Identified for PGMAs of Piping 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.
4. BHEL's decision with regard to classification of a particular product group for applicable rate category shall be final & binding on the Contractor.

5. Besides the above, weight of all temporary piping, valves, pumps, tanks and other miscellaneous equipments etc for carrying out hydraulic test, chemical cleaning, steam blowing and other tests, as stated elsewhere will get added.

6. Electrical & C&I items of handling system is excluded from the scope of work.

7. Weight of valves, fittings, supports etc. are including in weight of piping (for all C.S. A.S. And S.S.) of respective scheme / systems of piping. The site welding of site weld joints and NDT/pre-post heat treatment requirements both for IBR & Non-IBR, CS, AS & SS piping's/system shall be as per BHEL drawings/documents and site requirement.

Attached separately.

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 including IBR certificates/license/clearances to carry out this work from the respective statutory/ local authorities are to be arranged by the Contractor at his cost in time to ensure smooth progress of work.

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 confirm to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to

Contractor's fault, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL as per GCC.

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 as per GCC.

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.

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.

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

11.19
Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc.

11.20
The details of equipment's 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 equipment's 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.

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 thermo wells & 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 thermo wells 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.

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 equipment / 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 system that includes, inter-alia, issue of materials, daily progress reporting, Contractor's running monthly billing and material reconciliation through

a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work.

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

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 equipment's and trial operation of the unit will be supplied by BHEL free of charges.

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) 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.

B) 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).

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

D) Surfaces inside seal box and other areas that are to be applied with castable refarctory 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.

E) 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.

F) 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.

G) 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.

H) 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 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 also 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.

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.

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.

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.

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.

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, commissinoning 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 up to the highest level to facilitate erection, movement of person and goods etc. the arrangement shall confirm 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.

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

12.5.10
Electro forged floor grills will be supplied for this project. These may have to be cut to suit requirement. Cutting shall be done only by mechanical cutters **and not by gas cutting**. Cold galvanizing compound is to be applied on the cut surface/edge. Cold galvanizing paint supply is in Contractor scope.

Fixing of floor grills shall be done by self-tapping screws **and not by weldable studs.** Special purpose electrically operated hand tools are available in the market for this, which drills, taps and fixes the screws in a single operation. Supply of necessary self-drilling-cum-tapping screws and fixing clips are in contractor scope. Contractor shall deploy the **drilling cum fixing machine** required for this purpose as a regular scope of work.

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 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 gallaries & 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/guidence 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 simillar manner all joints, connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be made leak proof and tested as per technical instruction / requirement.

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

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

e) Boiler roof sheets shall be erected on boiler roof structure. Payment shall be made as per the tonnage rate quoted for boiler non pressure part.

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.

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.

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 **20 m**m 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.

Neutralization 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 leveled before handing over of area to owner.

Effluent has to be disposed of safely from neutralizing 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 equipment's. 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 contractors.

13.5
Complete grouting of structures equipment's, including anchor/ foundation bolts, beneath base, base hollows etc, as may be applicable, is included in the scope of Contractor. Arranging all

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

13.6
After the grouting has finally set and cured, alignment of equipment's involved shall be checked again to verify for any disturbance or any other reason. If required, de-coupling of equipment's 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.

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/MIG 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 (Chief Inspector of Boiler) 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 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.

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 chalks, & 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 P-91 material, the induction heating process shall continue un-interrupted. Therefore, contactor shall arrange back-up DG set to take care of power interruptions during the process.

14.2.10
Results of these processes shall be verified/ validated as per requirements of BHEL/client.

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 provided by BHEL.

14.3.6
Contractor 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.

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.

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.

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 alunimium 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:

➢	a	Pourable & castable insulation	-	2%
➢	b	Insulation bricks and motor	-	2%
➢	c	Wool mattresses	-	2%
➢	d	Cladding sheets	-	2%

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

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.

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-II** of painting specification (attached separately). 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.

The contractor may be required to fill up dents / marks by applying putty before final painting of equipment. All materials and arrangements have to be made within quoted lump sum price/rates.

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 equipment's/ components covered in these specifications. Applicable paints and primer shall be supplied by BHEL.

16.5

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 mechanized 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 equipment's 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 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

All paints should be stored in well-ventilated store. The painters and other personnel deployed should use proper protective equipment to avoid inhalation of fumes.

16.17 PRIMER AND PAINTS FOR FINAL PAINTING

All primer and paints required for final painting shall be provided by BHEL free of charges.

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 equipment's free of undue restrictions, chemical **(EDTA)** cleaning of boiler, steam blowing of the boiler and the critical piping, floating of safety valves, coal firing, trial operation and loading etc. are some of these activities. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

Chemical (EDTA) cleaning: All pumps and motors, starter panel, cable, SFU etc. as required shall be arranged by contractor. However, piping, fittings & valves material shall be provided by BHEL, erection of the same is in the scope of contractor. Operation and maintenance of chemical cleaning system is under the scope of contractor.

Unit # 3 EDTA activity is in advance stage and work shall be executed by the contractor if only required at site. The payment for this milestone shall be done only after the work shall be executed by the contractor as per the terms of payment.

17.2
All these tests should be repeated till all the equipment's 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 equipment's.

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.

17.6
Overhauling, cleaning, servicing of tanks, pumps, equipment's, 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 equipment's 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 equipment's 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
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 along with 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 along with 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 N_2 blanketing arrangement.

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

17.17

Assistance for Conducting of performance guarantee test (PG 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.

17.18
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.

18.1 PRESERVATION & PROTECTION OF COMPONENTS

At all stages of work, equipment's/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 equipment's 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 utilization 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.

BHARAT HEAVY ELECTRICALS LIMITED
PIPING CENTRE, CHENNAI– 17
QUALITY ASSURANCE & CONTROL DEPT.

PAINTING SCHEME FOR PIPING

PROJECT NAME: - AMRAVATI THERMAL POWER PROJECT– (5X 270 M W)

BHEL CUSTOMER Nos: 7109, 7110,7111,7112,7113.

QPNO : 7109:QPC:11
REV.NO : 01
Date : 01.02.2011

Sl. NO	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat			Finish coat				REMARKS
			Primer	No of coats & DFT	Paint	No of coats & DFT	Shade	Paint	No of coats & DFT	Shade	Total DFT Microns (Min.)	
1	2	3	4	5	6	7		9	10	11	12	13
1	Insulated Piping, components (MS / HRH / CRH / Aux Steam lines, ... IBD,CBD tanks)	SSPC-SP3/ Power Tool Cleaning	Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	2 (30 microns per coat.)	—	—	—	—	—	Red Oxide	60	
2	Uninsulated Piping, components (Spray Water / Condensate lines ...,Tanks & Vessels)	SSPC-SP3/ Power Tool Cleaning	Red Oxide - Zinc Phosphate (Alkyd base to IS: 12744)	2 (25 Microns per coat)	—	—	—	Synthetic enamel Long oil Alkyd to IS: 2932	3 ** (35 microns per coat) (2 at shop + 1 at site)	Smoke Grey (Shade No. 692 of IS: 5)	120 at shop + 35 at site	** 1 coat of DFT-35 microns finish coat at site
3	Structures	SSPC-SP3/ Power Tool Cleaning	Red Oxide - Zinc Phosphate (Alkyd base to IS: 12744)	2 (25 Microns per coat)	—	—	—	Synthetic enamel Long oil Alkyd to IS: 2932	3 ** (35 microns per coat) (2 at shop + 1 at site)	Smoke Grey (Shade No. 692 of IS: 5)	120 at shop + 35 at site	** 1 coat of DFT-35 microns finish coat at site
4	Hangers & Supports - (CLH)	Abrasive Blast cleaning to Sa 2 1/2 (35-50 microns)	Epoxy Zinc rich primer to IS 14589 Gr.II,% VS = 35 Min	1 (40 microns per coat)	—	—	—	Aliphatic Acrylic Polyurethane paint ,%VS = 40 min	1 (30 microns per coat)	Phirozi Blue Shade No.176 of IS 5	70	
5	Hangers & Supports - (VLH)	SSPC-SP3/ Power Tool Cleaning	Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	1 (30 microns per coat.)	—	—	—	Synthetic enamel paint long oil alkyd to IS 2932	2 (20 Microns per Coat)	Smoke Grey Shade No 692 of IS 5	70	
6	Pipe Clamps.	SSPC-SP3/ Power Tool Cleaning	Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	1 (30 microns per coat.)	—	—	—	Synthetic enamel paint long oil alkyd to IS 2932	2 (20 Microns per Coat)	Note 1	70	
7	Stainless steel / Galvanized items	No paint										

Note 1 - Smoke grey shade for Carbon Steel ; White shade for Alloy Steel Clamps.

PREPARED BY : VIVEKANANDA YELLU, PE / QA	APPROVED BY: G.PANNEER SELVAM, DGM / QA	For Customer use

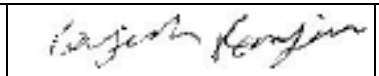
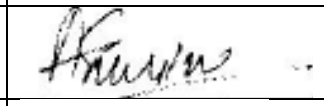
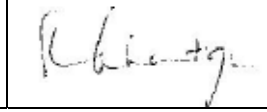
Approved
A.K. Tandon
Name : Jaivir Singh
Sign. : Dt. : 10.02.11
Indiabulls Power Limited
Gurgaon

BHARAT HEAVY ELECTRICALS LIMITED
RAMACHANDRAPURAM::HYDERABAD-32

PULVERISERS ENGINEERING

AMRAVATI THERMAL POWER PROJECT, AMRAVATI, 5x270 MW
M/s ELENA POWER & INFRASTRUCTURE LTD.

PAINTING SCHEDULE FOR BOWL MILLS

PREPARED BY	RAJESH RANJAN		DOCUMENT NO:BA/PS/AMRAVATI /00 REV. NO: 00 , DATED 16.04.2010 SHEET : 01 OF 08
REVIEWED BY	AMAN SURIN		
APPROVED BY	SATISH GHATGE		

PAINTING SCHEME FOR XRP 943 BOWL MILL - AMRAVATI TPP, 5x270 MW

SL. NO	SURFACE LOCATION & PGMAs	SURFACE PREPARATION	PRIMER		INTERMEDIATE		FINISH COAT			TOTAL DFT
			PAINT (mat.code)	NO.OF COATS	PAINT (mat.code)	No. OF COATS	PAINT (mat.code)	NO.OF COATS	SHADE	µm min.
01	Journal Assembly 61-000 a) Oil swept inside unmachined surfaces	Kerosene Cleaning	-	-	-	-	White crank case sealer (HY5530078052) or Oil resistant Synthetic Enamel (AA5610032563	2	-	50
	b) Outer Surfaces	Abrasive blast clean to Sa2½ (IS0:8501-1:)	Alkyd Zinc Phosphate	4 to a DFT of 100 µ	-	-		-	-	100

PAINTING SCHEME FOR XRP 943 BOWL MILL - AMRAVATI TPP, 5x270 MW

SL. NO	SURFACE LOCATION & PGMAs	SURFACE PREPARATION	PRIMER		INTERMEDIATE		FINISH COAT			TOTAL DFT
			PAINT (mat.code)	NO.OF COATS	PAINT (mat.code)	No. OF COATS	PAINT (mat.code)	NO.OF COATS	SHADE	µm min.
02	Mill Drive and Bowl Assembly 61-100 a) Inside surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)			-	-	Amine Adduct Cured Epoxy Paint (HY561000 5949)	2	WHITE	50
	b)Outer Surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyd Zinc Phosphate Primer	2 to a DFT of 40 µ			Synthetic Enamel Colour (HY561002 6997)	3*	Grey RAL 9002	100

*** Out of 3 Finish coats, 2 are to be done in shop/Subcontract to a DFT of 40 µ and 3rd coat of 20 µ to be done at site. With this 80µ (40µ primer +40µ finish paint) DFT is to be done at shop and 20µ at site. Thus a total of 100µ DFT is achieved.**

PAINTING SCHEME FOR XRP 943 BOWL MILL - AMRAVATI TPP, 5x270 MW

SL. NO	SURFACE LOCATION & PGMAs	SURFACE PREPARATION	PRIMER		INTERMEDIATE		FINISH COAT			TOTAL DFT
			PAINT (mat.code)	NO.OF COATS	PAINT (mat.code)	No. OF COATS	PAINT (mat.code)	NO.OF COATS	SHADE	µm min.
03	Mill Side and Liner Assembly 61-200									
	a) Inside surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyd Zinc Phosphate Primer	2	-	-		-	-	40
	b) Outer Surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyd Zinc Phosphate Primer	2 to a DFT of 40µ	-	-	Synthetic Enamel Colour (HY/561002 6997)	3*	Grey RAL 9002	100

PAINTING SCHEME FOR XRP 943 BOWL MILL - AMRAVATI TPP, 5x270 MW

SL. NO	SURFACE LOCATION & PGMAs	SURFACE PREPARATION	PRIMER		INTERMEDIATE		FINISH COAT			TOTAL DFT
			PAINT (mat.code)	NO.OF COATS	PAINT (mat.code)	No. OF COATS	PAINT (mat.code)	NO.OF COATS	SHADE	µm min.
04	Separator Assembly 61-300									
	a) Inside surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyd Zinc Phosphate Primer	2 to a DFT of 40µ	-	-		-	-	40
	b) Outer Surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyed Zinc Phosphate Primer	2 to a DFT of 40µ	-	-	Synthetic Enamel Colour (HY5610026997)	3*	Grey RAL 9002	100

PAINTING SCHEME FOR XRP 943 BOWL MILL - AMRAVATI TPP, 5x270 MW

SL. NO	SURFACE LOCATION & PGMAs	SURFACE PREPARATION	PRIMER		INTERMEDIATE		FINISH COAT			TOTAL DFT
			PAINT (mat.code)	NO.OF COATS	PAINT (mat.code)	No. OF COATS	PAINT (mat.code)	NO.OF COATS	SHADE	µm min
05	Mill Discharge Valve Assembly PGMA-61400 a) Outer Surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyed Zinc Phosphate Primer	2 to a DFT of 40µ	-	-	Synthetic Enamel Colour (HY5610026997)	3*	Grey RAL 9002	100

PAINTING SCHEME FOR XRP 943 BOWL MILL - AMRAVATI TPP, 5x270 MW

SL. NO	SURFACE LOCATION & PGMAs	SURFACE PREPARATION	PRIMER		INTERMEDIATE		FINISH COAT			TOTAL DFT
			PAINT (mat.code)	NO.OF COATS	PAINT (mat.code)	No. OF COATS	PAINT (mat.code)	NO.OF COATS	SHADE	µm min.
06	Coupling Guard 61-700 b) Inside surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyd Zinc Phosphate Primer	2 to a DFT of 40µ	-	-		-	-	40
	b) Outer Surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyd Zinc Phosphate Primer	2 to a DFT of 40µ	-	-	Synthetic Enamel Colour (HY5610026997)	3*	Grey RAL 9002	100

PAINTING SCHEME FOR XRP 943 BOWL MILL - AMRAVATI TPP, 5x270 MW

SL. NO	SURFACE LOCATION & PGMAs	SURFACE PREPARATION	PRIMER		INTERMEDIATE		FINISH COAT			TOTAL DFT
			PAINT (mat.code)	NO.OF COATS	PAINT (mat.code)	No. OF COATS	PAINT (mat.code)	NO.OF COATS	SHADE	µm min.
07	Seal Air Assembly, Coal Sampling Platform, PGMA-67400, Lube Oil System and Loose Items a) Outer Surfaces	Abrasive blast clean to Sa2½ (ISO:8501-1)	Alkyd Zinc Phosphate Primer	2 to a DFT of 40µ	-	-	Synthetic Enamel Colour (HY5610026997)	3*	Grey RAL 9002	100

BHARAT HEAVY ELECTRICALS LIMITED
Tiruchirappalli - 620 014

PAINTING SCHEME FOR
AMRAVATI TPP-5 X 270 MW
M/s. ELENA POWER & INFRASTRUCTURE LTD.,(EPIL)
NANDGAONPETH, AMRAVATI DIST.,MAHARASTHRA
CUSTOMER NO:U2/ 1220 TO U2/ 1224

Prepared by	**L. Gragori Manager / P. Lab**		**Document No: Q: PL: C3 - PS /1220**
Reviewed by	**S.Dhanabal DGM/PE / FB**		**Revision No: 00 Dated: 19-01-2010**
Approved by	**Dr.G.Ravichandran SDGM /P. Lab**		**Sheet No. : 1 of 11**

N/ CHEM/CONTRACTS 09/ELENA-AMRAVATI TPP-5 X270 MW_00.DOC.

RECORD OF REVISIONS

Rev. No	Date	Details of revision	Remarks
00	19-01-2010	NEW	BHEL STD Painting scheme for Normal Atmosphere.

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of Coats / DFT	Paint	No. of coats	Paint	No. of coats	Shade	
1.1	1AC	Drum (Except Internals) **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= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20µm per coat	Inter-national 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= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20µm per coat	Inter-national Orange Shade No: 592 of IS 5	70
1.3	5	Drum Internals **04** – 134, 136, 138 Other Machined Components: **43** – 101, 102, 103, 104, 105, 106, 107	SSPC-SP1 or SP3 Solvent / Power Tool Cleaning	Rust Preventive Fluid to PR: CHEM: 09 – 04	1 DFT=25µm per coat	--	--	--	--	--	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= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20µm per coat	Yellow Shade No: 356 of IS 5	70
2.1	11	Foundation Materials and Pin: **35** - 010, 011, 012, 013, 020, 030, 190 **38** – 010 **39** - 010, 011, 012, 020, 030, 040 48 – 019 & Columns below " 0 " level of PG 35,36, 38 & 39	--	No Paint	--	--	--	No Paint	--	--	--

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
2.2	1A	Buck Stays and Structural Items: Buck stays **08** – 001, 003, 006, 007, 101, 104, 107, 111, 380, 382, 400, 500, 501, 503, 700, 900, 901, 904, 907, 910 Boiler Supporting Structures **35** – 100, 110, 111, 112, 120, 121, 122, 130, 131, 132, 133, 134, 135, 136, 140, 141, 142, 143, 144, 150, 151, 152, 153, 160, 161, 162, 171, 172, 173, 174, 181, 182, 183, 184, 185, 186, 191, 192, 193, 194, 195, 196, 210, 211, 212, 213, 214, 220, 221, 222, 230, 231, 232, 240, 250, 310, 311, 312, 320, 321, 322, 330, 331, 332, 340, 341, 342, 350, 351, 352, 360, 361, 362, 380, 381, 382, 383, 390,392, 410, 420, 430, 440, 441, 442, 443, 451, 452, 453, 461, 462, 463, 471, 472, 473, 481, 482, 483, 500, 510, 511, 512, 513, 514, 520, 521,522, 523, 524, 530, 531, 532, 533, 540, 541, 542, 550, 551, 552, 561, 562, 563, 571, 572, 573, 581, 582, 583, 591, 592, 593, 594, 595, 596, 597, 598, 599, 610, 612, 613, 710, 711, 712, 713, 715	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	1 DFT= 30µm per coat	–	–	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20	Smoke Grey Shade No: 692 of IS 5	70
			SA2·5	Epoxy based zinc phosphate	2(60)			Polyamide cured high build epoxy	2 (150)		→ operating Temp upto 65°c
		36 – 110,120, 130, 150, 200, 210, 211, 212, 220, 221, 222, 230, 231, 232, 240, 241, 242, 250, 251, 252, 260, 261, 262, 270, 271, 272, 280, 281, 282, 290, 291, 292, 300, 301, 302, 310, 311, 312, 313, 314, 315, 316, 320, 321, 322, 323, 324, 325, 326, 327, 330, 331, 332, 333, 334, 335, 340, 341, 342, 343, 344, 345, 346, 347, 348, 350, 351, 352, 353, 354, 355, 360, 361, 362, 363, 370, 371, 372, 380, 381, 382, 383, 390, 391, 392, 393, 394, 395, 396, 397, 410, 420, 430, 490, 491, 492, 510, 520, 610, 612, 620, 621, 630, 631, 632	SA2·5	Ethyl Silicate zinc rich	1(65)			Heat resistant aluminium	2(30)		→ operating temp 65–300° c
		38 – 110, 120, 130, 210, 211, 299, 310, 311, 380, 381, 390, 410, 510, 511, 512, 513, 521, 522, 610, 611, 612, 620, 710, 712, 720, 730	SA2·5*	—do—	1(65)			Heat resistant silicon aluminium	2(24)		operating temp → above 300° c
		39 - 100, 101, 102, 110, 120, 121, 130, 140, 141, 142, 143, 150, 160, 200, 210, 300, 301, 303, 304, 305, 306, 311, 312, 323, 390, 391, 392, 393, 901									
		Duct Supports **48** – 005, 015, 025, 045, 055, 065, 085, 105, 115, 125, 145, 155, 185, 195, 200,205, 215, 225, 235, 245, 255, 265, 275, 295, 305, 315, 325, 335, 345, 355, 365, 375, 385, 415, 425, 435, 445, 455, 465, 475, 485, 495, 665, 805, 815, 825, 845, 855, 865, 875, 885, 995 Piping Centre: 80-800 to 882, 920 to 933, 940									

* → area where it is not possible to sandblast, may be cleaned by power brushing as per St-3 with the consent of owner/consultant

→ Polyamide cured high built epoxy.

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
2.3	1A	Hangers: **36** - 740, 741, 742, 743, 744	SSPC-SP3/ Power Tool Cleaning SA2-5	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744 Epoxy Based Zinc phosphate	2(60) DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2(150) DFT= 20µm per coat	Smoke Grey Shade No: 692 of IS 5	70
2.4	1AB	Hand Rails & Posts **35** - 850, 851 **36** - 850, 851, 852, 853 **38** - 850, 851 **39** - 850, 851 Refer Note – A	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	1 DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20µm per coat	Black	70
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 85.0 microns (minimum). ** Guard plates will be painted as given in Sl. No. 2.2.								
2.6	1AB	Ladders & Stairs **35** – 820, 821, 822, 823 **36** – 820, 821, 822, 823 **38** – 820, 821 **39** – 820, 830, 831 **48** - 466 Refer Note – A	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	1 DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20µm per coat	Black	70

NOTE – A

For hand rails & Post, Ladder & stairs follow the following painting :-

1. Surface preparation & surface profile – SA 2.5
2. Primer coat, (Paint) – Epoxy based zinc phophate, No. of coat 2(60) ie 2 coat
3. Finish coat, (Paint) – Polyamide cured high built epoxy, No. of coat 2(150) ie 2 coat & total DFT 150 µm.

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

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
3,3	2	Heat Exchanger Coils: (SH, RH & Economiser Coils) **11** - 036, 037, 038, 074, 077, 078, 095, 135, 136, 138, 170, 174, 175, 178, 179, 235, 236, 237, 238, 248, 250, 251, 271, 272, 274, 275, 277, 278, 279, 280, 336, 337, 338, 340, 342, 356, 358, 370, 374, 377, 378, 395, 585, 587, 591, 606, 608, 616, 618, 682, 683, 684, 685, 686, 687, 688, 691, 694, 716, 717, 718, 767, 768, 769, 787, 791, 882, 883, 884, 885, 887, 916, 917, 918, 967, 968, 969, 986, 987, 988, 991, 994, 999 **12** – 135, 136, 170, 174, 178, 184, 187, 335, 395, 495, 515, 535, 551, 619, 800, 803, 805, 850, 851, 852, 900, 901, 903, 906, 914, 917, 924, 927, 928, 944, 948, 954, 968, 988, 999 **16** – 077, 079, 132, 235, 236, 237, 238, 256, 275, 277, 279, 281, 377, 379 **19** - 001, 104, 105, 114, 124, 184, 802, 814, 824, 884, 914, 924, 984	SSPC – SP2 or SSPC – SP3 Hand tool / Power tool cleaning	Red Oxide Zinc Phosphate Dip coat primer to PR: CHEM: 09 – 03	1 DFT= 35µm per coat	--	--	--	--	--	35
3.4	3	Components coming in Gas Path other than Coils **06** - 033, 036, 037, 041, 043, 046, 047, 052, 054, 089, 090, 091, 092, 093, 094, 130, 133, 136, 137, 141, 143, 146, 147, 152, 154, 189, 190, 191, 192, 193, 194, 231, 331, 350, 400, 430, 466, 467, 500, 530, 609, 611, 613, 614, 616, 620, 621, 623, 624, 630, 631, 633, 634, 636, 637, 639, 640, 641, 643, 644, 646, 647, 649, 650, 651, 652, 653, 654, 655, 657, 658, 659, 670, 689, 690, 691, 692, 693, 694, 695, 709, 713, 714, 715, 716, 720, 723, 730, 731, 733, 734, 737, 740, 741, 743, 744, 747, 749, 750, 751, 753, 755, 789, 790, 830, 840, 850, 851, 857, 895, 896, 897 **10** – 182, 183, 184, 185 **16** – 988, 999 **19** – 703, 704, 708, 763, 783, 850, 851, 900, 988, 999 **30** – 010, 104, 105, 211, 212, 216, 217, 218, 219, 220, 223, 227, 228, 233, 235, 993, **31** – 010,101, 102, 103, 104, 105, 108, 301, 993 **32** – 001, 002, 005, 006, 007, 008, 009, 011, 012, 021, 022, 023, 024, 025, 026, 027, 031, 033, 041, 042, 043, 044, 050, 055, 061, 073, 110, 120, 210, 620, 720, 810, 910, 993 **42** - 129	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30µm per coat	--	--	--	--	Red Oxide	60
3.5	8A	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 Tool Cleaning	General purpose Aluminium paint to IS 2339	2	--	--	--	--	Alumunum	40

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
4	15	Constant Load and Variable Load Hangers (CLH / VLH) **(See NOTE 14)** **07** - 400, 401, 402, 403, 404, 405, 410, 420, 431 **10** - 200 **17** – 904, 906, 919, 929 **19** – 901, 904, 905, 906, 907 **24** - 346, 351	Abrasive blast cleaning to Sa 2 ½ 35- 50 microns	Epoxy zinc rich primer to IS 14589 Gr. II %VS=35 (min)	1 DFT=40 µm / coat	--	--	Aliphatic acrylic Poly-urethane paint %VS=40 (min)	1 DFT=30 µm per coat	Phirozi Blue Shade No. 176 of IS5	70
5.1	1A	Miscellaneous and Casing Sheets: **07**-500, 501, 600, 601, 997, 999, **19** – 101, 102,**21** - 601, 987, **24** - 101, 125, 130, 135, 140, 201, 225, 230, 235, 240, 301, 325, 335, 340, 350, 370, 374, 400, 401, 425, 430, 435, 440, 470, 471, 473, 501, 525, 535, 540, 570, 601, 625, 635, 640, 800, 801, 815, 825, 987, 989, 996, 998 **35** - 994, 995, **36** - 613, 903, 999, **37** - 010, 110, 210, 310, 410, 510, 610, **39** - 302, 924 Fuel Firing: **41** – 100, 110, 200, 310, 320, 330, 340, 350, 390, 410, 420, 430, 450, 460, 470, 997 Steam Blowing Piping: **42** – 002, 003, 005, 010 **42** – 040, 045, 050, 055, 060, 065, 070, 111, 112, 113, 114, 118, 119, 120, 121, 122, 123, 124, 130, 131, 132, 151, 152, 154, 155, 156, 157, 160, 165, 170, 176, 180, 195, 196, 989, 997, 998 **43** – 000, 001, 002, 003, 004, 005, 006, 007, 008, 997, 999 **45** – 050, 120, 160, 161, 180, 181, 220, 221, 260, 261, 321, 325, 326, 401 **47** – 121, 122, 123, 124, 125, 129, 140, 141, 142, 143, 144, 145, 146, 149, 161, 162, 163, 164, 165, 169, 180, 181, 182, 183, 184, 185, 189, 200, 201, 202, 203, 204, 205, 209, 221, 222, 223224, 225, 241, 242, 243, 244, 245, 246, 247, 248, 249, 261, 262, 263, 264, 647, 648, 649, 650, 746, 953, 959, 963 Duct Plates and Expansion Joints: **48** – 002, 004, 007, 011, 012, 014, 017, 018, 022, 024, 028, 032, 034, 040, 042, 044, 052, 054, 062, 064, 066,072, 074, 082, 084, 092, 094, 102, 104, 107, 112, 114, 116, 122, 124, 132, 142, 144, 152, 154, 162, 172, 182, 184, 192, 194 Coal Handling: **65** – 051, 060, 070, 260, 402, 403, 460, 724, 736, 738, 786 **67** – 204, 251, 256, 261, 266, 271, 272, 276, 277, 283, 286, 400, 801, 802, 803, 804, 999 **99** – 201, 299	SSPC-SP3/ Power Tool Cleaning SA 2·5 SA 2·1 SA 2·5	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744 Epoxy based Zinc phosphate Ethyl silicate zinc rich Ethyl silicate zinc rich	1 DFT= 30µm per coat 1(65) 1(65) 1(65)	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932 polyamide cured high build epoxy Heat resistant aluminium heat resistant silicone aluminium	2 DFT= 20 2(150) 2(30) 2(24)	Smoke Grey Shade No: 692 of IS 5	70
5.2	3	Erection Materials and Commissioning Components: **04** - 988, **05**-993, **06**-993, **07** – 988, 993, 12-993, **24** – 993, **28** – 993, **35** – 993, **36** – 993, **37** – 993, **38** – 993, **39** – 993, **48** – 988, 993, **65** – 988, 97-585,**99** – 045, 099, 501, 502	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30µm / coat	--	--	--	--	Red Oxide	60

operating temp (Deg C)

upto 65 –

operating temp b/w 65 – 300°C

operating temp. above 300°C

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
6.1	10	Cast carbon steel valves (Conventional) Cast alloy steel valves (Conventional) All API valves, QCNRV, SV & SRV Silencers, Water Level gauge HP / LP system 22-101,889	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr.I	2	--	--	--	--	--	40
6.2	--	Forged valves	Phosphating	Coating weight of 1500 mg per sq.ft.	--	--	--	--	--	--	--
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 Tool Cleaning SA 2.1	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744 Epoxy based zinc phosphate	1 DFT= 30µm per coat 2(60)	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932 Polyamide cured high build epoxy	2 DFT= 20 2(150)	Verdigris Green Shade No. 280 of IS5	70
6.4	36	On Shore OFE Components	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50µm per coat	2	--	--	Chlorinated Rubber Based Finish Paint DFT= 30µm per coat	2	French Blue Shade No: 166 of IS 5	160
6.5	35	Off Shore Components	SSPC-SP3/ Power Tool Cleaning	High Build Epoxy Mastic Aluminium Primer-	1 DFT= 100µm per coat	--	--	Aliphatic acrylic Poly-urethane paint %VS=40 (min) IS 13213	1 DFT=30 µm per coat	French Blue Shade No: 166 of IS 5	130
6.6	8A	Hand Wheels Refer Note-A	SSPC-SP3/ Power Tool Cleaning	General Purpose Aluminium Paint to IS 2339	2 DFT= 100µm per coat	--	--	--	--	--	40

PS for Arrows shall be as per valves and the final shade will be 'Post Office Red-Shade No. 538 of IS 5

NOTES:

1. **This painting scheme covers a comprehensive list of PGMAs being used in 125 / 210 / 250 / 500/600 MW and Industrial Boilers under Fossil Boilers working in normal environment, in an effort to standardise the painting scheme. Therefore, the entire list of PGMAs will not be applicable for any specific project and only those PGMAs applicable for the project may be used, while choosing the painting scheme applicable.**
2. Rust Preventive coating should be given on HSFG Bolt & Nut threads. → specify DFT (min).
3. All threaded & machined surfaces and all retainers 'A' & 'C' types are to be applied with a coating of Temporary Rust Preventive oil.
4. All surfaces of foundation materials, insulation pins, Anchor channels, Sleeves shall be coated with Temporary Rust Preventive Fluid and during execution of civil works; the dried film of coating shall be removed using organic solvents.
5. PGMAs under Sub-Vendor items are not indicated. Please refer respective Engineering Document for all sub-vendor items. Wherever it is not specified, it shall be as per the painting scheme of the applicable PGMA.
6. No painting is required for Aluminium, Stainless Steel components and galvanized items. Abrasive blast cleaning to SSPC-SP6 (Sa 2) grade shall be done to prepare the surface of hot worked pipes prior to application of primer.
7. Wherever **inside surfaces** of components under PGMA 48 – XXX, need protection till erection, and all running meter items for spares and main item 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.
8. The Temporary Rust Preventive coating that has already been applied on any component, tubes, pipes etc., shall be visually inspected for good adherence. If the coating is intact, direct coating of alkyd based red oxide paints over the coating is permitted. In case, the coating has peeled off over a large area, then the coating is to be removed by suitable solvents / heating to 350 –400 °C for an hour before primer paint application –but, in this case, it should be ensured that the minimum surface cleanliness required for primer paint application shall be SSPC – SP2 (equivalent – Hand Tool cleaning).
9. **All currently active PGMAs are covered. Requirements for Missing / new PGMA s will be included under the relevant section, following the appropriate paint logic.**
10. Ground shade/colour finish paints & identification tag/ band for equipments, piping, pipe service, boiler supporting structures and other boiler components shall be followed as per tender. Code.
11. In components, wherever plates/sheets of thickness less than or equal to 5 mm, tubes/ rods/drain pipe are used, power tool /hand tool cleaning to SSPC-SP3/ SSPC-SP-2 shall be followed and the painting shall be done as described in Sl no: 5.1.
12. Touch-up painting of damaged areas shall be carried out as per clause applicable painting scheme.
13. Only weldable primer shall be applied on surfaces, which require to be welded subsequently at site. At those locations no other paint shall be applied.
14. DUs coming under Constant Load Hangers (CLH) shall be painted as per the system - **PS 15** indicated in Sl. No. 4 of the table. However, for DUs coming under Variable Load Hangers (VLH), the painting shall be as per Painting Scheme PS 1A indicated in Sl. No. 5.1 of the table. (i.e., one coat of Red Oxide Zinc Phosphate Primer followed by two coats of Synthetic Enamel Paint –shade smoke grey, total DFT – 70 microns)
15. 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 (colourless) shall be 250 gm/ cu.m. (About 2 to 3 bags weighing approximately 100 grams each) . **VCI pellets shall not be used for stainless steel components and its composite associates.**
16. All threaded components of spring assemblies and turnbuckles shall be galvanized and achromatized to 15 microns minimum thickness.
17. 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-DFT-30 μ and 2 coats of Synthetic Enamel paint (Long Oil Alkyd) to IS 2932-DFT-2X20μ. Shade Yellow –Shade No. 356 of IS 5- Total DFT 70μ.

→ BHEL ~~fault~~ specify ~~use~~ what PGMA & DUs stand for.

Painting Scheme – Details for procurement & application purposes

Sl. No.	Material Code of Paint	Generic nature of paint	Theoretical Covering Capacity Sq. m per Litre	No. of pack	Volume solids, % (min) **	DFT in microns (min) per coat	Shade	Shade No. to IS5	Mode of appln.	Over coating interval, Hrs.
1	120016131800	Heat Resistant Aluminium paint to IS 13183 Grade I	10	1	-	-	Aluminium	--	Brush / Spray	24
2	120011111900	Red oxide Zinc Phosphate primer paint to IS 12744	10	1	--	--	Red Oxide	--	Brush / Spray	12
3	120011121900	Red oxide Zinc Phosphate Dip coat primer paint to PR: CHEM: 09-03	10	1	--	--	Red Oxide	---	Dip	12
4	120011311200	Long oil alkyd synthetic enamel finish paint to IS2932	10	1	--	--	Reqd. shade	Corrpdg. Shade no.	Brush / Spray	12
5	120011140000	Temporary Rust preventive fluid to PR: CHE: 09 – 04	10	1	--	--	Amber	--	Brush / Spray	12
6	120012141700	Epoxy Zinc rich primer to IS14589 Gr. II	8	2	35	40	Grey	--	Spray	24
7	120013310200	Aliphatic acrylic polyurethane paint to IS13213	10	2	40	30	Phirozi – Blue./French Blue	176/166	Spray	24
8	120017101800	De Oxy Aluminate Weldable Primer- Colour Aluminium	10	1	--	--	Aluminium	--	Brush / Spray	24
9	120014111700	HB CR Based Zinc Phosphate Primer	10	1	40	50	Grey	--	Brush / Spray	12
10	120014300100	CR Based Finish Paint	10	1	30	30	French Blue	166	Brush / Spray	12
11	12001213800	High Build Epoxy Mastic Aluminium Primer-	8	2	80	100	Aluminium	---	Spray	24

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