TENDER SPECIFICATION
BHE/PW/PUR/ KRSR-BLR/1504

For

Collection of materials from BHEL/Client's storage/storage yard, Transportation to site and carrying out Replacement/Erection, Overhauling, Testing, Commissioning, Trial Operation and handing over of Boiler and its Auxiliaries including Air Pre-heaters, Ducts and Dampers, Fans, Fuel Piping, Boiler Integral Piping, Power Cycle Piping, Chemical Dozing System, Lining & Insulation, Final Painting and Transportation of the scrap to scrap yard etc. for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), Unit # 6.

At

MSPGCL, Koradi TPS

Dist.: Nagpur

Maharashtra

VOLUME –I BOOK - I

TECHNOCOMMERCIAL BID (Book I & II)

Book-I consists of

- **Volume-IA : NOTICE INVITING TENDER (NIT) & Technical Conditions of Contract**

Book-II consists of

- **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-SAS
345, Kingsway, Shreemohini complex, 5th floor -Nagpur- 440 001

CONTENTS			
Volume No	Description	No. of pages	Hosted in website bhel.com as files titled
NIL	Tender Specification Issue Details		(Part of **Vol-IA-1504**
NIL	Notice Inviting Tender		(Part of **Vol-IA-1504**
I-A	Technical Conditions of Contract		Vol-IA- 1504
I-B	Special Conditions of Contract		Vol-IBCD-1504
I-C	General Conditions of Contract		(Part of Vol-IBCD- 1504
I-D	Forms & Procedures		(Part of Vol-IBCD- 1504
II	Price Bid Specification		Vol-II-504

Tender Specification Issue Details

TENDER SPECIFICATION No.
BHE/PW/PUR/ KRSR-BLR/1504

For

Collection of materials from BHEL/Client's storage/storage yard, Transportation to site and carrying out Replacement/Erection, Overhauling, Testing, Commissioning, Trial Operation and handing over of Boiler and its Auxiliaries including Air Pre-heaters, Ducts and Dampers, Fans, Fuel Piping, Boiler Integral Piping, Power Cycle Piping, Chemical Dozing System, Lining & Insulation, Final Painting and Transportation of the scrap to scrap yard etc. for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), Unit # 6.

At

MSPGCL, Koradi TPS

Dist.: Nagpur

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 :

1504

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/ KRSR- BLR/1504 Date: 22/07/2015

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/ KRSR-BLR/1504**	
ii	**Broad Scope of job**	**Collection of materials from BHEL/Client's storage/storage yard, Transportation to site and carrying out Replacement/Erection, Overhauling, Testing, Commissioning, Trial Operation and handing over of Boiler and its Auxiliaries including Air Pre-heaters, Ducts and Dampers, Fans, Fuel Piping, Boiler Integral Piping, Power Cycle Piping, Chemical Dozing System, Lining & Insulation, Final Painting and Transportation of the scrap to scrap yard etc. for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), Unit # 6 at MSPGCL, Koradi TPS, Dist.: Nagpur, 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*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*

iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :*** ***Start : 22/07/2015 ,*** ***Closes: 05/08/2015 , 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*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 06/08/2015, Time 15.00 Hrs*** ***Place : BHEL PS Regional office at :Nagpur*** Tenders being submitted through representative shall be submitted at dispatch section of PSWR HQ Office after making entry/registration at the reception. For any assistance on the matter kindly contact following officials: 1. Pratish Gee Varghese / Sr Engineer (Purchase 2. Shivkesh Meena / Engineer (Purchase) 3. NIRMAL PG /Asst Engineer (PUR)	*Applicable*
vi	**OPENING OF TENDER**	***1 hour after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	***Rs 2,00,000/- (Rupees Two Lakhs Only)***	*Applicable*
viii	**COST OF TENDER**	***Rs 2000/-***	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Date: Atleast 3 days before the due date of offer submission* *Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	*Date : Not applicable.*	*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	Mrs. Pravin Tripathi (Rtd. IA & AS)	*Applicable(Bidders to submit duly filled & signed Annexure III of NIT)*

xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be intimated by Fax/E-mail. Bidders to keep themselves updated with all such information	***A**pplicable*

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	
	<u>ENVELOPE – II superscribed as</u>: 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 **<u>OR</u>** 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	
	<u>ENVELOPE-III</u> 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 , …. 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**:**

Aggregate of Performance scores for all similar packages in all the Regions

= ----------

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 = **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	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = **T_T**

	in the 'period of assessment for corresponding similar Package (as in row 1)								
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	Corresponding value of 'L'

	Rating (R_{BHEL})	
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 ≤ 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 TabIe-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	i). Electrical ii). CI	i). Boiler & Aux (All types including CW

	ii). Pile and Pile Caps ii). Civil Works including foundations v). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower ii). Others (Civil)	iii). Others (Elec & CI)	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 iii). 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 '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

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

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	Collection of materials from BHEL/Client's storage/storage yard, Transportation to site and carrying out Replacement/Erection, Overhauling, Testing, Commissioning, Trial Operation and handing over of Boiler and its Auxiliaries including Air Pre-heaters, Ducts and Dampers, Fans, Fuel Piping, Boiler Integral Piping, Power Cycle Piping, Chemical Dozing System, Lining & Insulation, Final Painting and Transportation of the scrap to scrap yard etc. for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), Unit # 6 at MSPGCL, Koradi TPS, Dist.: Nagpur, Maharashtra
TENDER NO	BHE/PW/PUR/ KRSR-BLR/1504

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** **Bidder should satisfy any of the following criteria's (B1. Or B.2).** **B.1** Bidder must have successfully executed similar work (R & M of Boiler with or without ESP in a Power plant) in the last seven (7) years as on latest date of bid submission as below: **B.1.1** One similar work of value not less than Rs. 920 Lakhs OR **B.1.2.** Two similar works each of value	**APPLICABLE**	

	not less than Rs. 575 Lakhs. OR **B.1.3**. Three similar works each of value not less than Rs. 460 Lakhs **OR** **B.2** 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 300 TPH or above.		
C-1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (audited) of **Rs. 345 Lakhs** or more over last three Financial Years (FY) i.e. 2012-2013, 2013-14, 2014-15 OR 2011-2012, 2012-2013, 2013-14 if Annual Accounts for FY 2014-15 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)	**NOT APPLICABLE**	BY BHEL

	who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.		
F	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E		BY BHEL
F	Technical Tie up criteria (if applicable)	Not 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, Unless otherwise specified, for the purpose of 'Technical' criteria of PQR (as in 'B' above), the word 'EXECUTED' means:

    1. "BOILER LIGHT UP" in respect of Boiler & Aux and ESP
    2. Term 'Commissioning' indicated in PQR refers to 'assistance to commissioning' / 'commissioning'
    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.~~
8. Boiler means HRSG or WHRB or any other types of Steam Generator consisting of Boiler structure, Non pressure parts and pressure parts.
9. Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass lines
10. 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.
11. ~~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~~. ~~12. 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.~~ 13. 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 14. 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.

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

BIDDER SHALL CLEARLY INDICATE IN THE TABLE BELOW, HOW THEY ARE SATISFYING TECHNICAL PQR. EXPLANATION AND THE DOCUMENTS REFERRED IN THE TABLE BELOW SHALL ONLY BE CONSIDERD BY BHEL FOR TECHNICAL PQR EVALUATION:

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer	
2	Details about type of the Firm/Company	
3	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Fax No:
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER

		APPLICABILITY	BIDDER REPLY
5	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES/NO
6	Whether Audited profit and Loss Account for the last three years submitted	Applicable	YES/NO
7	Whether Copy of PAN Card submitted	Applicable	YES/NO
8	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	YES/NO
9	Whether duly filed & Signed Integrity Pact (Annexure III of NIT) submitted	Applicable	YES/NO
10	Declaration by Authorised Signatory	Applicable	YES/NO
11	Whether No Deviation Certificate submitted	Applicable	YES/NO
12	Whether Declaration confirming knowledge about Site Conditions submitted	Applicable	YES/NO
13	Whether Declaration for relation in BHEL submitted	Applicable	YES/NO
14	Whether Non Disclosure Certificate submitted	Applicable	YES/NO
15	Whether Bank Account Details for E-Payment submitted	Applicable	YES/NO
16	Capacity Evaluation of Bidder for current Tender	Applicable	YES/NO
17	Tie Ups/Consortium Agreement are submitted as per format	Not Applicable	Not Applicable
18	Whether Power of Attorney for Submission of Tender/Signing Contract Agreement submitted	Applicable	YES/NO
19	Whether Analysis of Unit rates submitted	Applicable	YES/NO

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

DATE : **AUTHORISED SIGNATORY**

(With Name, Designation and Company seal)

ANNEXURE - 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

6.1 The Bidder(s)/ Contractor(s) undertake(s) to obtain from his sub-contractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20% of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).

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

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

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

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

Section – 8 Independent External Monitor(s)

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

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

8.3 The Bidder(s)/ Contractors(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/Contractor(s) will grant the

monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s)/ Sib-contractor(s) with confidentiality.

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

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

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

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

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

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

8.10 The word ‘Monitor’ would include both singular and plural.

Section 9 – Pact Duration

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

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

Section 10 – Other Provisions

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

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

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

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

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

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

Annexure-4

IMPORTANT INFORMATION

Sealed Tenders shall be submitted at following address to AGM /Purchase BHEL PSWR NAGPUR:

BHEL PSWR, SRIMOHINI COMPLEX , 345 KINGSWAY, NAGPUR 440001, INDIA

All correspondences regarding this tender shall be addressed to AGM / PURCHASE BHEL PSWR at above address. Bidders may also opt to correspond with following BHEL officials regarding this tender through email at following email ids . However please be informed that sealed tenders shall necessarily be submitted in original at above address:

AGM Purchase, Email id: rajeebc@bhelpswr.co.in. Ph: +91 – 712 – 3048633

Sr Engineer Purchase, Email: pgv@bhelpswr.co.in, Ph: +91 – 712 – 3048713
Engineer Purchase, Email id: svm@bhelpswr.co.in , Ph: +91 – 712 – 3048715
Asst. Engineer, Email: nirmalpg@bhelpswr.co.in, 0712-3048732

1. **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)**

2. **Refer Chapter XII of Volume IB Special Conditions of Contract regarding Suspension of Business Dealings: The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' has now been uploaded on www.bhel.com on "supplier registration page" at the following link: http://www.bhel.com/vender_registration/pdf/Suspension-of-Business-Dealings-with-Supplier-issued-Sept13_abridged.pdf**

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

4. **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

5. 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.

6. PRICE VARIATION CLAUSE

Revision in Price Variation Compensation Clause no. 2.17 of Vol I C GCC:

Clause No. 2.17.9 of Vol IC GCC is revised as below:-
PVC shall be applicable only during the extended period of contract (if any) after the schedule completion date for the portion of work delayed / backlog for the reasons not attributable to Contractor. However total quantum of Price Variation amount payable/recoverable shall be regulated as follows:

i. For the portion of backlog attributable to the contractor and for the portion of backlog due to force majeure condition during contract period, PVC shall not be paid.
ii. For the period of force Majeure during extended contract period, PVC will be as per the indices applicable at the beginning of the force majeure period.
iii. void
iv. The total amount of PVC shall not exceed 20% of the cumulatively executed contract value during the extended contract period. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works.

Clause No. 2.17.5 of is modified as below:-

Base date shall be the calendar month of the (schedule completion date of the contract). Schedule Completion date shall be the actual start date plus contract period as defined in Chapter VI 'Vol IA TCC'

7. <u>OVER RUN COMPENSATION</u>

Modification in Price Variation Compensation Clause no. 2.12 of Vol I C GCC:

Clause No. 2.12 of Vol IC GCC is Revised as below:-

IF THE CONTRACT IS EXTENDED BEYOND THE CONTRACT PERIOD FOR ANY REASON OTHER THAN THOSE ATTRIBUTABLE TO THE CONTRACTOR OR FORCE MAJEURE CONDITIONS, THE CONTRACTOR WILL BE COMPENSATED BY PAYMENT OF OVERRUN CHARGES AT THE RATE OF **RS.1,00,000/- (Rupees One Lakh Only)** PER MONTH. OVERRUN COMPENSATION WILL BE PAID FOR THE EXTENSION ATTRIBUTABLE TO BHEL ONLY. NO OVERRUN COMPENSATION WILL BE PAYABLE

FOR THE EXTENSION ON ACCOUNT OF REASONS ATTRIBUTABLE TO CONTRACTOR AND/OR FORCE MAJEURE CONDITIONS. OVERRUN COMPENSATION FOR ELIGIBLE PERIOD SHALL BE IN PROPORTION TO THE PROGRESS ACHIEVED AGAINST THE PLAN FOR RESPECTIVE PERIOD.

8. Acceptance of Bank Guarantee (BG)

Revision in Acceptance of Bank Guarantee (BG) Clause no. 1.10.3 (V) of Vol I C GCC:

Clause No. 1.10.3 (V) of Vol IC GCC is revised as below:-

"Bank Guarantee issued by:

a. Any of the BHEL consortium bank listed below :

State Bank of India
ABN Amro Bank N.V.
Bank of Baroda
Canara Bank
Citi Bank N.A.
Corporation Bank
Deutsche Bank
HDFC Bank Ltd.
The Hongkond and Shanghai Banking Corporation Ltd.
ICICI Bank Ltd.
IDBI Ltd.
Punjab National Bank
Standard Chartered Bank
State Bank of Travancore
State Bank of Hyderabad
Syndicate Bank

b. Any public sector Bank (other than consortium banks) with a clause in the text of Bank Guarantee that it is enforceable at Nagpur, Maharashtra

c. Any private sector banks, with a clause in the text of Bank Guarantee that it is enforceable by being presented at any branch of the bank

Note: "Bank Guarantees issued by Co-operative Banks are not acceptable".

9. **VOID**

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.

1504

VOLUME – IA
Part I & II
TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Contents

PROJECT INFORMATION

1. Purchaser / Owner : **MSPGCL**

2. Project Title : Koradi Thermal Power Station Unit # 6(210 MW)

LOCATION AND APPROACH :

1. Location :KORADI, DIST. :NAGPUR, MAHARASHTRA (INDIA)

2. Nearest City : The site is about 14 Km from Nagpur city.

3. Nearest Air Port : Nagpur

4. Railway Approach : Nearest Railway Station : Nagpur

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

SCOPE OF WORKS

2.0 INTRODUCTION

Unit # 6 of Koradi Thermal Power Station is a 210 MW Unit commissioned in 1982. The Boiler is of BHEL design.

This work involves Receipt of materials/components, loading and transportation of erection materials from storage yard to erection site, stacking, storage and preservation, pre assembly, Replacement/Erection, overhauling, testing and commissioning, Trial operation and reliability operation of equipments.

The work scope includes application of thermal insulation and cladding. Transportation of the scrap to scrap yard, for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), UNIT # 6 (210 MW),MSPGCL, Koradi TPS.

Scope also includes supply and application of final painting as required.

2.1 OVERHAULING OF STEAM GENERATOR

- Erection of Cuff Lock coupling in Furnace, SH zone & Second Pass
- Cleaning of boiler inside & outside
- Removal of Ash from Pent House, Dead Chamber & other areas
- Replacement of damaged Seals/ tubes & bends of Platen SH, Secondary SH, Pendent RH, Drain lines with 100% radiography
- Servicing / repair of all valves of Boiler area, all drum mountings/fittings, vents, drains, oil lines, etc.
- Servicing of connecting links of buck stay beams & EQ restraints and boiler sliding supports
- Repair of Pent house header supports, realignment & pipe line insulation
- Servicing of Boiler manholes, peep holes, doors
- Repair/ Replacement of damaged portion of dog house, cat house including supports

- Overhauling of Clinker Grinder, Ash disposal system
- Repairs to PA ducts & expansion joints
- Removal of ash from various zones, ducts & hoppers
- Any other activities related to overhaul but not covered above

The following E&C activities will take up during R&M

1. Re-heater modification
2. ID system duct modification
3. Assistance in carrying out PG testing of Boiler system
4. Repair / Overhauling of components
5. Partial replacement of tubes and thickness survey.
6. Replacement of Economiser headers, coil assemblies, shielding / cassettes
7. Need based repair / replacement of drum internals, steam separators etc.
8. Replacement of SH & RH attemperator assemblies.
9. Attending works as required in Auxiliary PRDS system
10. Replacement of Platen SH pendant coil assembly and Final SH pendant coils assembly.
11. RH headers and pendant coils assembly.
12. Repairs to Buck stays as required.
13. Replacement of Water wall tubes, Steam cooled walls based on thickness survey & corrosion mapping.
14. Replacement of LRSB, Half retractable SBs
15. Repairs, Replacement & servicing of valves
16. Replacement of Hanger supports.
17. Retrofitting of Rotary Air Pre-heater as per materials supplied.
18. Installation of modified higher capacity mills as supplied.
19. Replacement of coal feeders.

20. Replacement of PC pipes as supplied.
21. Replacement of coal burners with modified one.
22. Replacement of Ducting / dampers.
23. Floor Grills & Platforms.
24. Installation of Igniter & scan air fan.
25. Replacement of valves in fuel oil system
26. Replacement of Instrument air piping
27. Application of insulation & refractory.
28. Chemical cleaning of Boiler.
29. Painting
30. Replacement of HP/LP bypass system
31. Pre-commissioning checks/test, trial run, testing and, steam blowing, commissioning, trial operation, preparation & assistance during PG Test.

The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship for fabrication, energy efficient renovation & modernization engineering and construction management. The Bidder should ensure timely completion of work. The Bidder must have adequate quantity of tools, construction aids, equipment's etc, in his possession. He must also have on his rolls adequate, trained, qualified and experienced supervisory staff and skilled personnel.

2.2 Detail scope of work for Boiler and its Auxiliaries

2.2.1 Presure Parts

2.2.1.1: Replacement of Water wall tubes

- Cuff Lock Scaffolding

Erection & dismantling of cup lock scaffolding from bottom of Furnace to Roof including complete inside cleaning of Furnace, Water Walls PTWW, PTSH, RH, Arch, Screen, FSH, LTSH, Economiser, Steam Cooled Wall, Supply Tubes Extended Water Wall & Extended Steam Cooled Wall including repair/replacement of Peep Holes. Main Holes, Drum Inspection, attending Furnace Leakages etc. as per given in scope of work. (Cleaning by Hi-Pressure Jet Pressure more than 100 Kg./Cm2)

(i)All the material for cup lock scaffolding for WW, Re-heater,

platens super-heater, final super-heater, etc. along with ladder and railing up to roof will be arranged by the contractor & for other areas like LTSH, economizer, supply tubes, steam cooled wall etc. materials required for scaffolding have to be arranged by firm.

(ii)Erection of cup lock type/ conventional scaffolding up to roof tube and cover rear arch, platen water wall coils, platen super heater coils, Re-heater front and Rear coils, Burner area water wall soot blower area, water wall, super heater, screen tube, FSH, all four burner corners etc. Landing should be at every 3 meters height so as to cover entire water wall tubes for inspection. Railing to be provided on all landing full length .All scaffolding material along with planks, ladders and required manpower for erection and removal of cup lock /conventional scaffolding is to be arranged by contractor. Approach platform to be made along all four wall of boiler at every three meters height up to roof tube.
"Arrangement should be such as to have approach to all the soot blowers, all corners. Portion of furnace above bottom ash hopper is to be sealed /covered so that work in the bottom hopper can go parallel."
Erection of complete scaffolding/platform at about 36 meter level which will seal the furnace. Safety nets to be provided at-least at two locations to avoid any accident. Any Additional Scaffolding if required for De-metering survey & DPT test.
Cleaning of Boiler and scaffolding should be such that it should help to carry out thorough inspection of each water wall tube and area up to Arch/screen and FSH tube, LTSH, Economiser. For cleaning of boiler scaffolding should be helpful for the visual inspection of tubes, thickness survey and inspection for bulging if any and replacement of tubes. Cleaning of WW/PTWW/SH/RH/SCREEN/ARCH/ROOF Tubes first pass/FSH/Tubes.
Cleaning of Furnace, re heater, platen water wall & platen super heater to be performed by High Pressure jet cleaning (pressure of water should be more than 100 Kg./Cm2 & other area by normal pressure)Pressure 5-6 Kg./cm2).
NOTE: - REMOVAL OF SCAFFOLDING SHOULD NEVER BE DONE BEFORE PRIOR PERMISSION OF ENGINEER IN CHARGE.

- Jet Cleaning of boiler inside / outside

Complete external cleaning of Boiler stair case, Beams, Plate form, from 0 miters to Pent House Roof (Canopy) & on ground floor from Mill area to Chimney. It includes water cleaning as well as removal of all unwanted materials, Scraps, Ash etc. from PA/SA Ducts & Coal Pipes also.

(i) Cleaning of complete boiler from top (roof canopy of pent house) to bottom and feeder floor / mill floor to the chimney, including cleaning of cable trays and ash trenches. Top to bottom cleaning must be completed within 3-4 days. Final water washing and cleaning of boiler after completion of all main work will have to be done compulsorily otherwise the head will not be considered at all.

(ii) Washing of complete boiler by water jetting should be done after covering all the outdoor motors i.e. soot blower motor actuator motors etc. with polythene to avoid damage, removing of covering after washing.

(iii) Removal of dust & debris all along the boiler area before light up to a specified place at ground floor with in 150 Mtrs. range. Disposal of above dust/ debris outside power house premises to specified place within a range 2 Kms.

(iv) Removal of scrap from boiler area before light up of Boiler and dump at a store or specified place.

(v) Complete cleaning of coal pipes, ducts etc.

(vi) Cleaning of tubes for inspection of entire pressure part including but not limited to water wall, roof SH, platen super heaters, re-heaters & final SH., Arch & Screen tubes, Extd. WW, Extd. SCW, economizer, LTSH, steam cooled wall, supply tubes etc.

(vii) Cleaning of top roof of boiler, bringing all ash deposited to the ground floor and flushing it into ash trenches, cleaning the above areas by water jetting.

(viii) Checking of top roof stiffeners and structures and tightening of loosened nut, bolts and pins including repairs etc.

Complete inside cleaning of pent house, dead chamber, cat chamber. Bottom hopper, air heater hopper, economiser hopper etc.

(i) Fabrication/ Repairing of chute for ash disposal from pent house.

(ii) Removing of ash from pent house manually in polythene bags and disposing in the chute. In no case the contractor will be allowed to use water jet for cleaning purpose in pent house.

(iii) Removing of ash from dead chamber, cat house, eco & A/H hoppers by water jet & manually only.

- Thickness survey of tubes @ 12000 points
- Replacement of corroded tubes of about 1200 Rmtrs. with Radiography.

(i) Visual Inspection of H.P. Tube.

(i) Replacement of tubes and bends found defective in the areas identified during visual inspection /thickness survey by cutting with cut off wheel or hacksaw blade.

(ii) Welding of H.P. tubes of pressure parts, root run by Tig welding and subsequently manual arc welding process subject to Radiography of the welded joints and repair of defective joints. Radiography to be arranged by the firm as per IBR Rules. Necessary care should be done for 'V' and surface preparation, and keeping proper root gap and alignment before welding.100% Radiography of the High Pressure Joints welded.

Following Low Hydrogen welding Electrodes shall be use for HP welding Joint strictly as specified below.

(A) For SA-210 Grade A1, D&H Secheron make 7018-1 Supratherme SP.
(B) For SA213 Grade T11, D&H Secheron make 8018 Cromotherme-1
(C) For SA213 Grade T22, D&H Secheron make 9018 Cromothrme-2

NOTE:-

(1) A PENALTY OF Rs.25000/-SHALL BE CHARGED FOR EACH FAILURE OF THE JOINT WITHIN ONE YEAR FROM THE DATE OF FIRST SYNCHRONISATION OF THE UNIT AFTER AOH.
(2) Firm should have at least 10 Nos IBR approved welders at site before starting the work.
(3) Test of each welder will be taken before allowing them for welding.

RAINFORCEMENT OF OLD ERODED H.P.JOINTS:-

(i) Grinding of old eroded H.P.Joints.
(ii) Reinforcement of joint by ARC/TIG welding by IBR welder.

METAL BUILDUP ON ERODED H.P.TUBES:-

(i) Grinding of old eroded portion of tubes.
(ii) Metal build up by ARC welding on eroded portion by IBR welder.

FABRICATION OF PRESSURE PART BENDS:-

(i) Cutting of straight IBR tube (Size 31 mm to 76.1 mm O.D.by hacksaw/cut off wheel.
(ii) Cold bending of tubes or fabricating the bends.
(iii) Fabricated bends should satisfy the IBR standards.
(iv) Bend of all types of tubes of boiler are to be fabricated.

- Replacement of all Burner Panels
- Replacement of all gooseneck bend tubes (136nos)
- Replacement of S-Panels (362 tubes) including cat house tubes
- Replacement of Water wall Platens(4x39 tubes)
- Replacement of eroded Steam cooled walls of about 300 Rmtrs.
- Replacement of all Ceiling SH tubes (120 nos)

2.2.1.2: LTSH

- Replacement of SHH 8 & SHH 9 Headers
- Replacement of Supply tubes (136 nos) between SHH 8 & 9
- Replacement of LTSH connecting (terminal) tubes (3X134 nos)between LTSH & SHH 10
- SS shielding with repl. Of wire mesh & refractory of all LTSH bends

2.2.1.3: Attemperators & Spray system

- Replacement of Reheater and Super Heater attemprator spray system
- Replacement of existing valves for SH & RH spray system

2.2.1.4: Platen Super Heater

- Replacement of complete Platen SH assembly(29 nos) excluding Headers
- Repair / replacement of Header supports

2.2.1.5: Final Super Heater

- Replacement of complete Final SH Pendent assembly(119 nos) excluding Headers
- Repair / replacement of Header supports

2.2.1.6: Re-heater

- Replacement of complete Reheater Pendent assembly (Front & Rear) including inlet & outlet Headers
- Repair / replacement of Hanger supports

REMOVAL AND REPL. OF HANDHOLE PLUGS

(i) Removal of hand hole plug by grinding only.
(ii) Checking of the header and if some foreign materials are found removing of the same.
(iii) Refitting/ replacement of hand hole plug. All welding is to be carried out by IBR welders, and after preheating of header. Necessary repairing plug by welding.
(iv) Thermal stress relieving of the welding joint. S/R chart to be submitted.

INSPECTION OF COMPLETE DESUPERHEATER ASSLY OF SH

(i) Removal of Hand hole plug to check the condition of assly.
(ii) Cutting spray nozzle assly. and removal of spray nozzle.
(iii) Re-welding of spray nozzle.
(iv) For above re-welding necessary preheating is must.
(v) Stress relieving of the all the welded joint necessary equipment for the S/R like heating coil etc. shall be arranged by contractor.
(vi) Radiography of all the welded joints. Necessary radiography source and radio grapher shall be provided by Board but helpers to shift source/ scaffolding etc. shall be provided by the contractor.
(vii) All the work to be carried out will be as per IBR. All IBR formalities like approval for cutting, approval for radiograph/SR chart from Director of Boiler, M.P. shall be contractor's responsibility.
(viii) All the other works necessary to perform above work but not mentioned will be in the scope of contractor.

2.2.1.7: Auxiliary Steam PRDS system

- Replacement of Auxiliary Steam PRDS system

2.2.1.8: VALVES

- Replacement of Valves as per list 3.2, 3.2a
- Servicing / refurbishment of Valves as per list 3.3

List of Valves- 3.2 List – 1

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S.N.	Tag No.	Replacement of the following valves.	Qty. No.
1.	B-66, 67, B-69, 70 & 72	CBD- 65 nb manual isolating	5
2.	B-71	CBD line 65 NB manual regulating	1
3.	B-62, B-63	EBD – 65 NB isolating motor operated 1no + 65 NB regulating motor operated 1no	2.
4.	B-61	Phosphate dozing line isolating 25 NB manual 1 no	2
5.	B-60	Phosphate dozing line NRV 25 NB 1 no.	2
6.	B-1, B-2	Boiler Drum safety valves (1749)	2
7.	B-13	Boiler Drum safety valves (1759)	1
8.	B-25, 26,27&28 B-53, 54,55& 56	Drum Gauge Glass isolating 40 NB	8
9.	B-30, 31& B-58,	Drum Gauge Glass 15 NB drain valves 4	4
10.	Welbloc (Yarway)	Drum Gauge Glass 40 NB three way chain operated drain valves 4 no.	4
11.	B-20, 23 B-40, 43	Drum Gauge Glass level transmitter 15 NB isolating 3/8” valves	4
12.	B-3, B-4 B-10, B-11	Drum Air vents 65 NB manual isolating 2 valves in series LHS & RHS (2500 class)	4
13.	B-64, B-65	Drum sampling valves 10 NB manual SS valves	8
14.	SB-1, SB-2	Soot Blowing Line Isolating 50 NB manual 1 no + 50 NB 1 no.	2
15.	SB-5	Soot blower Line control valve 150/25 kg/cm2	1
16.	SB-7	Soot blowing line safety valve 1811 HB	1

17.	SB-3, 6,8,10,11	Soot blowing impulse line root valves 15 NB	5
18.	SB-22, 23	Soot blowing line thermal operated drain valve	2
19.	AS-102, 103, 106	PRDS Gate valve 150 NB motor operated	3
20.	AS-105, AS-108	PRDS globe valve 300 NB regulating	2
21.	AS-104	PRDS Control Valves Pneumatic on main line	1
22.	AS-107	PRDS globe motorized Control Valves on bypass station.	1
23.	AS-110	16 ATA header valve manual 300 NB isolating	1
24.	AS-144, AS-145	PRDS Interconnecting manual 250 NB gate valves	2
25.	AS-116, AS-117	PRDS & 16 ATA Header Drain Valves 50 NB	2
26.	DW-211A, 211B, DW-212A, 212B, DW-216,217.	PRDS & 16 ATA Header Drain Valves 25 NB	6
27.	S-74	S/H spray (block valve) gate valve 150 NB Motor operated.	1
28.	S79, S-85, S-83, S-89.	Gate valve 65 NB motor operated.	4
29.	S- 80, 86 S-83, 89	S/H spray control valves main and bypass station	4
30.	--	S/H spray line NRV 65 NB piston lift type (line size 76.1x10)	2
31.	--	S/H spray line flow measurement orifice (covered in C&I package)	2
32.	S-91, S-92,S-93	S/H Spray Drain valves 25 NB	3
33.	S-31, S-32	Super Heater Safety Valve 1739 WD	2
34.	MS-103, MS-104	S/H Outlet (Boiler Outlet) Gate valve 300NB	2

35.	S-50, S-51	Steam sampling valves 10 NB 400 kg/cm2 SS	2
36.	R-44, R-38	Reheater spray line control valves	2
37.	R-5,6,R-11,12,R-21.	Reheater safety valve type 1785 (suitable to the new R/H requirement)	5
38.	--	R/H spray line NRV 40 NB 250 Kg/cm2 piston lift type (line size 44.5x6.3)	2
39.	--	R/H spray line flow orifices (covered in C&I package)	2
40.	R-49	R/H spray line drain valve	1
41.	FW-113, FW-114	Boiler Feed Line – control valves of main line	2
42.	FW-115	Boiler Feed Line – control valve of low load line	1
43.	FW-118, FW-119	Boiler Feed Line – isolating valves of low load line 150 NB 250 kg/cm2 motor operated	2
44.	E-1	Boiler feed Line – NRV Flap type, 300 NB 250	1
45.	E-2	Economiser Inlet Valve 300 NB 250 kg/cm2 motor operated	1
46.	DW-210 to 206	BF Drain valves 25 NB 250 Kg/cm2 manual operation class 1500	6
47.	--	BF root valves for impulse lines 15 NB 250 kg/cm2	8
48.	FW-164, 165	Feed sampling valves 10 NB 400 kg/cm2, SS	2

- **3.2(a) Replacement of the following items**

S.N	Description	Qty
1.	Yarway make GG assembly 7 ports, 15 NB. (B-29,B-57)	2 no

2.	S/H Spray drain lines 44.5x5.5 SA 210 Gr.I	(@) length 60 m
3.	Boiler feed drain lines (25 NB SA 210 Gr.I)	50 m
4.	Replace drum air vent (LHS & RHS). (76.1x10 SA 210 Gr.I)	20 m
5.	Replace Sampling lines (14x 2.9, SS)	1000 m
6.	Replacement of all sample valves and sample coolers and shifts the same to SWAS room.	100 nos.
7.	Replace impulse lines 5/10/15 / 25 NB for Boiler and Turbine scope Material of carbon steel /alloy steel / SS as per application requirement.	1500 m
8.	Replace impulse lines root valves Boiler and Turbine scope as per the line application.	200 nos.
9.	Replace chemical dozing pipes.	200 m

- **3.3 List of valves to be serviced /refurbished.**

S.No.	Description	Quantity
1	All safety valves Drip pan and drain piping have to be properly re-installed	1 lot
2	EMRV 1536 VC valve replacement of solenoid and servicing of valve.	1 main + 1 pilot valve.
3	Repair start up vent line and replace valve actuators	For 2 isolating + 2regulating valves
4	Replace Actuators of platen water wall drains.(B74,B75)	2 no.

2.2.1.9: HANGERS & SUPPORTS

- Repair / replacement of Hangers & Supports- (20 nos approx)
- Replacement of all hangers and supports & structures of critical piping (MS-51 nos, HRH-55, CRH-50 & BFD-59 nos)

- SERVICING /REPLACEMENT OF CRITICAL PIPING HANGERS

(i) Replacement of critical piping hanger by new one if required.
(ii) Holding of main steam, HRH, CRH and feed water lines sector wise with rigid supports and removal of all the hangers provided in the line. Preparation of platform if required.
(iii) Checking and cleaning of hanger spring & casing for free movement & making dust/ rust free cutting & re-welding of casing cover and adjusting bolts for free movement of the spring, wherever required.
(iv) Replacement/Resetting the hanger loading as per BHEL's norms.
(v) Checking & straightening of the rods and turn buckles and making them free.
(vi) Checking the critical piping clamps & support clamps, repairing wherever required.
(vii) Refitting the hangers & loading them by tightening the turn buckles.
(viii) Removal of arresting temp. structure as provided on pipes & rechecking the load on the hangers in cold condition resetting the hangers again if required.
(ix) Painting of hangers with one coat of red oxide and one coat of traditional gray colour and marking the hanger code No.and its cold and hot setting values with paints on its casing.
(x) Checking of hanger setting in hot condition and resetting again wherever required.
(xi) To assist in servicing /setting of hangers under supervision of expert engineers.

2.2.2: Non Pressure Parts

2.2.2.1: BUCK STAYS

- Repairs to Buck stay including the corner fixing arrangement, sealing of gaps and refractory to eliminate air ingress

- Extensive repairs to vertical buck stays in second pass & in cat house
- Removal of ash deposition on buck stays and shielding on them

(i) Removing of outer casing of buck stays.
(ii) To cut the all locking of buck stay beams located between two corners.
(iii) To take out the pourable insulation from backstay.
(iv) Checking, rectification alignment of backstay if any including corner jo and re-insulation. For alignment all the arrangements of chain pulley bl hydraulic jacks etc are to prepared by the contractor.

REPAIRING OF BUCK STAY BEAMS BEHIND ASH PANEL OF BOILER

(i) Checking of buck stay beams of ash panel of front and rear side.
(ii) Preparation of jacking system for re-positioning of beam to its orig position.
(iii) Welding all clits and supports as per requirement.
(iv) Displacement of ash panel tubes to be rectified and fin welding along v length & clits welding

2.2.2.2: Soot Blowers

- Replacement of existing LRSBs with new
- Erection of smart soot blowing system
- Overhaul & setting of Wall Blowers

a. Checking of oil travel carriage gear box, reduction gear box on traversing of rotary power packs.
b. Checking operation of pappet valve and lapping of the same wherever necessary.
c. Checking complete assemblies, tightening loosened nuts bolts etc.
d. Coating the threaded components with anti seize compound.
e. Checking alignment for proper clearance from pressure parts and resetting wherever required.
f. Test operation of each soot blower, checking the blowing pressure and resetting / wherever required during on load trail.
g. Checking the mounting/hings. Support of soot blowers, steam piping of blowing system.
h. Painting of soot blower with traditional green colour paint.
i. Attending of the defects observed during the operation of the soot blowers.

2.2.2.3: PENT HOUSE

- Alignment of Roof Tubes
- Restoration & replacement of hangers / tie-rods
- Modified sealing arrangement with better refractory system
- Replacement of pent house casing with insulation
- Cleaning of complete pent house by eco friendly hydro ejector system
- Repair / replacement of Boiler roof

REPAIRING OF PENT HOUSE, CAT HOUSE AND DEAD CHAMBER

(i) Repairing of pent house shield plates by welding of new M.S. plates / S.S. plates etc.
(ii) Checking and repairing of all supports, pins, hangers, stiffeners etc. of pent house. Repairing of supports of pent house roof & Pr. Joint additional support if required will be in scope of contractor.
(iii) Repairing of dead chamber, cat house and ash panel area by 3.15 mm thickness plate.
(iv) Repairing of the above areas by replacing worn out H.R. sheets, corrugated sheets and pouring the refractory of above areas. Checking of all pins, hinges and stiffeners in the above specified areas repairing/ replacement as per requirement.
(v) Repairing of skin casing and including pent house wherever required in above areas.
(vi) Repairing of expansion joints of above area.
(i) Removal of roof of pent house.
(ii) Fabrication of roof as per recommendations of M/S CPRI engineers with appropriate supports.
(iii) Application of pourable refectory / old insulation material.

2.2.2.4:Manholes and peep holes of boiler

Adjustment and repair/replacement of all manholes and peep holes of boiler furnace, pent house, fixing of asbestos rope.
(i) Opening of drum manholes of both sides, taking out all turbo separator and screen driers for drum inspection & refitting of the same.
(ii) Attending of all leakages from inside the furnace due to incomplete fin welding improper shielding and loose refractory.
(iii) Complete inside water cleaning of first pass & second pass of boiler pressure parts.

2.2.2.5: PC FEEDERS

- Replacement of feeders with Gravimetric Feeders along with associated works

2.2.2.6: PC PIPING

- Replacement of all existing PC Pipes with ceramic lined bends, orifices
- Rerouting of piping if required
- Check/replacement of PC piping supports

2.2.2.7: COAL BURNERS

- Replacement of all existing Coal Burners with new modified low Nox higher capacity burners
- Replacement of Wind Box with secondary air dampers
- Replacement of Scanners & Igniters with modified ones

2.2.2.8: DUCTS,DAMPERS & ACTUATORS

- Replacement of Secondary & Primary Air ducts
- Replacement of APH outlet to ESP inlet ducts
- Replacement of ESP outlet to ID Fan ducts
- Replacement of ID Fan to Chimney ducts
- Replacement of Dampers with actuators
- FABRICATION & ERECTION OF EXPANSION JOINTS

(i) Fabrication of expansion joints/loop by H.R. sheet of 2 mm thickness as per Drg./Sample. Required H.R. sheet of 2 mm thickness shall be arranged by the Board. Transportation of H.R. sheet from O&M Store-II to site will be firm's responsibility. However, Truck/Crane shall be provided by Board.
(ii) Cleaning of area and then cutting of the corroded expansion loop.
(iii) If work is carried out during rung units then suitable packing have to be provided at place where air ingress is observed.
(iv) Putting new expansion joint and welding of the same.
(v) Necessary scaffolding required for work will be arranged by contract. Through scaffolding material like scrap pipe etc. Shall be arranged by Board.
(vi) Safety of labours and safety appliances will be in contractor's scope.
(vii) All T & P, welding machine, cutting gas, welding electrode shall be arranged by contractor. Only free electricity supply will be arranged by Board.
(viii) All other activities related to the erection of the expansion lop not mentioned in scope will be in contractors scope.

2.2.2.9: FUEL OIL SYSTEM

- Replacement of fuel oil system
- Repair / replacement of Oil Guns
- Replacement of Hydro motor valves with pneumatic valves

SERVICING & REPAIRING OF OIL HEATING UNITS

(i) Checking of tubes of oil heaters, cleaning of heaters, and tube and fixation of pre-heaters assemblies.
(ii) Checking and servicing of all valves and rectification of defects wherever noticed. Repair/Replacement and tightening of all joints, cleaning of oil strainers and re-fixation in position. Replacement of jammed valves.
(iii) Any modification if required is also to be done.
(iv) Replacement of steam tracing line including removal and re-application of insulation.
(v) Cleaning of complete trench of the oil heating station.

2.2.2.10: BOTTOM ASH HANDLING

- Refurbishment of Bottom ash hoppers
- Replacement of Refractory
- Replacement of ECO & APH hopper liners
- Repair / replacement of seal trough, dipper plates,etc.

FITTING OF SCALOPED BAR IN ALL FOUR ASH PANEL CORNERS

(i) Cutting of scalloped bar exactly as per profile of ash panel corner by gas. Grinding of the same.
(ii) Welding on the corners.
(iii) Providing stopper on the bar to hold the refractory at 1mtr. Spacing.
(iv) Fitting of scalloped bar should be done in such a manner that there should be no leakage of dust from corners in to cat house.

- Replacement of Bottom Feed Gate assembly

2.2.2.11: FLOOR GRILLS, PLARFORMS, RAILINGS, etc.

- Repair / replace damaged Floor grills, hand railing. Platforms, etc. for 12 MT (approx)

- Erection of addl. Platforms at ECO & LTSH floor

2.2.3: Rotating M/C

2.2.3.1: AIR PREHEATER

- Replacement of Air Pre-heater with modified sealing arrangement

  New APH is envisaged to take care of higher output as per tender requirement.

  Heater Size **:**27.0
  VIMT 2000 (72° PA)
  Quantity **:** 2 Nos / Boiler

1. RAPH: Two numbers Tri-sector Regenerative Air pre-heater per Boiler, complete with all accessories including Rotor assy, Housing, Seals, Guide & Support Bearings, Bearing lubricating oil system, Heating Elements with Baskets, Drive assy. having two Electric Motors and Air motor coupled to a common Gear Reducer, Air Receiver, Thermo-couple based Fire Detecting elements, Fire Fighting Manifolds, Water Washing Manifolds, Rotor Stoppage Alarm assy and Motor Driven Soot Blower at Cold End.
2. Special Tools: One set of Hydraulic lifting cylinder with accessories and one number Chain pulley block with mono rail for handling heating elements from inside APH to APH operating floor.
3. List of Special Tools & Tackles

Sl No	Description Of Items	Specification	Qty / Contract
01.	Hydraulic Lifting Cylinders with Accessories	50 Ton	1 Set
02.	Mono Block with Geared Trolley	1 Ton	1 Set

4.Start Up & Commissioning Spares

Sl No	Description Of Items	Unit	Qty / Boiler
01.	Hot End Radial Seals	Set	1

02.	Air Breather	No	4

Lubricants Requirement - Air Pre-heater

Heater Size: **27.0 VIMT 2000 (72 deg PA)**
No of Heaters : **2 Nos per Boiler**

Sl	IOC	HPC	BP	Quantity / Blr
01	Servocyl C-680	Cyndol TC-680	Engol J-680	400.0 lts
02	Servomesh SP 320	Parathan EP 320	Amocam 320	200.0 lts
03	Servosys 46	Enklo 46	Tellus 46	9 lts
04	Servomesh SP 460	Gear Oil ST 140	Spirol 140 EP	2.0 lt
05	Servosys 32	Enklo 32	Actuma T Oil 10w	1.0 lts
06	Gear Oil SAE.90	-	-	2.0 lts
07	Servogem 3	Lithon 3	MP Grease 3	7.0 Kg
08	Servogem HT XX	-	-	0.4 kg

Note: Above Quantity is for first fill & top - up requirement.

Utility Requirements

Sl No	Requirements	No / Blr	
Equipment			**Qty / Blr**
Cooling water at 5 kg / cm2 (g)			**m3 / hr**
1	Guide Bearing Oil Cooler	2 + 2	2
2	Support Bearing Oil Cooler	2 + 2	2
3	Oil Carry - Over Probe	2	1

Service water at 5 kg / cm2 (g)			**m3 / hr**
4	Water Washing - Hot & Cold End	4	432
5	Deluge System - Hot & Cold End	4	432
	(During fire both system must operate)		
Service air at 6.33 kg / cm2 (g)			**N m3 / min**
6	Auxiliary drive - Air Motor	2	11.9
7	Cleaning Device - Gas Out (required only during start up of boiler when auxiliary steam is not available)	2	21.5
Steam at 14 kg/cm2 (g) & 150 degC superheat			**kg / hr**
8	Cleaning Device - Gas Out	2	4200
	(Cleaning Duration : 30 minutes per pass)		
Electrical			**Rating**
L T Motors : 415 V, 3 Ph, 50 Hz, AC			**KW**
9	Main Drive Motor	2 + 2	11.0
10	Oil Circulation Motor – Support & Guide Brg.	4 + 4	0.75
11	Cleaning Device Motor - Gas Out	2	0.18
Other Equipment : 230 V, 1 Ph, 50 Hz, AC			**KW**
12	Light Assembly	2	0.50
13	Solenoid Valve	2	0.02

2.2.3.2: BOWL MILLS

- Replacement of mill components with modified & up gradation of mill capacity
- Carrying out modifications as suggested by BHEL Hyderabad
- Replacement of hot air gates, dampers and cold air dampers with actuators

2.2.3.3: FD FAN-2 NOS

- OH of Fans with motors
- Lube Oil Flushing and system readiness
- Repair/Replacement of dampers & isolation gates

2.2.4: INSULATION & CLADDING

100 % removal & re-application of Insulation & cladding including refractory's etc is required.

➢Replacement of existing insulation of boiler components viz. furnace, second pass, pressure parts, ducting, penthouse and refractory with existing arrangement and thickness.

2.2.4.1: REFRACTORY

(i) Inspection and repair of cast able refractory at manholes, peep holes, economiser zone, between front and rear arch and bottom ash hoppers & pent house wherever refractory is found.
(ii) Welding of retainers for reinforcement before application of refectory.
(iii) Removing of refractory with proper care. The surface should be cleaned thoroughly so that inspection of each tube particularly behind buck stay beams can be carried out satisfactorily.
(iv) After necessary repairing reapplication of refractory with proper thickness of bed.

2.2.4.1: INSULATION:-

(i) Removal of insulation for complete boiler furnace, second pass, Eco/Air pre-heater hoppers, ducts, expansion joints, and other air/flue gas paths.
(ii) Removal of insulation of firing corners ,bottom ring header, feed valves, **main** boiler furnace, eco, LTSH, supply tubes, steam cooled wall, hoppers, wind box and other pipe lines.
(iii) Fixing G.I./Aluminum cover the insulation wherever required application of putty at joints for sealing.

2.2.5: COLLECTION & TRANSPORTATION OF SCRAP

Removal of complete scrap from the work area and transportation up to O&M store or the any other specified area within a lead of 1km by road transport arranged by the contractor, including loading unloading in his account. Contractor should note that no extra payment will be paid for

removal of scrap. Shifting of scrap is the part and partial of the maintenance work of each item.

2.2.6: PAINTING

The scope of work shall include supply and application of final painting for all the components.

2.2.6.1
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.

2.2.6.2 Touch-up painting on damaged areas -

a)For coatings damaged up to metal surface

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

2.2.6.3
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.

2.2.6.4
The scope of work includes painting of colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/customer engineer at site for the equipments/ components covered in these specifications.

2.2.6.5
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.

2.2.6.6
In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

2.2.6.7
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.

2.2.6.8
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.

2.2.6.9
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 70 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.

2.2.6.11
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.

2.2.6.12
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.

2.2.6.13
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.

2.2.6.14
The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

2.2.6.15
Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

2.3 HYDRAULIC TESTING, PRESERVATION AND OTHER TESTS

2.3.1 Contractor shall carry out the following tests required to complete the Renovation & Modernisation and commissioning of the Boiler and its Auxiliaries:

(1) Hydraulic testing of individual equipments.

(2) Chemical cleaning of the equipments and piping as part of scope
(3) Ultrasonic test
(4) Dye Penetrate test
(5) Magnetic Particle Test.

All facilities (men, materials, equipments, consumables etc) with operating engineer/experienced person and proper approach wherever required shall be provided by the contractor for satisfactory completion of the above tests.

2.3.2 Contractor shall lay all necessary temporary piping, weld, support, install pumps, valves, pressure gauges, electric cables and switches etc, required for the Hydro test, Air leak test, Chemical cleaning, Steam blowing etc.. After the test is over, all the temporary piping, pumps, etc will be removed. It may also specifically be noted that servicing, erection and dismantling of piping and equipments for conducting above tests will be done by the contractor. No separate payment shall be made for this purpose.

2.3.3 All the above tests shall be repeated till all the equipments, piping and systems satisfy the technical and statutory requirements. All related works form part of the scope.

2.3.4 Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration/ venting /drain points with valves as per BHEL engineer's instruction, for performing hydro test of piping is within the scope of work**.** Contractor will provide required valves, fasteners, blank flanges, blanks or steel for blank flanges. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL engineers' instruction.

2.3.5 Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

2.3.6 While conducting hydraulic test of steam lines, water lines, oil lines either individually or grouping a few lines or in portions. Blanks/spools may have to be put up at terminal points, strainers, walls, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored.

2.4 PRE-COMMISSIONING TESTS, COMMISSIONING AND POST COMMISSIONING

4.10.1 Commissioning of the Boiler equipments with associated Aux. and other Equipments with auxiliaries shall involve the following tests and activities of the equipments erected:

(a) Trial run of Boiler and other various rotating machineries / pumps as per tender specification.
(b) Trial run of motors/ drives for various auxiliaries.
(c) Hydraulic Test, Chemical Cleaning, Oil flushing of oil system, Air cleaning/blowing of pipelines, closed systems, Tanks and Vessels.
(d) Flushing of all pipelines by air/oil/water/Chemicals/steam as the case may be.
(e) Servicing of all valves (Hydraulic/Electrical/manually operated), and fittings.
(f) Manual/mechanical cleaning of Oil tanks, and other various equipments & tanks /vessels erected by the contractor. This may have to be repeated several times during the commissioning process.
(g) Chemical cleaning of piping systems as per requirement. Contractor shall carry out disassembly and reassembly of vulnerable components like gauges, instruments etc. as instructed by BHEL during this process.
(h) Synchronization.
(i) Full load operation.
(j) Trial operation
(k) PG Test

2.5 ACID CLEANING / ALKALI FLUSHING / STEAM BLOWING / OIL FLUSHING ETC WHEREVER REQUIRED.

2.5.1 Contractor shall lay temporary pipelines with fittings and accessories and also erect/commission pumps after servicing as per requirements, tanks and other installations, as a system as instructed by BHEL for the purpose of chemical cleaning, steam blowing, steam washing, steam flushing, water flushing, water washing, oil flushing etc. of piping and other equipments which are within the scope of work and also systems in which equipments and piping erected by contractor form a part of the scope of work.

It shall be specifically noted by the contractor that all pipes for above works shall be supplied in random length and in loose condition. Contractor has to assemble and erect them as per schemes / drawings provided by BHEL. Further, flanges bend etc. for completing the scheme shall be machined/ fabricated by the contractor at his own cost. However, plates / steel etc for the same will be provided by BHEL free of charges.

2.5.2 After the chemical cleaning has been successfully completed, dismantling of all temporary installations as instructed by BHEL is within the scope of work under this specification. The dismantled materials

shall be dressed and returned to BHEL as stated elsewhere in this tender specification.

2.6 ELECTRICAL AND INSTRUMENTATION

2.6.1 Contractor shall mount all flow indicators, centrifugal/speed switches of motors, accumulators, pressure regulators, etc which are received loose and which are to be erected/mounted at site on air lines, water lines, oil lines, HP/LP Bypass system, steam lines, auxiliaries and firemen floor and other operating floors on boiler/power house and other equipments. These are to be mounted during R&M for finalizing routing/position etc. They are to be dismantled after completion of erection work and handed over to BHEL for calibration. After calibration, these instruments shall be remounted by the contractor in their respective positions just before commissioning.

2.6.2 Certain instrumentation like, pressure gauges, power cylinders, flow meters, valve actuators, flow indicators, etc are received in assembled condition as integral part of equipments. Contractor shall dismantle such equipment at an appropriate stage under the instruction of BHEL and hand them over to BHEL for calibration and storage. Contractor shall re-erect them in position just before commissioning of the equipment.

2.6.3 Seal welding of Thermo wells, plugs before Hydro test of equipments and piping systems is also within the scope of this work/specification. 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.

2.6.4 Providing necessary engineer/supervisors/technicians/electricians as required by BHEL engineer for drying out the LT/HT motors is within the scope of the work. Job includes testing the motor for finding out PI & IR values and making necessary cabling connection for heating for dry out from the nearest source of supply and maintaining and controlling the temperature till the IR and PI values are achieved as per standards. However, BHEL will provide necessary motorized insulation testers for this purpose. The contractor shall provide necessary power cables and other tools and consumables for the above works free of charges. Before undertaking dry out/trial run of HT motors, the end shields and covers shall be opened on both the ends of the motor for inspection, cleaning and greasing of bearings.

2.7: PG TEST TAPPING POINTS

Installation and welding of Tapping Points for taking performance test measurements shall be carried out by the contractor as part of this work for the equipments covered under this tender specification under the guidance of BHEL engineer. The scope will be limited to all the tapping points for which materials are available and their locations identified within the regular contract period and extensions thereof.

PG TEST:

1. Installation of temporary pipes line and its termination with isolating valves, nipples and fittings etc.
2. Installation of flow nozzle in condensate line, mounting of thermo wells as required.
3. Lying of compensating cables and lead wire with termination at input/output module and field.
4. Installation of instruments like pressure transmitter, thermocouples, RTDs and power meter etc.
5. Installation of data logger system for conducting PG Test.
6. Providing manpower for conducting PG Test.
7. Dismantling of all instruments after completion PG Test.

2.8 T&P, cranes, erection tools etc.

All the tools tackles, Cranes (except those being provided by BHEL), Derricks arrangements (Structural material for fabrication of Derik will be provided by BHEL on returnable basis) required for satisfactory and safe execution of work to be arranged by contractor at his cost. The quoted rate includes entire completion of work including arrangements for labor colony for their workers stay & their transportation.

Due to confined space, there may be most of the areas being non-approachable by crane. Agency has to use improvised methods for dismantling and assembly / erection of various equipment components etc. to complete the erection work. These methods may include tying of ropes through existing structures /equipment such as chimney, conveyor structure and other available structures etc. At some locations, such structures are not available and crane also cannot approach, in such cases, derrick arrangement to be made for erection.

Bidders are strongly advised to visit the site along with BHEL officials to assess the possibility of using alternate arrangements apart from crane. No separate payment shall be made for any such arrangements used during the execution of the contract. All safety precautions have to be

taken for such alternate arrangements and no damage should be caused to the existing equipment, structure, customer property etc.

All the above activities included in the quoted rate. No separate amount will be paid for any work. The Boiler R&M work completion means completion of work in all respects and takeover by customer. Any miscellaneous works arises for satisfactorily completion of work to be carried out by bidder without any extra amount.

SPECIAL NOTES:

1. Fuel for operation of the BHEL Cranes to be provided by Bidder. Loading, unloading, shifting and assembly, dissembling arrangement are also included.

2. Bidders are strongly advised to visit the site to acquaint themselves with the working conditions and the project requirements for execution of the job.

2.9 ITEM TO BE ARRANGED BY THE CONTRACTOR:- (As per site requirement)

The following items will be arranged by the contractor and no additional payment over and above the quoted rate will be made to him on account of these items.

1. All consumable like cotton, waste, cloth, kerosene, diesel, petrol, rustling etc.
2. All consumable items required for effective cleaning of Boiler equipment, spares, heating surfaces, such as soft wire brushes, jute ropes, gunny bags, ordinary cleaning brushes, brooms, water and air hoses and fittings.
3. Surface, primer, synthetic enamel paint Epoxy paint /Primer, spry guns, brushes and other accessories required for painting.
4. All materials for erecting scaffolding including scaffolding piping clamps, wooden planks, cup lock etc.
5. All normal T&P like welding sets, grinders, safety belts hand tools, winch, pulleys, pull & lift machines, cutting & brazing torches, safety appliances, tig welding equipment with consumable etc.
6. All general purpose and special hard facing welding electrodes as approved by MSPGCL should be used & oxygen L.P.G. should be used.
   Following Low Hydrogen welding Electrodes shall be use for HP welding Joint strictly as specified below:-
   A. For SA-210 Grade A1, D&H Secheron make 7018-1 Supratherme SP.

B. For SA213 Grade T11, D&H Secheron make 8018 Cromotherme-1.
C. For SA213 Grade T22, D&H Secheron make 9018 Cromothrme-2.

7.
a. For pressure parts work, firm should be capable to engage minimum 10 Nos. High Pressure welders duly IBR approved (endorsed by Director of Boiler, Indore) for 210 MW Boiler
b. For scrap shifting separate gang will have to be engaged by firm.
c. Firm will use only approved make radiography quality electrode for welding work.
d. For HP welding joints & fin welding work only High Pressure Welders are to be engaged by firm.

8. Shifting of material and scrap is be done by the contractor at his own cost.
9. Firm will be totally responsible for safety and security of man & materials.
10. CONTRACTOR SHALL ARRANGE ADEQUATE FLOODLIGHTS, HAND LAMPS AND AREA LIGHTING. CONTRACTOR SHALL USE HIS OWN MATERIALS LIKE CABLES, FUSES, SWITCH-BOARDS ETC. BHEL/CLIENT WILL NOT PROVIDE ANYTHING IN THIS REGARD.
11. The above conditions may be read with the General Instruction to the Bidder and General Terms and Conditions of Purchase as stipulated in the booklet of tender specification for compliance.

2.10:- PENALTY / LIQUIDATE DAMAGE:

Penalty / Liquidate Damage shall be applicable for delay in completion of works as per BHEL RM recommendations.

Shutdown period will be 240 Days for Unit-6 shall be provided by MAHAGENCO for facilitating the total R&M work.

2.10.1:- PENALTY FOR DELAYED DEPLOYMENT OF MAJOR T&P

BHEL SHALL LEVY NON-REFUNDABLE PENALTY IN THE FOLLOWING MANNER IF THE CONTRACTOR DELAYS DEPLOYMENT OF MAJOR T&P SUCH AS CRANES, CONSTRUCTION ELEVATOR, HUCK INSTALLATION TOOLS & HUCK HOSE ASSY VIS-A-VIS THE SCHEDULE AS PER THE ADVICE OF BHEL BASED ON PROJECT REQUIREMENTS. TENTATIVE SCHEDULE GIVEN IN RELEVANT APPENDIX IS FOR GUIDANCE PURPOSE.

a) IN RESPECT OF 8 / 10 MT CAPACITY PICK AND CARRY MOBILE CRANE: @ RS. 1,000/- PER DAY OF DELAY, PER CRANE.
b) IN RESPECT OF 18 / 20 / 25 MT CAPACITY CRANE: @ RS. 5,000/- PER DAY OF DELAY, PER CRANE.
c) IN RESPECT OF 40 MT CAPACITY CRANE: @ RS. 10,000/- PER DAY OF DELAY, PER CRANE

IN CASE SUCH DELAY IS ATTRIBUTABLE TO EITHER BHEL OR FORCE MAJEURE CONDITIONS, NO SUCH PENALTY SHALL BE APPLICABLE.

WHEREVER TENTATTIVE SCHEDULES ARE NOT INDICATED, THE DECISION OF BHEL SHALL BE FINAL.

NOTE:-

1. PLEASE NOTE THAT IF THERE IS ANY TUBE LEAKAGE WITH IN THREE MONTHS HAVE TO BE ATTENDED BY THE CONTRACTING FIRM FREE OF COST OR GOT ATTENDED BY THE OTHER FIRM AT THE RISK AND COST OF THE CONTRACTING FIRM.(THIS EXCLUDES THE FAILURE DUE TO OLD JOINT OR MANUFACTURING DEFECTS IN THE TUBE METERIAL)

2. PENALTY FOR NON ERRECTION/COMMISSIONING OF CUP LOCK SCAFOLDING.

3. CLEANING OF FURNACE, RE-HEATER, PLATEN WATER WALL & PLATEN SUPER HEATER TO BE PERFORMED BY HIGH PRESSURE JET CLEANING (PRESSURE OF WATER SHOULD BE MORE THAN 100 Kg./cm2) & OTHER AREA BY NORMAL PRESSURE (PRESSURE 5-6 Kg./cm2). IN CASE THE SAME IS NOT DONE THEN MPPGCL; WILL HAVE THE RIGHT TO CALL OUTSIDE AGENCY FOR THIS WORK & COST INVOLVED WILL BE RECOVERED FROM CONTRACTORS BILL.

If contractor fails to erect and commission the cup lock Scaffolding in the stipulated time then will levy the suitable penalty as per the site condition and detailed below.

(A) To get the erection and commissioning of cup lock scaffolding from other agency on the contractor's cost and risk.

(B) To recover the amount of erection and commissioning of cup lock scaffolding as quoted by highest bidder.

(C) To impose the penalty for the activities suffered due to non erection and commission of cup lock scaffolding as per penalty clauses.

(D) If firms fail to erect and commission scaffolding completely in all respect within 6 days an amount @Rs. 50,000/- for each day of delay will be levied maximum to rate of cup lock.

(E) Penalty for non execution of part work/ unsatisfactory work will be done as follows:- (Percentage deduction will be on rate of 3.0

(i) Cleaning of water wall and extended w/w - 5%

(ii) Cleaning of platen w/w.- 1%

(iii) Cleaning of platen super heater. - 1%

(iv) Cleaning of re-heater I & II - 2%

(v) Cleaning of Arch/screen.- 0.5%

(vi) Improper scaffolding between platen super heater & reheater-5%.

(vii) Improper scaffolding at platen water wall 2%.

(viii) Improper scaffolding at Arch/Screen tubes, SCW hangers-0.5%.

(ix) Servicing/replacement of peep holes assly. main holes assly. of furnace -5%

(x) Non erection of landing at any desired level at water wall @2% per landing. Landing should be given at minimum 10 places.
(xi) For incomplete cup lock @ 0.5% per mtr.
(xii) Non erection of scaffolding (complete sealing of furnace at about 36 mtr.)-10%.
(xiii) Non provision of safety nets – 2% per level (atleast 2 locations).

Note:

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

Scope Table

Description-	Replacement as existing / Modifications	Work Scope Description
Economiser	Redesigned with plain tube economiser coils	Inlet / intermediate headers, coil assemblies & shielding/baffles.
Water walls	Repair / Replacement	1200 RMS of water wall tube, Burner panel assembly, Gooseneck bend tubes, Bottoms "S" panel tubes with wear bar and Water Wall Platen coil.
Steam cooled wall	Redesigning of partial SCW to accommodate LTSH inlet header along with SCW rear side. Repair / Replacement	SCW panels as required for modification, SCW headers and 300 RMS of tubes for repair.
Radiant roof	Replacement	All the roof tubes
LTSH	Redesigned with two banks to accommodate modified economiser	LTSH headers (SH8 & SH9), Coil assy, connecting (terminal tubes) tubes, SS Shielding (cassettes).
Attemperators & Spray system	Modification	SH / RH attemperator assembly, spray control station valves.
Platen SH	Modification	Platen Super Heater Pendent coils assembly with upgraded material.
Final SH	Modification	Final super heater coils with upgraded material.
Reheaters	Modification	Re-designed RH coils with upgraded material and in/out headers.

Soot blowers	Replacement of LRSB's	Long Retractable soot blowers complete system
Valves	Replacement	Ref List - 1
Pent House	Replacement	20 no of Hangers / tie-rods, skin casing of existing design, refractory, pent house casing and boiler roof sheeting.
Coal feeders	Modification	New Gravimetric feeders to meet the mill capacity
Pulverized Coal Piping	Modification	PC piping along with ceramic lined bends/orifices for the upgraded mills.
Coal burners / Wind box	Modification	Wind box with burners, secondary air dampers, HEA Igniters, scanners.
Ducts	Replacement / modification	Air ducts , FG ducting from economiser outlet to ESP, ID system ducting for new layout, metallic expansion joints
Floor Grills and Platforms	Repair/ Replacement	12 MT of materials for repair/ replacement.
Igniter and Scanner air fan	Modification	New scanner cum gun cooling air fan. Since HEA igniters are offered, no igniter fan is required
Fuel oil system	Modification	Pneumatic valves for complete replacement of the Hydro motor valves and New oil gun.

Auxiliary steam PRDS (Existing from MS line)	Replacement
Hangers and Supports	Replacement
APH	New APH to take care of higher output as per tender requirement.
Coal Mills	Modification
Dampers	Replacement of Gates and dampers
FD Fan	Overhauling

Auxiliary steam PRDS – Additional system from CRH line	Addition
Pent house: - Hydro ejector system for pent house cleaning.	Addition
Bottom ash hopper	Replacement

Package/product	**Work Scope Description**
Boiler drum	Services like cleaning and inspection of boiler drum.
	Replacement of drum internals like steam separators, supply points, isolation valves for gauge glass and level indicators, diamond springs and supports.
Water wall	Scope of services like Thickness survey and corrosion mapping.
Steam cooled wall	Scope of services like Thickness survey.
Radiant roof	Arrangement of hooking sky climber for water wall cleaning & inspection to be revived.
LTSH	Scope of services like erosion and thickness measurement.
Platen super heater	Hangers & supports to be checked for proper loading and alignment.
Final super heater	Hangers & supports to be checked for proper loading and alignment.
Valves	As per the list of valves enclosed in the table1
PC piping	PC pipe supports additional required.
Mill	Replacement of the seal air filter in the seal air piping.
	Air flow measurement in the seal air piping.
Mill	Motors for the mills that are being replaced by the XRP 803.
Mill	Lube oil system requirements.

PC piping	Coal flow measurement arrangement in each line.

RLA/CA scope of work balance test to be carried out in Koradi # 6 Boiler

SL.No	Component Name	Tests Required
1.0	Eco outlet header	Internal inspection through video scope
2.0	Water Wall Bottom ring header	Internal inspection through video scope
3.0	WW outlet headers, WW	Internal inspection through video scope
4.0	Roof inlet & outlet headers, Steam cooled wall inlet headers, Extd. SCW inlet and outlet headers, Junction header.	Internal inspection through video scope
5.0	Water wall	a) Visual inspection.
		b) Dimensional measurement
		c) Tube sampling for deposit and metallurgical analysis
6.0	Extd. Water wall	Tube sampling for metallurgical analysis
7.0	SCW & Extd. SCW, SH Hanger and screen tubes	Tube sampling for metallurgical analysis
HIGH TEMPERATURE HIGH THICKNESS PRESSURE PARTS:		
8.0	LTSH Outlet header	Internal inspection through video scope
9.0	Platen SH inlet & Outlet Headers	Internal inspection through video scope
10.0	Final SH inlet & outlet headers	Internal inspection through video scope
11.0	SH DESH Links, PLSH to FSH links.	Internal inspection through video scope on link pipes

Tube sampling:

Area	Qty (Nos)
Water wall at high heat zone	4
Extd water wall	1
Steam cooled wall	2

Extd. Steam cooled wall	1
Total	**8 Nos**

Note:

1 For thickness measurement in water wall area (sl No.8), Video scopes inspection of the Water wall platen inlet header scaffolding is required inside the furnace from bottom of the furnace to WWW platen coil area.

2. Riser tube/Saturated steam link pipe cutting is required for Video scopes inspection of water wall platen outlet header, Roof inlet header, WW screen header, Junction header etc.

FACILITIES IN THE SCOPE OF CONTRACTOR / BHEL (SCOPE MATRIX)

Sl.No	Description	Scope to be taken care by		Remarks
	PART I	**BHEL**	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	FOR CONSTRUCTION PURPOSE:			
A	Open space for office	Yes		
B	Open space for storage	Yes		
C	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
D	Fire fighting equipments like buckets, extinguishers etc		Yes	
3.1.2	FOR LIVING PURPOSES OF THE BIDDER			
A	Open space		Yes	
B	Living accommodation		Yes	
3.2	**ELECTRICITY**			
3.2.1	Electricity For construction purposes (to be specified whether chargeable or free)			
3.2.2	Single point source	Yes		Free for construction purpose.
3.2.3	Further distribution for the work to be done which include supply of materials and execution		Yes	
3.2.4	Electricity for the office, stores, canteen etc of the bidder which include:		Yes	
3.2.4.1	Distribution from single point including supply of materials and service		Yes	

Sl.No	Description	Scope to be taken care by		Remarks
	PART I	**BHEL**	**Bidder**	
3.2.4.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	
3.2.4.3	Duties and deposits including statutory clearances for the above		Yes	
3.2.4.4	Living facilities for office use including charges		Yes	
3.2.4.5	Demobilization of the facilities after completion of works		Yes	
3.2.4.6	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
3.3	**WATER SUPPLY**			
	For construction purposes:			
3.3.1	Making the water available at single point	**YES**		
3.3.1.1	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.1.2	Water supply for bidder's office, stores, canteen etc		Yes	
3.4	**LIGHTING**			
	For construction work (supply of all the necessary materials) At office storage area At the preassembly area At the construction site /area		Yes	
3.5	**COMMUNICATION FACILITIES for site operations of the bidder**	**-**		

Sl.No	Description PART I	Scope to be taken care by		Remarks
		BHEL	Bidder	
	Telephone, Fax, internet, intranet, email etc		Yes	
3.6	**COMPRESSED AIR SUPPLY**			
3.6.1	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc	Yes		
3.6.1.1	Installation of above system and operation & maintenance of the same	-	Yes	
3.6.1.2	Supply of the all the consumables for the above system during the contract period		Yes	

Sl.No	Description PART II	Scope to be taken care by		Remarks
		BHEL	Bidder	
3.1	**ERECTION FACILITIES**			
3.1.1	**Engineering works for construction**			
3.1.1.1	Providing the erection drawings for all the equipments covered under this scope	Yes		
3.1.1.2	Drawings for construction methods		Yes	In consultation with BHEL
3.1.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes	Yes	Yes	,,
3.1.1.4	Shipping lists etc for reference and planning the activities	Yes		”

Sl.No	Description PART II	Scope to be taken care by		Remarks
		BHEL	Bidder	
3.1.1.5	Preparation of site erection schedules and other input requirements		Yes	”
3.1.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	**Yes**	Yes	
3.1.1.7	Weekly erection schedules		Yes	
3.1.1.8	Daily erection / work plan based		Yes	For daily monitoring meeting at site
3.1.1.9	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	
3.1.1.10	Preparation of preassembly bay		Yes	

OPEN SPACE

Open space for building of temporary office shed, contractor’s stores shed(s) will be provided free of hire charges. Contractor has to make his own arrangements for labor colony.

ELECTRICITY

The contractor shall be provided with free supply of Electricity for the purpose of execution of work at single point only at work site. For further distribution contractor shall make his own arrangements. Electricity for all other services if required will be provided on **chargeable basis** as per norms.

a) Consumption charges as per norms
b) Any dispute regarding consumption, BHEL engineer’s decision is final.

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

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

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

T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

4.1 The following minimum major Tools & Plants shall be deployed by the contractor:

Sl. No	DESCRIPTION OF EQUIPMENT	CAPACITY	MINIMUM QUANTITY	REMARKS
01	Tyre Mounted Telescopic Crane	75 T	01	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
02	PICK AND CARRY CRANE	12 T	02	TO BE DEPLOYED FROM BEGINNING FOR START OF DISMANTLING TILL COMPLETION
03	SELF DRILLING CUM TAPPING MACHINE FOR SCREWS OF FLOOR GRILL & ROOF SHEETING	AS REQUIRED	02	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
04	3 ph DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWING CONSTRUCTION POWER, FITTED WITH ENERGY METER	AS Required	As required	AS REQUIRED AND AS PER INSTRUCTION OF BHEL ENGINEER
05	WELDING GENERATOR (ELECTRIC & DIESEL)	300 AMPS	AS REQUIRED	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
06	ELECTRIC WINCH	1 TON / 2 TON / 3 Tons / 5TON	10 (TOTAL)	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
07	ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER	AS REQUIRED	AS REQUIRED	TO BE DEPLOYED FROM BEGINNING OF START OF MATERIAL HANDLING TILL COMPLETION
08	BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR BAKING COATED WELDING ELECTRODES	AS REQUIRED	01 SET EACH	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
09	PORTABLE OVEN FOR COATED WELDING ELECTRODES	AS REQUIRED	05 SET	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
10	TIG WELDING SETS	AS REQUIRED	SUFFICIENT QUNTITY	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
11	PIPE CUTTING AND BEVELLING MACHINE	AS REQUIRED	AS REQUIRED	TO BE DEPLOYED AT APPROPRIATE STAGE OF

				WORK AS PER INSTRUCTION OF BHEL ENGINEER
12	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS	AS REQUIRED	AS REQUIRED	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
13	PIPE CUTTING AND BEVELLING MACHINE	AS REQUIRED	AS REQUIRED	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
14	PIPE BENDING M/C (ELECTRIC/ ELECTRO- HYDRAULIC)	UPTO 4" SIZE	AS REQUIRED	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
15	AIR COMPRESSOR	120 CFM	1 NO	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
16	STEP DOWN TRANSFORMER	230V/24V	AS REQUIRED	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
17	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER	AS REQUIRED	AS REQUIRED	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
18	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS	AS REQUIRED	AS REQUIRED	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
19	TRAILER WITH PRIME MOVER	ADEQUATE CAPACITY	AS REQUIRED	WHILE FURNISHING THE DEPLOYMENT PLANS FOR THESE ITEMS, THE NEED FOR TRANSPORT OF MATERIAL RECD ON GODOWN DELIVERY BASIS IS TO BE KEPT IN VIEW. VEHICLES DEPLOYED SHOULD HAVE VALID STATUTORY DOCUMENTS AT ALL TIMES
20	TRUCK	9 MT	1 NO	
21	SLINGS, 'D'-SHACKLES, HYDRAULIC JACKS, ETC.	AS REQUIRED	AS REQUIRED	WITH TEST REPORTS

4.2: MEASURING AND MONITORING DEVISES (MMD)

01. Taper gauge, slip gauge set, depth gauge and depth micrometer.
02. Feeler gauge sets, feeler strips of 0.03 to 0.10 mm size.
03. One set of 2 meter long feeler gauge strips (0.05 to 1.0 mm).
04. Dial indicators with magnetic bases (at least 2 dials of diameter 40 mm travel – 5 mm).
05. Micrometers (inside and outside up to 300 mm, 450mm, 600mm & 1000mm).
06. Telescopic gauge (2 sets). Bevel protractor and combination sets.
07. Try square.
08. Set of parallel blocks/ V blocks.
09. Vernier calipers, (150 and 500 mm), measuring steel tapes and 5 meters steel rulers.
10. Precision spirit level (with micro head).
11. 2 sets of D.E. and Ring spanners (6-36mm).
12. 2 sets of ox spanners (6 to 20mm and 22-50mm).
13. Allen keys of various sizes (from 2mm. onwards).
14. D.P.Test Kit (with consumables).
15. Crowbars tin cutters, pliers (cutting plier, nose plier grip plier circlip-outside and inside).
16. Screw drivers and sledge hammers – 10 lbs – 1 lbs.
17. Adjustable wrenches, pipe wrenches and heck saws.
18. Single ended spanners (36 Mm and above).
19. Flat, half round, triangular bearing scrappers-8”, to 12”.
20. Files flat round, half round and square, rough and smooth (sizes 6”, 9” and 12”).
21. Bench Grinders, straight grinders GQ4 and GQ6, Angle grinders.
22. Reamers upto 30 mm. Taper reamers.
23. Drilling machine with magnetic stand upto –30 mm with drill bits.
24. Flexible grinders with grinding stones and cutters of different Shapes and sizes, Angles Grinders and Sander machine.
25. Number punch, letter punch, centre punch and hole punches etc.
26. Steel wire brushes, wire brush wheels, nylon wire brushes and Painting bushes.
27. Reamers and honing tools with proper jigs and fixtures for carrying out coupling hole Reaming /honing.
28. Lifting devices eye bolts, D-shackles, slings of various sizes Guide rods etc.
29. Chain pulley blocks upto 5 tons, 2 tons pull/lift.
30. Copper/Brass rods dia. ½” to 1 ½”X450 mm.

31. Tap and die sets 6 to 36 mm.
32. Surface plate 450 X 450 mm.
33. Torch light/hand lamps with cables, 230/24 V transformer.
34. Torque wrench and torque multiplier.
35. Wooden mallet, Nylon Mallet.
36. Hand glover-asbestos, Manila rope, asbestos cloth leather and Rubber gloves.
37. Set of needle files.
38. Air blower – electric.
39. Electric drills – ¼", ½", and 5/8".
40. Ball pen hammer of various sizes.
41. Gas cutting and heating set with torches regulators, hoses and cylinder minimum two sets).
42. Arc welding generator/rectiformers with regulator, cables, Electrode holders and shields, TIG welding holders.
43. Pneumatic – grinders.
44. Hose pipes for compressed air.
45. Bench vices.
46. Hydraulic jacks 5, 10, 25, 50 & 150 tons capacity and screw jacks- 5 to 10 tons.
47. Hydraulic pump for testing coolers and 500 V megger.
48. Electric switchboards and flood light arrangements with fuse boxes and isolating switches, Plugs and sockets.
49. In addition to above T and P contractor will be required to fabricate fixtures such as pullers etc. for removal of any other equipments related to the scope of work.
50. Pedestal fans/air coolers.
51. Wooden sleepers.
52. Wooden Planks.
53. Magnifying glass.
54. Plastic helmets, Fiber helmet.
55. Gas cutting/welding goggles, grinding goggles.
56. Bearing pullers.
57. Tarpaulin.
58. Insulation testers and Meggers 500 V and 1000 V at least 1 No. each.
59. Any other T and P as per requirement and as per our General and special conditions of Contracts.
60. Digital Multimeter
61. Analogue multimeter of Motwane make
62. Scaffolding materials

The above list is tentative. The contractor has to provide required type and capacity of T&P, cranes/lifting tools for satisfactory completion of work.

4.2.1:-SCAFFOLDING MATERIALS

(A) THE CONTRACTOR SHALL PROVIDE ALL THE NECESSARY SCAFFOLDING MATERIALS, TEMPORARY STRUCTURES AND NECESSARY SAFETY DEVICES ETC, DURING ALL STAGES TILL COMPLETION OF WORK. SCAFFOLDING MATERIALS (MS PIPES, 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. IT IS TO BE SPECIFICALLY NOTED THAT NO WOOD OR ANY SUCH OTHER INFLAMMABLE MATERIAL WILL BE PERMITTED TO BE USED FOR ABOVE APPLICATIONS. ANY SUCH USE ON EACH OCCASSION SHALL INVITE LEVY OF PENALTY AS DEEMED FIT BY BHEL ENGINEER.

(B)

(i) CONTRACTOR SHALL DEPLOY A MINIMUM OF 6000 NOS OF SCAFFOLDING MS PIPES (SIZE NOMINAL BORE – 40 mm, LENGTH: 6M EACH) WITH NECESSARY CLAMPS AND FITTINGS.

(i) THESE SHOULD BE DEPLOYED OVER A PERIOD OF 2 MONTHS FROM THE START OF WORK (REFER APPENDIX-IV) OUT OF WHICH 4000 PIPES WITH ASSOCIATED CLAMPS AND OTHER FITTINGS/ FASTENERS SHALL BE DEPLOYED WITHIN THE FIRST MONTH OF START OF WORK

(iii) BHEL WILL IMPOSE PENALTY FOR ANY SHORTFALL IN QUANTITY, OF PIPE AND ASSOCIATED PAIR OF CLAMPS, FROM THE END OF MONTH IN WHICH THE SPECIFIED QUANTITY IS SCHEDULED TO BE FULLY INDUCTED IN RESPECTIVE UNIT. THE RECOVERY WILL CONTINUE TILL THE SHORTFALL IS MADE GOOD. THIS PROVISION WILL BE APPLICABLE TILL THE COMPLETION OF WORK. PENALTY WILL BE IMPOSED AT THE RATE OF Rs.15/- PER PIPE AND ASSOCIATED PAIR OF CLAMPS PER MONTH ON PRO-RATA BASIS.

(iv) IN CASE ADDITIONAL INDUCTION OF SCAFFOLDING PIPES WITH ASSOCIATED PAIR OF CLAMPS IS NECESSITATED OVER AND ABOVE THE TOTAL QUANTITY SPECIFIED FOR UNITS.THEN, BHEL WILL MAKE ADDITIONAL PAYMENT @ Rs. 15/ PER PIPE WITH ASSOCIATED PAIR OF CLAMPS PER MONTH OF INDUCTION. ANY SUCH ADDITIONAL INDUCTION SHALL BE DONE BASED ON WRITTEN INSTRUCTIONS FROM BHEL. SIMILARLY THESE SHOULD BE DEMOBILIZED ON WRITTEN ADVICE FROM BHEL.

(C) WHEN ADDITIONAL INDUCTION OF SCAFFOLDING PIPES AND CLAMPS IS REQUIRED DURING EXTENDED PERIOD OF CONTRACT, FOLLOWING METHOD SHALL BE APPLICABLE:

(i) DURING EXTENSION ATTRIBUTABLE TO THE CONTRACTOR NO ADDITIONAL PAYMENT WILL BE MADE.

(ii) DURING EXTENSION ATTRIBUTABLE TO BHEL ADDITIONAL PAYMENT WILL BE MADE AS STIPULATED AT B(iv) ABOVE.

(D) FOR WORKING IN OVERHEAD POSITION AT HIGH ELEVATIONS CONTRACTOR SHALL ARRANGE NON-COMBUSTIBLE LIGHT-WEIGHT AND STURDY PLATFORM MATERIALS.

NOTE:

1. As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction site due to inherent power shortage in state; it shall be the responsibility of the contractor to have minimum numbers of diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by the bidders at their cost. No separate payment shall be made for this contingency.

2. Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work

3. All the T&Ps required for this scope of work, except the T&Ps provided by BHEL are to be arranged by the contractor within the quoted rates.

4. Also refer relevant clauses in SCC

5.0 T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

List of T&P's to be made available by BHEL to contractor free of hire charges on sharable basis.

Sl. No	DESCRIPTION OF EQUIPMENT	CAPACITY	MINIMUM QUANTITY	REMARKS
1	Tyre Mounted Telescopic Crane	Tyre Mounted Crane-150 T	AS REQUIRED	IT MAY BE USED ON REQUIREMENT BASE

5.1 FACILITIES TO BE PROVIDED BY BHEL

5.1.1SPACE FOR SITE OFFICE / STORES

5.1.2CONSTRUCTION POWER & WATER

5.1.3 **OTHER MATERIALS AND CONSUMABLES:**

BHEL SHALL NOT PROVIDE ANY MATERIAL / CONSUMABLES EXCEPT THOSE SPECIFICALLY MENTIONED AS BHEL SCOPE IN THESE SPECIFICATIONS.

5.1.4MATERIALS FOR IBR WELDER SITE QUALIFICATION TEST (PIPES)

BHEL WILL PROVIDE ONLY THE TUBES/PIPES FREE OF CHARGES FOR PREPARATION OF TEST PIECES FOR CONDUCTING THE SITE QUALIFICATION TEST OF HIGH PRESSURE IBR WELDERS. CONTRACTOR SHALL PREPARE THE REQUIRED TEST PIECES FROM SUCH RAW MATERIALS. CONTRACTOR SHALL ARRANGE ALL THE MATERIALS AND PREPARE TEST COUPONS FOR SITE QUALIFICATION TEST OF ALL OTHER WELDERS.

5.2 FILLER WIRE FOR TIG WELDING AND WELDING ELECTRODES FOR WELDING OF T-91/P-91 MATERIAL TUBES/PIPES

5.3 EQUIPMENTS – TOOLS & PLANTS

BHEL WILL MAKE AVAILABLE T&P LISTED IN THE RELEVANT APPENDIX FREE OF CHARGE. FURTHER DETAILS ARE AS UNDER:

5.3.1 CRANES TO BE PROVIDED BY BHEL

5.3.1.1
BHEL WILL MAKE AVAILABLE THE CRANES (AS PER RELEVANT APPENDIX) FREE OF CHARGE TO THE CONTRACTOR ON SHARING BASIS MAINLY FOR THE PURPOSES ENUMERATED VIDE NOTES IN THE ABOVE REFERRED APPENDIX. BHEL CRANES HAVE TO BE SHARED WITH OTHER AGENCIES / CONTRACTORS OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR.

5.3.1.2
CONTRACTOR SHALL LAY NECESSARY SLEEPER BEDS, BACKFILLING OF APPROACHES WHEREVER NECESSARY FOR SAFE MOVEMENT OF THE CRANES AS DIRECTED BY BHEL. CONTRACTOR SHALL TRANSPORT THE EQUIPMENTS AND COMPONENTS/SUB ASSEMBLIES/ATTACHMENTS OF BHEL EQUIPMENTS TO & FRO BETWEEN BHEL STORES AND SITE.

5.3.1.3
CRANES, INCLUDING THE CRANES HIRED BY BHEL, WILL BE INITIALLY ISSUED IN BASIC ASSEMBLED CONDITION. ANY ALTERATION/ADDITION LIKE BOOM REDUCTION/EXTENSION, ASSEMBLY OF COMPONENTS/SUB-ASSEMBLIES NEEDED FOR MODULATING THE CAPACITY/REACH/OTHER FEATURES OF CRANES AND RESTORATION TO THE STATE AS DIRECTED BY BHEL SHALL BE THE CONTRACTOR'S RESPONSIBILITY. ALSO REFER SECTION-5 IN THIS REGARD.

5.3.1.4
THE DAY-TO-DAY UPKEEP AND RUNNING MAINTENANCE LIKE FILLING / TOPPING UP OF LUBRICANTS, CHANGING FILTERS ETC, OF BHEL CRANES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SPARES IF ANY, REQUIRED IN NORMAL COURSE WILL BE PROVIDED BY BHEL. MAJOR BREAKDOWNS WILL BE ATTENDED TO BY BHEL. FOR HIRED CRANES THESE RESPONSIBILITIES WILL BE IN THE SCOPE OF CRANE HIRING AGENCY. THE CRANES PROVIDED BY BHEL (INCLUDING THE HIRED CRANES) WILL BE WITHDRAWN FOR REGULAR AND CAPITAL MAINTENANCE AS PER THE RESPECTIVE SCHEDULE OF MAINTENANCE. AS FAR AS POSSIBLE SUCH SCHEDULES WILL BE INTIMATED TO THE CONTRACTOR IN ADVANCE AND MAY BE ADJUSTED DEPENDING ON THE WORK REQUIREMENTS AT SITE. HOWEVER NO CLAIM WHATSOEVER WILL BE ENTERTAINED ON ACCOUNT OF NON-AVAILABILITY OF CRANE(S).

5.3.1.5
CONTRACTOR SHALL PROVIDE FUEL FOR THE CRANES PROVIDED BY BHEL FOR HIS USE. OPERATOR FOR HIRED CRANES WILL BE PROVIDED BY THE CRANE HIRING AGENCY OF BHEL.

5.3.1.6
WHERE THE SERVICES OF THE CRANES PROVIDED BY BHEL ARE TO BE SHARED BY OTHER AGENCIES/ CONTRACTORS OF BHEL, THE CONTRACTOR'S RESPONSIBILITIES DEFINED ABOVE WILL ALSO BE APPORTIONED ACCORDINGLY TO THE BENEFICIARY AGENCY. WORKING ARRANGEMENTS IN THIS REGARD WILL BE DONE AT SITE BY BHEL ENGINEER AND IN ANY CASE HIS DECISION SHALL BE FINAL AND BINDING.

5.4 OTHER T&P

5.4.1
THE RESPONSIBILITIES OF CONTRACTOR DEFINED ABOVE FOR BHEL CRANES SHALL ALSO BE APPLICABLE, MUTATIS – MUTANDIS, IN RESPECT OF OTHER TOOL & PLANTS PROVIDED BY BHEL.

5.4.2
CHEMICAL CLEANING EQUIPMENTS PROVIDED BY BHEL WILL HAVE TO BE RETURNED AFTER USE TO BHEL AFTER DUE SERVICING AND PRESERVATION.

5.4.3
SPECIAL TOOLS WHICH ARE SUPPLIED BY BHEL AS PART OF MAINTENANCE TOOLS TO BE HANDED OVER TO CUSTOMER UNDER REGULAR DU / DESS NUMBERS IN VARIOUS PRODUCT GROUPS MAY BE ISSUED TO THE CONTRACTOR FREE OF CHARGES FOR SPECIFIC ACTIVITIES, AT THE DISCRETION OF BHEL. CONTRACTOR SHALL RETURN THEM AFTER THE COMPLETION OF THE SPECIFIC ACTIVITY FOR WHICH THE TOOLS WERE SPARED, IN GOOD WORKING ORDER.

5.4.4
LUBRICANTS LIKE ENGINE OIL, CARDIUM COMPOUND, HYDRAULIC OIL, GEAR OIL, AND GREASE ETC FOR HIRED CRANES WILL BE PROVIDED BY THE CRANE HIRING AGENCY. SIMILARLY FILTERS FOR HIRED CRANES WILL BE PROVIDED BY THE CRANE HIRING AGENCY.

5.4.5
THE CONTRACTOR MUST NOT USE THESE EQUIPMENTS FOR ANY PURPOSE OTHER THAN WHAT THEY ARE INTENDED FOR.

5.4.6
IF THE ABOVE ITEMS ISSUED TO CONTRACTOR ARE FOUND NOT UTILISED / NOT MAINTAINED TO THE SATISFACTION OF BHEL ENGINEER OR MISUSED, THESE WILL BE WITHDRAWN AND NO REPLACEMENT WILL BE DONE FOR SUCH ITEMS.

7.4.7
REQUIRED TEMPORARY STRUCTURAL STEEL, PIPES & FITTINGS, VALVES FOR CONDUCT OF HYDRAULIC TEST, CHEMICAL CLEANING / STEAM BLOWING / OIL FLUSHING / ACID CLEANING ETC SHALL BE PROVIDED BY BHEL.

TIME SCHEDULE

1.6 TIME SCHEDULE

1.6.1 INITIAL MOBILIZATION AND TENTATIVE SCHEDULE

CONTRACTOR SHALL REACH SITE WITHIN THREE WEEKS FROM THE DATE OF FAX LETTER OF INTENT, MAKE HIS SITE ESTABLISHMENT AND BE READY TO COMMENCE THE WORK AS PER DIRECTIONS OF BHEL ENGINEER.

THE CONTRACTOR HAS TO SUBSEQUENTLY AUGMENT HIS RESOURCES IN SUCH A MANNER THAT THE ENTIRE WORK IS COMPLETED TO ACHIEVE THE FOLLOWING SCHEDULE:

SN	MAJOR MILESTONE	TENTATIVE COMPLETION SCHEDULE FROM START OF BOILER ERECTION
01	BOILER DISMANTLING START	1st MONTH
02	BOILER ERECTION START	2th MONTH
03	BOILER HYDRAULIC TEST	5th MONTH
05	BOILER LIGHT UP	6th MONTH
07	STEAM BLOWING COMPLETION & SAFETY VALVE FLOATING	7th MONTH
09	SYNCHRONIZATION	8th MONTH
10	TRIAL OPERATION COMPLETION	9th MONTH

1.6.1.1 The entire work of carrying out Replacement/Erection, overhauling, Testing, commissioning and Application of Insulation/cladding including painting for Unit-6 of 210 MW Boiler at MSPGCL -Koradi Thermal Power Station-Koradi, Maharashtra as detailed in the Tender Specification shall be completed within 10 (Ten) months from the date of commencement of work at site.

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

1.6.1.3 The erection work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The

decision of BHEL in this regard shall be final and binding of the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

1.6.2 COMMENCEMENT OF CONTRACT PERIOD

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

1.6.3 MOBILISATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

The activities for erection, testing etc shall be started as per directions of BHEL Engineer. The contractor has to augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:

Expected Erection start for work: **16- Aug ’2015**

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.

In case any requirement is there to compress the schedule of activities to achieve project completion, then the additional expenses if any incurred will be discussed mutually and settled. BHEL decision in this regard is final and the issue is not arbitral.

1.6.4 CONTRACT PERIOD

The contract period for completion of entire work of Boiler shall be 10 (Ten) months from the “COMMENCEMENT OF CONTRACT PERIOD” as specified earlier.

1.6.5 GUARANTEE PERIOD

Shall be applicable as per GCC conditions.

TERMS OF PAYMENT

7.0 TERMS OF PAYMENT

7.0.1
The contractor shall submit his monthly RA account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar month. However, first RA Bill shall be released only after signing of Contract Agreement.

7.0.2
Release of payment in each Monthly running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter.
The 5% thus remaining shall be on account of workmanship guarantee of work executed. The same will be released after completion of the guarantee period of **12 months** from the date of completion of entire work as certified by BHEL.

However, on specific request of vendor, this amount may be released on pro rata basis for the value of work executed and accepted by BHEL, along with any RA Bill and onwards, subject to receipt and acceptance of bank guarantee of equal amount in BHEL's prescribed format. The BG shall be kept valid till completion of such guarantee period and an additional six months claim period. This is also subject to the condition that the contractor has started the work and also furnished/remitted the initial Security Deposit as per contract.

7.0.3
The payment for running bills will normally be released within around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

7.0.4
BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, the following details are to be furnished by the Contractor pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker:

1. Name of the Company
2. Name of Bank
3. Name of Bank Branch
4. City/Place
5. Account Number
6. Account type
7. IFSC code of the Bank Branch
8. MICR Code of the Bank Branch

BHEL may also choose to release payment by other alternative modes as suitable.

Progressive Payment against monthly running bills will be made on Pro-rata basis and payments against stage / milestones events shall be as per the following table.

7.1
7.1.1 : DISMANTLING WORK:

Cl No:	Description	Rate Schedule
	PRO RATA PAYMENTS (95%)	%
	Area cleaning, temporary structures cutting	
I.7.1.1	Completion of Dismantling work	70
I.7.1.2	Satisfactory completion of Dismantling work in all respects	5
	STAGE/MILESTONE PAYMENTS	
1.7.2.3	Area cleaning, temporary structures cutting/removal and return of scrap	15
1.7.2.4	Punch List points/pending points liquidation	5
1.7.2.6	Completion of Contractual Obligation	5
	TOTAL FOR STAGE/MILESTONE PAYMENTS	**25**
	TOTAL I + II	**100**

7.1.2 : ERECTION / RETROFITTING WORK:

Cl No:	**Description**	Rate Schedule
	PRO RATA PAYMENTS (95%)	**%**
I.7.2.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION SHALL BE CLUBBED WITH PLACEMENT IN POSITION)	15
I.7.2.2	PLACEMENT IN POSITION	30
I.7.2.3	ALIGNMENT	15

I.7.2.4	WELDING/BOLTING/FIXING	10
I.7.2.5	NDT/RT/HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	10
1.7.2.6	Painting	5
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	**85**
	STAGE/MILESTONE PAYMENTS	
1.7.2.7	Hydro Test	2
1.7.2.8	Light up	2
1.7.2.9	Chemical Cleaning	2
I.7.2.10	Steam Blowing/Safety Valve Floating	2
I.7.2.11	Synchronization	2
1.7.2.12	PG Test completion	1
1.7.2.13	Trial Operation of Unit	1
1.7.2.14	Punch List points/pending points liquidation	1
1.7.2.15	Material Reconciliation	1
1.7.2.16	Completion of Contractual Obligation	1
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	**15**
	TOTAL I + II	**100**

7.1.3: Cleaning/ Overhauling/ Repair /Re-alignment/Servicing of Boiler

Cl No:	Description	Rate Schedule
	PRO RATA PAYMENTS (95%)	%
I.7.3.1	Erection and commissioning of cup lock scaffolding	10
1.7.3.2	Scaffolding between platen super heater & re-heater	4
1.7.3.3	Scaffolding at platen water wall	4
1.7.3.4	Scaffolding at Arch/Screen tubes, SCW hangers	2
1.7.3.5	Cleaning of boiler inside & outside	10
1.7.3.6	Removal of Ash from Pent House, Dead Chamber & from various zones, ducts &	10

	hoppers etc	
1.7.3.7	Servicing / repair of all valves of Boiler area, all drum mountings/fittings, vents, drains, oil lines	10
1.7.3.8	Servicing / repair of connecting links of buck stay beams & EQ restraints and boiler sliding supports	5
1.7.3.9	Repair /realignment/Servicing of Boiler Pent house header supports	5
1.7.3.10	Repair /realignment/Servicing of manholes, peep holes, doors.	5
1.7.3.11	Repair of damaged portion of dog house, cat house including supports.	5
1.7.3.12	Completion of Overhauling work for all required boiler components including FD Fans	10
1.7.3.13	Punch List points/pending points liquidation	5
1.7.3.14	Area cleaning, temporary structures cutting/removal and return of scrap	10
1.7.3.15	Completion of Contractual Obligation	5
	TOTAL I + II	100

Note:

1. In case any requirement is there to compress the schedule of activities to achieve project completion, then the additional expenses if any incurred will be discussed mutually and settled. BHEL decision in this regard is final and the issue is not arbitral.
2. Recovery of Retention amount as per Cl. 2.22 of GCC.
3. RA bill payments as per Chapter-X of SCC
4. Payment for the first running bill will be released only on production of the following.
   i. PF Regn. No.
   ii. Labour License No.
   iii. Workmen Insurance Policy No.
   iv. Unqualified Acceptance for Detailed L.O.I.
   v. Initial 50% Security Deposit.

   Rs 100 /- Stamp Paper for Preparation of Contract agreement.

8.0 TAXES, DUTIES, LEVIES (Consolidated Rev 04 dated 14/05/2015)

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 14 %) 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.

8.4 BOCW Cess

The quoted rates shall be exclusive of the BOCW Cess which shall be paid extra by BHEL against Documentary evidence. However, the applicability of the BOCW Cess shall be got confirmed from BHEL in writing, before remitting such Cess/tax.

8.5 GST: As and when GST becomes applicable to this contract, the net differential (negative or positive) financial liability of the bidder to the Authorities (as compared to such liability prior to applicability of GST), if any, shall be to the account of BHEL. For this purpose, all available options under the GST shall be explored, and the decision of BHEL in this regard shall be final and binding on the bidder.

WEIGHT SCHEDULE

KORADI R&M - WT. DETAILS					
AREA WISE WT. DETAILS					
1	**Boiler**	Structures	1000	MT	
2	**Boiler**	Pressure Parts	1257	MT	
3	**Boiler**	Non Pressure Parts	1455	MT	
4	**RM**	Rotating Machines (FD Fans Mills, etc and aux)	174	MT	
5	**RM**	Air-preheater	496	MT	
6	**PIPING**	Piping-Hangers and Supports	69	MT	
7	**INSULATION**	Wool Mattress, Iron parts, Aluminum Cladding sheets, Pourable and castable	717	MT	
Wt. for Boiler Work			**5167**	**MT**	
1		**BOILER**			
PG	**MA**	**PGMA Description**	**Weight (Kg)**	Unit wise Wt.(Kgs)	Wt. in Tons
04	988	Drum Gasket	10		
06	400	Burner Panel	16000		
06	637	WW Lower Front Panel	20000		
06	647	WW Lower Rear Panel	20000		
06	896	Waterwall Platen Asssy	19000		
07	226	Rear Arch Tubes	10000		
07	309	Furn Wall Supports - DD	100		
07	401	WW Suspension	1500		
07	423	Furn Screen Tubes - OS	500		
07	561	Furn Wall Supports - SHOP	500		
07	992	Imported Electrodes	10		
08	104	FURNACE INTERMEDIATE BUCKSTAYS	50000		
08	500	FURNACE BACK PASS BUCKSTAYS	80000		
08	900	FURNACE KEY BUCKSTAYS	4000		
09	001	SEAL BOXES FOR FURNACE OPENINGS	500		
09	002	SEAL BOXES FOR INSTRUMENT INSERTS	500		
09	304	Seal Boxes - DD	50		
10	135	Sh Horizontal Spaced Inlet Header	7000		
10	182	BP Rear Inlet Header	3500		
10	282	Rear Pass Sw Outlet Headers	3150		
10	185	BP Boiler Lower Front Header	2800		

11	236	Sh Horizontal Spaced Upper Coil Assy	97000		
11	237	Sh Horizontal Spaced Lower Coil Assy	97000		
11	274	Sh Vertical Spaced Coil	94500		
11	278	Sh Platen Coil Assy	67000		
11	616	BP Rear Upper Panel	17000		
11	618	Steam Cooled Rear Wall Lower Panel	5000		
11	685	Steam Cooled Front Wall Lower Panel	3000		
11	687	Sh Rear Roof Panel	9000		
11	688	Steam Cooled Side Wall Lower Panel	7500		
11	691	SH Radiant Roof Tubes	15000		
12	184	SH.BP.EXTD.SIDE WALL INLET PIPES	400		
12	368	SUSPN OF SH PLATEN COIL ASSY-DD	100		
12	535	LTSH Terminal Tubes	34000		
12	568	SUSPN OF SH PLATEN COIL ASSY-SHOP	3000		
12	803	Steam Cooled Spacers	900		
12	805	Sh Hanger Tubes	4000		
12	852	SH DESH links - Hydro test matl	500		
12	900	Sh Desh	2400		
12	903	Sh Misc Components(Cassette Baffle&Erosion Shields)	34000		
12	917	SH Radiant Roof Supports	3500		
12	924	Suspension of BackPass Headers	15000		
12	927	Sh Rear Roof Support	2600		
12	928	Suspension Of Sh Rear Wall	4000		
12	948	Suspension Of Vertiacal Spaced Coil Assy	14000		
12	968	Suspension Of Platen Assy	10000		
12	992	Imported Electrodes	100		
15	174	RH Inlet Header	5000		
15	274	RH Outlet Header	5000		
16	275	Rh Vert Platen Front Coil Assy	57750		
16	277	Rh Vert Spaced Rear Coil Assy	62900		
17	319	RH Supports - DD	100		
17	519	RH Supports - SHOP	3000		
17	904	RH Header Supports	4000		
17	919	Suspension Of Rh Front Coil Assy	7000		
17	929	Suspension Of Rh Rear Coil Assy	6000		
17	992	Imported Electrodes	70		
18	001	Skin Casing Arrangement	9600		
18	010	Pressure Parts Attachments	1000		
18	301	Skin Casing Arrangement - DD	50		
19	114	Eco Upper Coil Assy	30000		
19	124	Eco Lower Coil Assy	30000		
19	306	ECO. LINES & LINKS SUPPORTS-DD	100		
19	506	ECO. LINES & LINKS SUPPORTS-SHOP	1000		

19	701	Eco Inlet header	6000		
19	753	Eco Intermediate Rear Header	3000		
19	763	Eco Intermediate Front Header	3000		
19	783	Eco Intermediate Center Header	3000		
19	802	Eco Hanger Tube	10000		
19	850	Eco Feed Pipe	3000		
19	904	Eco Header Support above Roof	20000		
19	905	Eco Coil Support Below Roof	2400		
19	907	Eco Feed Pipe Support	500		
19	992	Imported Electrodes	100		
21	600	SOOT BLOWER PIPING AND FITTINGS	4000		
21	601	SOOT BLOWER PIPING SUPPORTS	1000		
21	602	SOOT BLOWER PIPING AND FITTINGS - DD	200		
21	604	SOOT BLOWER PIPING SUPPORTS - OS	3500		
21	605	SOOT BLOWER PIPING SUPPORTS - DD	10		
21	700	BULKED BPS COMPONENT FOR SB PIPING	600		
21	800	SB VALVES (BHEL)	800		
21	825	SB VALVES (SUB-DELIVERY)	325		
21	988	COMMG SPARES FOR SUB DELIVERIES	1		
21	992	IMPORTED ELECTRODES	35		
24	200	BOILER TRIM PIPING AND FITTINGS	25000		
24	201	BOILER TRIM PIPING SUPPORTS	4000		
24	203	BOILER TRIM PIPING AND FITTINGS - DD	300		
24	204	BOILER TRIM PIPING SUPPORTS - OS	6000		
24	213	BOILER TRIM PIPING SUPPORTS - DD	8		
24	220	SAFETY VALVE ESC PIPE & DRAIN - CC RH BLR	500		
24	224	SAFETY VALVE ESC PIPE & DRAIN - CC RH BLR - OS	1000		
24	227	SAFETY VALVE ESC PIPE & DRAIN - CC RH BLR - DD	400		
24	228	SAFETY VALVE ESC PIPE & DRAIN - CC RH BLR - BOI	25		
24	240	SAMPLE COOLER AND SUPPORTS	750		
24	241	SAMPLE COOLER AND SUPPORTS - OS	400		
24	242	SAMPLE COOLER AND SUPPORTS- DD	20		
24	260	VALVES (BHEL) - CC RH BOILER	9000		
24	265	VALVES AND FITTINGS (SD) - CC RH BOILER	5700		
24	273	WATER LEVEL GAUGE (BHEL MAKE)	250		
24	280	ERV AND SAFETY VALVES (BHEL)	3500		
24	316	Rh Desh	1575		
24	700	BULKED BPS COMPONENT FOR TRIM PIPES	200		
24	955	LAPPING TOOLS FOR SV & ERV	75		
24	960	LAPPING TOOLS FOR CONVENTIONAL VALVES (BHEL)	25		

24	987	COMMG SPARES FOR SAFETY VALVES / ERV	2		
24	988	COMMG SPARES FOR IMPORTED SUB DELIVERY	2		
24	989	COMMG SPARES FOR CONVENTIONAL VALVES	20		
24	992	IMPORTED ELECTRODES	25		
24	993	CONSUMABLES AND ERECTION MATERIALS	5		
24	994	NAME PLATES	150		
28	220	DOORS	8500		
28	700	BPS FASTENERS	670		
30	103	SEAL PLATE ASSY	2540		
30	105	FURNACE BOTTOM ENCLOSURE FRAMING	4640		
30	211	FURNACE REAR ARCH ENCLOSURE FRAMING	1600		
30	212	FURNACE EXTD SIDE BOTTOM ENCLOSURE FRA	7670		
30	215	MAIN BOILER	3540		
30	219	VERTICAL ROOF ENCLOSURE FRAMING	39770		
30	220	DECK SUPPORT AND SEALS	19780		
30	224	ANTI VIBRATION BAFFLES	8390		
31	010	SKIN CASING COMPS WELDED TO PRESSURE P	3600		
31	102	FURNACE BOTTOM SKIN CASING	1230		
31	104	FURNACE REAR ARCH SKIN CASING	4980		
31	105	SECOND PASS SKIN CASING	280		
42	001	Pneumatic fittings	150		
42	200	Sub Del. Fuel Oil Systems	1500		
42	700	BPS Fasteners	100		
42	710	Fuel Oil System - DD Items	50		
97	088	ELECTRONIC WATER LEVEL INDICATOR	1400		
97	195	EWLI PRESSURE VESSEL AND ACCESSORIES	260		
97	196	ELECTRODES AND GASKET	6		
97	282	FLOW METERS	510		
97	297	MTM CLAMPS & PADS	40		
97	298	MTM THERMOCOUPLES & JUNCTION BOXES	950		
97	585	ACOUSTIC STEAM LEAK DETECTION SYSTEM	14000		
97	590	ERECTION MATERIALS	1500		
97	591	BURNER TILT SHEAR PIN FAILURE SYS.	56		
97	592	PNEUMATIC TUBINGS FITTINGS & AIR SET	2700		
97	599	PNEUMATIC ACTUATOR IN A & FG SYSTEM	3800		
97	960	EWLI FACE CUTTER TOOL	2		
		Total Pr.Parts	**1256807**		**1257**
32	010	FIXING COMP FOR BLR PR PARTS INSUL	5030		
32	110	FIXING COMP FOR BLR MOUNTINGS INSUL	5900		
32	120	FIXING COMP FOR SB PIPES INSUL	1760		

32	310	FIXING COMP FOR AIR DUCTS INSUL	31960		
32	410	FIXING COMP FOR AH AND GAS DUCTS INSUL	7510		
32	510	FIXING COMP FOR ID DUCTS INSUL	51820		
32	710	FIXING COMP FOR OIL SYSTEM INSUL	1740		
33	021	BLR PR PARTS MINERAL WOOL	101420		
33	121	BLR MOUNTINGS MINERAL WOOL	9000		
33	126	SB PIPES MINERAL WOOL	2850		
33	201	MAIN BLR FORMED REFRACTORY IS8	440		
33	210	MAIN BLR CASTABLE REFRACTORY GR A	85000		
33	230	MAIN BLR POURABLE INSULATION	100000		
33	321	AIR DUCTS MINERAL WOOL	119020		
33	421	AIR HEATER AND GAS DUCTS MINERAL WOOL	31770		
33	521	ID DUCTS MINERAL WOOL	36930		
33	721	OIL SYSTEM MINERAL WOOL	2400		
33	924	MISC EQPTS ASBESTOS MATERIALS	170		
33	970	MISC EQPTS EXPANDED METAL	2000		
33	971	MISC EQPTS WOVEN WIRE CLOTH	520		
33	975	MISC EQPTS SEALING COMPOUND	200		
37	010	BLR OUTER CASING COMPONENTS	13460		
37	810	BLR OUTER CASING	19990		
81	318	FIX COM FOR MISCELLANEOUS PPG INSULATION	6000		
81	325	MINERAL WOOL BONDED	64000		
81	341	SEALING COMPOUND FOR INSULATION	160		
81	350	ALUMINIUM CLADING FOR INSULATION	15600		
		Total Insulation	**716650**		**717**
35	220	Boiler Ceiling Structure-Rolled Beams	30000		
35	230	Boiler Ceiling Structure-Bracings	10000		
35	993	Consumables and erection materials	15000		
36	391	Miscellaneous platforms	65000		
36	392	Miscellaneous platforms	20000		
36	393	Miscellaneous platforms	15000		
36	811	Floor Grills And Guard Plate (Long span floor grill - 32mm)	25000		
36	820	Stairs and Ladders	7500		
36	851	Hand Rails And Posts	5000		
36	993	Consumables and erection materials	12000		
39	012	Foundation Materials I.D.Duct Supports	15000		
39	101	Columns Frames Before Esp- Left	55000		
39	102	Columns Frames Before Esp- Right	55000		
39	141	Cols Frames Near I.D.Fan - Left	125000		
39	142	Cols Frames Near I.D.Fan - Right	125000		

39	150	Col Frames Betn I.D.Fan And Chimney	45000		
39	300	Platforms - External Structure	120000		
39	301	Struc And Platform For Fans	5000		
39	302	Struc For Motor Hood Covering	7500		
39	303	Monorail Beams For Fans	70000		
39	304	Fan Handling Structure For Fd Fan	60000		
39	305	Fan Handling Structure For Pa Fan	45000		
39	700	Hsfg Fasteners For Pg 39	2500		
39	810	Floor Grill	37500		
39	820	Stairs and Ladders	10000		
39	850	Hand Rail And Hand Rail Posts	8000		
39	993	Consumables And Erection Materials	10000		
		Total Structure	**1000000**		**1000**
41	350	Oil gun Assembly Air cooled	812		
41	390	Oil Gun Vice assembly & Rack	840		
41	500	High Energy Arc Ignitor	270		
41	988	Commissioning Spares	3		
43	004	Assy. Scaner & Gun Air system	1600		
43	005	Assy Mill Air System	3000		
43	104	M/C SCNR & Gun Air system	1060		
43	105	M/C Mill air system	1410		
43	200	Sub Del Air system	2810		
43	710	Seal Air & Scanner Air System - DD items	31340		
45	200	Windbox - Sub Delivery	2000		
45	220	Wind Box Support 22-In Width	62190		
45	221	Wind Box Support 22-In Width	3700		
45	710	Wind Box & SOFA Assembly - DD items	170		
45	997	Coal nozzle tips	3900		
47	200	Fuel Piping - Sub-delivery	12000		
47	201	Fuel Piping Supports With 20-In Pipe	9000		
47	203	Pipe Couplings,Orifice & Misc Items	3600		
47	209	St Pipes,Shop Bends for rest of The Mills	240000		
47	710	Pulverised Fuel Piping - DD items	500		
47	858	Fuel Piping - Shop Items	4300		
48	012	Rect Duct Bet FD Fan and Airheater	28200		
48	014	Expn Piecesbet FD Fan and Airheater	600		
48	015	Supportsetcbet FD Fan And Airheater	1450		
48	019	Foundation Materials	2700		
48	112	Rect Ducts PA Fan To Airheater Pri side	48980		
48	114	Expn Pieces PA Fan To Airheater Pri side	300		
48	115	Supports etc PA Fan To Airheater Pri sid	5500		
48	141	Seal Air HAG and ID Fan Out gate	100		
48	142	Rect Duct Coldairbus(Temp Air To Mill	11000		

48	144	Expn Pieces cold airbus(Temp Air To Mill	300		
48	145	Supports etc coldairbus(Temp Air To Mill	2500		
48	200	Instrument Tappings On Ducting	350		
48	202	Rect Ductsairheater To Windbox duct	44000		
48	204	Expn Pieces airheater To Windbox duct	13750		
48	205	Supportsetcairheater To Windbox duct	8250		
48	207	Flowmeters For Secondary Air Flow	3300		
48	212	Wind Box Connecting Ducts - Rectangula	19800		
48	214	Expn Pieceswindbox Connecting Duct	2100		
48	222	Rect Duct-Airheater Pri side to hotair B	39600		
48	224	Expn Pieces airheater Pri sidetohotair B	4950		
48	225	Supports For Hot P.A (AH To Hot Bus)	2750		
48	382	Rect Duct Economiser To Airheater2nop	75000		
48	384	Expn Pieceseconomiser To Airheater2nop	10500		
48	385	Supportsetceconomiser To Airheater2nop	1100		
48	432	Rect Duct Airheater Boiler Outlet-Gas	22000		
48	434	Expn Pieces airheater Boiler Outlet-Gas	400		
48	435	Supports etc airheater Boiler Outlet-Gas	2200		
48	462	Rect Duct Boiler Outlet to ESP	53700		
48	464	Expn Pieces boiler Outlet to ESP	19500		
48	465	BOF To ESP Ducting Supports	14500		
48	482	Rect Ducts-Elec Prptr/M.S to ID Fan	48300		
48	484	Expn Pieceselec Prptr/M.S to ID Fan	13000		
48	485	Supportsetcelec Prptr/M.S to ID Fan	7800		
48	492	Rect Duct ID Fan to Chimney	56700		
48	494	Expn Pieces ID Fan to Chimney	2200		
48	495	ID System Duct Supports	8200		
48	662	Rect Duct Hot Air Bus To Mills	16500		
48	664	Expn Pieceshot Air Bus To Mills	3300		
48	665	Supports For Hot PA To Mills	7500		
48	667	Venturi-Primary Air Flow	10500		
48	700	Bulked BPS Components	2100		
48	993	Erection Materials	1650		
R4F5	57010	GATE-PA FAN OUTLET	10000		
R4F5	57073	DAMPER-SA APH INLET	15000		
R4F5	57110	GATE-PA FAN OUTLET	8000		
R4F5	57141	SEAL AIR HAG AND ID FAN OU	5000		
R4F5	57143	DAMPER-COLD AIR TO MIL	3300		
R4F5	57160	GATE-COLD AIR TO MILLS	12000		

R4F5	57173	DAMPER-PA APH INLET	3000		
R4F5	57203	DAMPER-SA APH OUTLET	15000		
R4F5	57209	MTG BKT FOR CL DAMPER	3500		
R4F5	57223	DAMPER-PA APH OUTLET	3000		
R4F5	57270	GATE-HOT AIR TO MILLS	12000		
R4F5	57273	DAMPER HOT AIR TO MILL	3300		
R4F5	57373	DAMPER-FGAS TRISECTOR AH I	13000		
R4F5	57433	DAMPER-GAS APH OUTLET	10500		
R4F5	57460	GATE-ESP INLET	19250		
R4F5	57466	PLATFORMS AND LADDERS	30000		
R4F5	57470	GATE-ESP OUTLET	23700		
R4F5	57480	GATE-ID FAN INLET	32250		
R4F5	57490	GATE-ID FAN OUTLET	32250		
R4F5	57491	BLOWER WITH MOTOR	1000		
R4F5	57577	ELECT ACTUATOR FOR GAT	15000		
R4F5	57988	DUCTS COMMISSIONING SP	20		
95	088	FSSS FLAME SCANNERS	250		
95	089	FSSS LGM SWITCH BOX	48		
95	091	FSSS FIELD INTERCONNECTING EQPTS	2500		
95	485	FEEDER REMOTE POWER CABINET	1840		
95	487	FEEDER UCB MOUNTED INSTS & CALIB. INS	6		
95	488	FEEDER INTEGRAL MOUNTED C&I EQPTS.	1290		
95	495	FEEDER FIELD INTERCONNECTING EQPTS	15000		
96	088	BEARING VIBRATION MONITORING SYSTEM	900		
96	186	SB MOTOR CONTROL CENTRE	8000		
96	187	SB CABLES AND ACC.	43000		
96	189	SB LOCAL CONTROL BOXES	10		
96	193	MISC LOCAL STARTER BOXES	75		
95	088	FLAME SCANNER COMMSSIONING SPARE	10		
95	988	FEEDER COMMISSIONING SPARES	20		
97	088	EWLI COMMISSIONING SPARE	7		

97	196	COMMISSIONING SPARES FOR EWLI ELECTRODES AND GASKETS	2		
97	585	ACOUSTIC STEAM LEAK DETECTION SYSTEM	10		
5	Ceramic Lined Items under scope of **CBU (IP JAGDISHPUR) :**				
	1. Total Wt for One Unit - 110 MT (Approx)		110000		
		Total Non Pr.Parts	**1454673**		**1455**
80	303	MS TO AUX PRDS STATION PIPING	7500		
80	431	SPRAY WATER TO AUX. PRDS	2300		
80	453	HP PIPING DRAINS	6500		
80	600	HP DOSING SYSTEM	2000		
80	616	INSTRUMENT AIR SYSTEM	8600		
80	901	SUB DELIVERY VALVE FOR LIGHT UP	8000		
80	905	BHEL VALVES FOR LIGHT UP	9000		
80	923	H&S FOR STEAM BLOWING	20500		
80	992	IMPORTED ELECTRODES	40		
81	128	HP DOSING SYSTEM (SKID)	1000		
81	411	GAUGES IN STEAM LINES	100		
81	412	GAUGES IN NON-STEAM LINES	100		
81	421	FLOW NOZZLE- MS LINE	2000		
81	422	FLOW NOZZLE-BFD LINES	1000		
		Total Piping and Hanger supports	**68640**		**69**
2		**APH**			
R4F5	52 000	Items per Contract	440		
R4F5	52 010	Rotor Assembly	309180		
R4F5	52 011	Rotor Post Assembly	15560		
R4F5	52 012	Pin Rack Assembly	3660		
R4F5	52 013	Rotor Seals	4300		
R4F5	52 030	Rotor Housing	42220		
R4F5	52 041	Connecting Plate Hot End	37250		
R4F5	52 042	Connecting Plate Cold End	54600		
R4F5	52 054	Axial Seal Assembly	420		
R4F	52 055	Bypass Seal Assembly	780		

5					
R4F 5	52 100	Rotor Drive Assembly	3700		
R4F 5	52 101	Air Receiver	8000		
R4F 5	52 211	Air Seal piping	700		
R4F 5	52 220	General Details (Including 52-210, 212,217,360)	2200		
R4F 5	52 261	Guide Bearing Assembly	2950		
R4F 5	52 262	Support Bearing Assembly	4300		
R4F 5	52 271	Oil Piping – Guide Bearing	500		
R4F 5	52 272	Oil Piping – Support Bearing	550		
R4F 5	52 274	Lub Oil Circulation Unit	1110		
R4F 5	52 275	APH Lubricants	570		
R4F 5	52 301	Washing & Deluge System (Gas In)	460		
R4F 5	52 302	Washing & Deluge System (Gas Out)	460		
R4F 5	52 326	Cleaning Device (Gas Out)	330		
R4F 5	52 329	Cleaning Device Drive Unit	1570		
R4F 5	52 600	Larg AH E C & I Components	200		
R4F 5	52 988	Commissioning Spares	260		
		APH Total	**496270**		**496**
		FANS			
R4F 5	55910	FD FOLS (80LPM/12BAR)	4500		
R4F 5	56921	FIRST FILL OF LUBRICANT	7000		
		Fans Total	**11500**		**11.5**
3		**Bowl Mills**			
		JOURNAL ASSEMBLY (61080)			
		SET OF INSERT TYPE GRINDING ROLLS	22050		
		MILL DRIVE & BOWL ASSEMBLY (61180)			
		SET OF MATCHING BULL RING SEGMENTS	6258		
		AIR PORT ASSLY RING ASSLY	5160		

		MECHANICAL FACE SEAL ASSEMBLY	882		
		OIL SEAL WITH WEAR SLEEVE FOR WORM SHAFT	12		
		MILL MOTOR COUPLING (61780)			
		SUITABLE MILL MOTOR COUPLING	762		
		SEPARATOR ASSLY (61308)			
		CONVENTIONAL SEPARATOR TOP ASSEMBLY	10716		
		CERAMIC LINED INNER CONE (BOTH INSIDE& OUTSIDE)	6000		
		CERAMIC LINED VENTURI VANE SET	360		
		VENTURI,	3930		
		COLLAR &			
		INVERTED CONE ASSEMBLY			
		BEARINGLESS SPRING ASSEMBLY	23220		
		MDV (61880)			
		MILL DISCHARGE VALVE (FLAP TYPE) ASSEMBLY	18240		
		VICTAULIC COUPLING BETWEEN MDV AND PC PIPES SET	156		
		APPLICABLE FASTENERS FOR ABOVE SET			
		SPECIAL TOOLS AND TACKLES			
		MDV MAINTENANCE PLATFORM WITH LADDER	6720		
		OIL FILETRING UNIT (PER BOILER REMNT)	2000		
		SPECIAL TOOLS AND TACKLES			
		1. BOX WRENCH TRUNION SHAFT END CAP	16		
		2. DRIVE CAP JOURNAL SHAFT	50		
		3. SAMPLING DEVICE ASSLY			
		4. SPRING PRELOAD FIXTURE	93		
		Total Hyderabad supply	106625		
65	200	Coal Feeder- Sub-Delivey	260		
65	224	Dual belt gravimentric feeder	29280		
65	710	Coal Feeder - DD items	35		
67	200	Coal Feeding System- Sub dely.	1160		
67	204	Needle Gate	2860		
67	256	Coal Gate 24In Circ. Chain-Feeder Inlet	3016		
67	710	Coal Feeding System - DD items	110		
67	801	Down Spout	10380		
67	803	Feed Pipe to Mill	4304		
			51405		

	Mill Motor	2500 X 2100 X 1300	4300	6 Nos	
		Total Bowl Mills	**162330**		**162**
		Total Weight for Boiler & Aux	**5166870**		**5168**

NOTE FOR WEIGHT SCHEDULE:

1. The weights given are only approximate and for general guidance and they are subject to variation as per site requirement for design consideration for erection.
2. The weights given are fixed for dismantling purpose. There is no variation are allowed in total tonnage 5168 MT. Dismantling and overhauling work to be completed within the quoted and accepted lump sum value.
3. The information furnished is only a description regarding the items to be erected by the contractor. BHEL reserves the right to add or exclude any components / items / system according to the site requirements / customer requirements to complete the systems in all respects.
4. Any other systems / Components which are integral to Boiler & auxiliaries, supplied by BHEL manufacturing units are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lump sum value.
5. Erection & dismantling of air blowers and connecting pipes , ducts and cables, providing blanks/ dummies at the required locations and conducting gas-tightness test is in the scope contract and shall be carried out within the quoted price.

GENERAL

The scope of the work will comprise of but not limited to the following:

1.10.1 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.

1.10.2 The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.

1.10.3 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account contractor only. BHEL engineer, depending upon the availability of materials, fronts etc, will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs or for any reason whatsoever.

1.10.4 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

1.10.5 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe/tubes, and

handrails etc for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

1.10.6 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be affected for such excess drawls at the rate prescribed by manufacturing units.

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

1.10.8 Contractors shall ensure that all their Staff/Employees are exposed to periodical training program conducted by qualified agencies/ personnel on ISO 9001 – 2000 Standards.

1.10.9 For other agencies, such as piping, cabling, instrumentation, insulation etc., to commence their work from/on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence/continue the work so as to keep the overall project schedule.

1.10.10 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

1.10.11 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

1.10.12 On Completion of work, all the temporary structures, pipe lines, cable etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

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

1.10.14 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.

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

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

1.10.17 **SITE INSPECTION**

The owner/employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner/employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.

1.10.18 **UTILITY POINTS**

Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N2) etc., shall be indicated in the P & I diagram. The utility points shall be located at convenient point to handle. Contractor to be locate the utility points as advised by site engineer.

1.10.19 **Safety**

Adherences to safety are upper most during execution of work, 100% safety norms to be strictly followed. Tendered should appoint qualified safety officer tom implement safety. He should interact with BHEL and customer for day to day activities. As the work is to be executed in the running plant, all work forces to undergo for a safety classes and obtain the certificate from customer. No person will be allowed without safety training.

Trained and certified safety supervisors to be appointed for every 50 work men. The safety officer, supervisors are not allowed to assigning any work other than safety. Heavy penalty will be levied if any un-safe practices are found during execution of work.

1.10.20 **Penalty**

NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND THE BHEL HAS RIGHT TO IMPOSE FINES ON THE CONTRACTOR AS UNDER **for every instance of violation noticed**:

Sl. N	Instance of Violation	Fine (in Rs)
01	Not Wearing Safety Helmet	50/-
02	Not wearing Safety Belt	100/-
03	Grinding Without Goggles	50/-
04	Not using 24 V Supply For Internal Work	500/-
05	Electrical Plugs Not used for hand Machine	100/-
06	Not Slinging property	200/-
07	Using Damaged Sling	200/-
08	Lifting Cylinders Without Cage	500/-
09	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
10	Not Removing Small Scrap From Platforms	200/-
11	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	200/-
12	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
13	Improper Earthing Of Electrical T&P	500/-
14	Major Accident or Accidents causing partial loss of earning to the victim	50,000/- per victim
15	Fatal Accident or Accidents causing permanent loss of earning to the victim	1,00,000/- per victim

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected above will be utilised for giving award to the employees who could avoid accident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

1.10.21 **Insurance**

In addition to the conditions covered under the GCC & SCC, following provisions will also apply:

1. Comprehensive Automobile Insurance

Insurance shall be in such a form to protect the Contractor against all claims for injuries ,disability , disease and death to members of public including the Owner's men and damage to the property of others arising from the use of motor vehicles during on or off the site operations ,, irrespective of the ownership of such vehicles ..
The liability covered shall be as herein indicated.

Fatal Injury
Rs. *1,00;000/-* each person
Rs. *2,00,000/-* each occurrence
Property Damage
Rs.1,00,000/- each occurrence.

2. Comprehensive General Liability Insurance

The insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act of omission on the part of the Contractor, his agents, his employees, his representatives and Sub-contractors or from_ riots, strikes and civil connation.
This insurance shall also cover all the liabilities of the Contractor arising out of the Clause entitled "Defence of Suits" in Section GCC, Conditions of Contract.

1.10.22 **Quality:**

Qualified and certified quality engineer to be posted at site for quality assurance. The quality person should maintain all records and reports to be generated as per BHEL quality standards. He should interact with customer and BHEL and all the stage wise protocols to be prepared after joint inspection and get is signed by BHEL and customer. All the record to be maintained and he is responsible for quality audit carried out by BHEL and customer.

FOUNDATIONS AND GROUTING

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

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

1.11.3 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also minor chipping, dressing of foundations up to 30 mm for obtaining proper face for packer plates/shims, and may be required for the erection of the equipment/plants will have to be carried out by the contractor without extra cost.

1.11.4 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments

1.11.5 Foundation pockets are to be cleaned thoroughly before placing the columns/equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement., if required cleaning of the threads to be done with proper dies.

1.11.6 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment. Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc., shall also be blue

matched by Prussian Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions.

1.11.7 The certificates of the grout is to be submitted BHEL. If necessary test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc to be arranged by the contractor including the fine aggregates.

1.11.8 All the materials required for grouting including special cements like Conbextra GPI,GP2, ACC- Shrinkkomb-N20, Sika Anckor, NSG/ NSG -1, CICO Excem GP, or its equivalent as approved by BHEL and other materials like Portland cement, sand etc., are to be arranged by the contractor at his cost.It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.

1.11.9 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates/sheets at site by the contractor to meet site requirement. However machining of the packers, wherever necessary, will be arranged by BHEL at free of cost.

1.11.10 **PROCEDURE FOR GROUTING**

Contractor has to carry out the grouting as per the work instructions for grouting available at site (As per FQP).

12.0 Technical write-up

Economiser

- Redesigning of Economiser with two banks of plain tube coils and supports with increased heating surface area to suit the specified coal.
- Cassette baffles / Shielding are proposed for all the bends and straight portions of top coil to protect from ash erosion.
- Replacement of Economiser Inlet Header, outlet header & Economiser Intermediate Headers including stubs for the modified arrangement.

Water Wall

- Water wall tubes of 1200 RM.
- Complete Burner panels along with top and bottom bends.
- All gooseneck panels of water wall (rear arch tubes and WW hanger tubes are not covered).
- All Bottoms "S" panel for both sides from header stub joints to erection joint at 15615mm level.
- Wear bar of 10mm rod for bottom "S" panel.
- Complete assemblies of Water Wall Platens coils excluding header.
- Bends for provision of ASLD

Steam cooled Wall

- Total 300 RM of tubes of steam cooled wall (75 RM tube of each of front, rear, left and right side wall).
- Partial redesigning of SCW and headers to suit proposed Eco and LTSH modification and to accommodate LTSH inlet header in line with rear side SCW.

Roof tubes

- Roof tubes with provision for fixing sky climber.

LTSH

- Headers SHH8 and SHH9.
- Redesigning of LTSH with two banks of coils
- LTSH terminal tubes from LTSH coils to outlet header's stubs.
- Cassette baffles / Shielding are proposed for all the bends and straight portions of top coil to protect from ash erosion.

Attemperators and Spray system (SH & RH)

- Atemperator headers with spray nozzle and liners for Re-heater with 5% capacity and Super heater with 10% capacity.
- Spray control station valves of SH & RH (spray and block valves of pneumatic type) with piping of spray station.

Platen SH

- All platen super heater coil assemblies with up-graded material. Both existing inlet/outlet headers retained.

Final SH

- All final super heater coil assemblies with up-graded material. Both existing inlet/outlet headers retained.

Re-Heater

- Re-heater coils with up-graded material and headers are re-designed.

Fuel oil system

- New air cooled oil gun
- Existing hydro motor valves are to be replaced with pneumatic operated valves.
- New oil burners as a part of burner assembly is contemplated.

Valves

- Refer List – 1 enclosed.
- Following valves of Tag no are covered in boiler package as per list - 1:-
- B-62, B-63, B-1, B-2, B-13, B-25, 26, 27&28, B-53, 54,55& 56, B-30, 31& B-58, 59, BHEL make Drum gauge glass valve, B-20, 23, B-40, 43, B-3, B-4, B-10, B-11, B-64, B-65, S-31, S-32, S-50, S-51, R-5,6,R-11,12,R-21, E-1, E-2, FW-164, 165, BHEL make GG assembly (B-29,B-57), S/H Spray drain lines 44.5x5.5 SA 210 Gr.I, drum air vent (LHS & RHS). (76.1x10 SA 210 Gr.I), sample line valves and sample coolers, impulse lines 5/10/15 / 25 NB for Boiler, impulse lines root valves Boiler, servicing material for all safety valves Drip pan and drain piping, solenoid for EMRV 1536 VC valve, start up vent line and valve, B74, B75.
- Valves covered in clause 3.4.1, under Soot blowing control station and Soot blowing thermal drain station : SB-1, SB-2, SB-5, SB-7, SB-3, 6,8,10,11, SB-22, 23,
- Valves covered in clause 3.2.6.2.1, under Spray control station valves of SH & RH: S-74, S79, S-85, S-83, S- 80, 86, S-89 S/H spray line NRV, S-91, S-92,S-93, R-44, R-38, R-5,6,R-11,12,R-21, R/H spray line NRV

40, R-49.

- Valves for APH soot blower

Critical Piping

I. Hangers & supports for critical piping, Valves for APRDS station, Boiler feed control station, valves for CBD pipeline all by Tag nos. supply of HP dosing skid system, Flow nozzles in Main steam line and feed water line to boiler, loose tubing's for impulse lines, root valves for impulse lines and for drains and vents in critical pipelines, supply of Main Steam Stop Valve in boiler area and thermal insulation for critical piping.

II. Scope of R&M package for steam generator and auxiliaries

Hanger consisting of selection of type of supporting arrangement, selection of variable spring hangers/ constant load hangers, selection of auxiliary steel structures for the hangers wherever additionally required for MS, CRH, HRH pipelines from boiler outlet to turbine inlet and BFD pipe line from feed control station to economizer inlet as per BHEL standard practice.

- Thermal Insulation for MS, HRH, CRH & BFD from Feed control station to Economizer inlet.
- Flow nozzles in MS Line and before Boiler Feed control station.
- APRDS STATION Valves AS-101, AS103, AS104, AS105, AS106, AS107 & AS108 are included for replacement. APRDS source line from MS line tap off up to APRDS inlet, PRDS station piping inclusive of Desuperheater, thermal insulation hanger & supports for this portion of piping are included.
- Loose valves in APRDS Tag nos: AS110, AS144, AS145, AS116, AS117, DW211A, 211B,212A, 212B,215, & 217 are included.
- Boiler Feed Line control station valves Tag nos: FW113, FW114, FW115, FW118, FW119 arer included.
- Boiler Feed Line drain valves Tag nos: DW206 TO 210 (6 nos), double root valves 8 nos are included.
- CBD pipe line valves NB65, gate valves, Tag nos: BW, B66, B67,B69, B70, & B71 (5 nos) are included; CBD line manual regulating globe valve Tag no: B71 is included.
- Loose phosphate dosing line valves, Tag no:B61, NB 25, Qty: 2 nos: and Tag no: B60, NB25, NRV, Qty: 1no are included:
- Main Steam flow nozzles (2 nos.) and Boiler feed line flow nozzle (1 no.) with 3 pairs of double root valves on each flow nozzle are included.
- Main steam stop valve Tag nos: MS103 & MS 104, Nb 300, Gate Valve, Motor Operated, AS, BW, Class 2500, are included.

- Loose tubing of NB15 & NB25 size of CS/AS/SS material, each of required length all sizes totaling to 1500 mts are included.
- Loose impulse lines root valves of NB15 & NB25 sizes of CS/AS materials each of required quantity all sizes totaling to 200 nos are included.
- Phosphate dosing skid containing mixing/ metering tank with motorized stirrer, 2 x 100% pump with manual stroke adjustable delivery, necessary non-return valves, suction filters and control panel as a unitized system is included along with 200 mts of NB25 SS tubing.
- Instrument air piping for those new/ replaced equipments supplied in SG scope from the nearest Instrument air header.

III. CLARIFICATIONS

Hangers and supports will be in line with BHEL current design practice. Auxiliary support structures are meant to connect existing main structures for erecting hangers & supports.

Flow nozzles will be of **2850 mm long** as per BHEL current standard design practice and pressure transmitters are not included with flow nozzles.

Thermal insulation will be in line with BHEL current design practice.

Positioner for control valves shall be I/P converter with 4-20 ma signals.

All BHEL make valves / bought out control valves shall be with new standard lengths and may not be to exact length of existing valves for replacement. Accordingly extra pipe lengths are supplied for shorter length valves and for longer than existing valve lengths adjacent pipe lengths shall be cut to accommodate the new valves.

CRH line tapping for providing Auxiliary steam to 16 ata header necessitate changes in the existing HBDs to provide flow parameters at different operating conditions/ loads for the selection of additional PRDS valves.

V. MODE OF SUPPLY (as applicable)

1. Hangers and Supports:

All hanger components, spring cage assembly, constant load hanger and auxiliary steel structure will be supplied as loose items.

Erector shall pick out the correct components pertaining to a hanger, assemble the components at site and erect as per the erection documents issued for hangers. Necessary cutting of rod and aux. steel structure to the required lengths shall be done at site by erector. Documents issued for erection purposes will be only standard erection drawings / booklets for standard hanger components.

2. Flow nozzles:

Erector shall mark the cutting location on the existing pipeline for installing the new flow nozzles providing 25mm allowance for edge preparation at both ends; add if necessary the spool pieces supplied after edge preparing at both ends, to the required dimensions and complete the welding as per erection document. The pipeline shall be properly anchored to column structure before cutting to avoid drifting of the pipeline from original position while inserting flow nozzle.

VI. GENERAL (as applicable)

1. Hangers and Supports:

Hanger components, variable spring hangers, constant load hangers, etc. will be as per BHEL's current standard design practices.

Constant load hangers will be provided at those locations wherever the variation between hot and cold load exceeds 25% of the hot load. At other locations, variable spring hangers or tie rod hangers will be used.

Buck stays

- Loose attachment items like scalloped bars, stirrups, stirrup connecting bolts to beams required for Buck stay repair works.

Soot Blowers

- 24 nos of long retractable soot blowers.
- Soot blowing control station along with valves.
- Soot blowing thermal drain station along with pneumatic operated valves.
- DA head valves for APH soot blower
- In view of PADO package being offered, a separate Smart blowing system for water walls is not required to be supplied.
- Wall blowers are not envisaged in tender and hence not covered in scope. However availability of all wall blowers are essential to maintain the optimum cleanliness and heat absorption in the furnace.

Penthouse

- 20 nos of hangers / tie-rods of pressure parts, furnished in pent house for replacement.
- Existing skin casing arrangement is offered as per latest practice along with refractory for roof tubes.
- Replacement of boiler roof sheeting with metapoly sheets and pent house casing.

Mill Seal Air Filter

- Mill seal air system along with filter, since modified seal fan is contemplated.

PC Feeders

- Gravimetric feeder of BHEL design, short centered, dual belt type is offered along with center feed pipe and suitable gates.

P.C Piping

- PC piping is offered with ceramic lined bends and orifices

Coal Burners

- Wind box along with burners, secondary air damper with power cylinders, burner tilting mechanism, scanners and HEA igniters.

DUCTS, GATES AND DAMPERS

1.1:-Ducts

- New mill air ducting from APH outlet to mills along with tempering air ducting and Hot/Cold bus duct.
- Hot secondary air ducting from APH to wind box, Cold secondary air ducting from FD fan to APH, Cold primary air ducting from PA fan to APH and flue gas ducting from APH outlet to BOF (Boiler outlet flange).
- ID system ducting from BOF to Chimney is redesigned to suit new ESP.
- Flue gas ducting from economiser to APH, to suit modified SCW and new APH
- Metallic (Carbon/Carten steel) Expansion joints of all the ducting.

1.2:-GATES AND DAMPERS

Power assisted Guillotine type & Louver isolation dampers along with their drives are provided at all locations in a Power Plant for carrying out internal repair and maintenance of pulverizes, electrostatic precipitators, induced draft fan, Primary & Secondary air fans when steam generator is on load.

1.2.1:-Mill Area

Sl. No.	Description	Type of damper	Type of actuator	Qty/boiler

01	Hot air control damper	Control Louver	Pneumatic regulating	6
02	Cold air control damper	Control Louver	Pneumatic regulating	6
03	Hot air gate	Air operated guillotine gate	Pneumatic	6
04	Cold air gate	Air operated guillotine gate	Pneumatic	6

1.2.2:-Primary Fan to Air heater:

01	PA Fan outlet Gate	Guillotine Gate	Electrical	2

1.2.3:- Secondary air to Air heater:

01	FD Fan outlet Damper	Louver Damper	Electrical	2

1.2.4:- Inlet & Outlet of Air preHeater:

01	Primary air inlet of Air heater	Louver damper	Electrical	2
02	Hot primary air outlet of air heater	Louver Damper	Electrical	2
03	Secondary air inlet of Air preheater	Louver Damper	Electrical	2
04	Hot Secondary air outlet of Air preheater	Louver Damper	Electrical	2
05	Flue Gas inlet of Air preheater	Louver damper	Electrical	2
06	Flue gas outlet of Air preeater	Louver damper	Electrical	2

1.2.5:-Inlet & Outlet of ID FAN:

01	Flue gas inlet of ID Fan	Guillotine Gate	Electrical	2
02	Flue gas outlet of ID Fan	Guillotine Gate	Electrical	2

1.2.6:-Inlet & Outlet of ESP'S:

01	Flue gas inlet of ESP	Guillotine Gate	Electrical	4
02	Flue gas outlet of ESP	Guillotine Gate	Electrical	4

1.0 Salient features of Guillotine gates

2.0 Gates are chain driven type

2.1 Guillotine gates are provided with zipper type seals thus providing sealing chamber for supply of seal air. These gates provide 100% sealing with seal air.

2.2 Pneumatic actuators are given in guillotine gates at mill area for quick operation. In other locations Electrical actuators drive the guillotine gates.

2.3 Electrical actuators have provision for local manual operation also from a gallery or floor level.

2.4 Gates are fitted with locking devices to permit locking in the fully open and shut conditions.

2.5 Seal air blowers are provided wherever flow medium temperature and pressure are high. In locations where medium pressure is below atmosphere, seal air is sucked through isolation valve.

2.6 The Gate blade & seals are totally out of flue gas flow path when the gate is in open condition.

2.0 Salient features of Louver/Control Dampers

2.7 The dampers are of heavy duty construction

2.8 Control louvers are given in mill inlet area for flow control purposes, to maintain temperature at mill inlet. Pneumatic actuators will operate control louvers.

2.9 Louver dampers are provided in locations requiring pass isolation and are operated by electrical actuators with reduction gearbox.

2.10 Electric actuators have provision for manual operation locally in case of requirement.

2.11 Stuffing boxes are provided on all damper blade shafts to prevent flow of medium outside.

3.0 Materials of construction (typical)

Casing/frame: IS 2062 Fe410A
Blade Material: - Corrosion resistant Corten steel
Seal Material: - corrosion resistant & high stiffness material (Hastelloy)
Shaft: Corrosion resistant material

4.0 Remarks on hot air gate & cold air gate

Single cylinder design gates are proposed to be supplied for hot air gate & cold air gate.

LIST # 2
Scope of Damper/Gates

Sl no	Description	Location
1.	Electrical Damper (Open/Close)	PA Fan Outlet
2.	Manual Damper (Open/Close)	Seal Air Line to Raw Coal Feeders
3.	Manual Damper (Open/Close)	Cold Primary Air Shut Off Gate.
4.	Manual Damper(Open/Close)	Hot Primary Air Shut Off gate
5.	Manual Regulating Damper	Hot Air Regulating damper
6.	Manual Damper(Open/Close)	Raw Coal feeder Inlet Slide Gate
7.	Pneumatic Regulating Damper	Cold Air Regulating Damper (Gate)
8.	Manual damper (Open/Close)	Pyrites Hopper Flap Valve
9.	Manual damper(Open/Close)	Tramp Iron Spout Valve
10.	Manual damper(Open/Close)	Pulverized Coal Classifier Vane
11.	Pneumatic Regulating Damper	Raw Coal Feeder Variator
12.	Pneumatic Regulating Damper	Auxiliary Air Damper in Wind Box-At Elevation—AA
13.	Pneumatic Regulating Damper	Auxiliary Air Damper in Wind Box--- At Elevation—AB
14.	Pneumatic Regulating Damper	Auxiliary Air Damper in Wind Box--- At Elevation—BC
15.	Pneumatic Regulating Damper	Auxiliary Air Damper in Wind Box--- At Elevation—CD
16.	Pneumatic Regulating Damper	Auxiliary Air Damper in Wind

		Box--- At Elevation—DE
17.	Pneumatic Regulating Damper	Auxiliary Air Damper in Wind Box--- At Elevation—EF
18.	Pneumatic Regulating Damper	Auxiliary Air Damper in Wind Box--- At Elevation—FF
19.	Pneumatic Damper(Open/Close)	Pulverized Coal + Air Mixture Discharge Gates---Mill-A
20.	Pneumatic Damper(Open/Close)	Pulverized Coal + Air Mixture Discharge Gates---Mill-B
21.	Pneumatic Damper(Open/Close)	Pulverized Coal + Air Mixture Discharge Gates---Mill-C
22.	Pneumatic Damper(Open/Close)	Pulverized Coal + Air Mixture Discharge Gates---Mill-D
23.	Pneumatic Damper(Open/Close)	Pulverized Coal + Air Mixture Discharge Gates---Mill-E
24.	Pneumatic Damper(Open/Close)	Pulverized Coal + Air Mixture Discharge Gates---Mill-F
25.	Electrical(Open/Close)	Before Air-Heater
26.	Electrical(Open/Close)	After Air-Heater
28.	Electrical(Open/Close)	Before Electrostatic Precipitator— Left
29.	Electrical(Open/Close)	Before Electrostatic Precipitator— Right
30.	Electrical (Open/Close)	After Electrostatic Precipitator— Left
31.	Electrical (Open/Close)	After Electrostatic Precipitator— Right
33.	Electrical (Open/Close)	Before I.D. Fan
34.	Electrical (Open/Close)	After I.D. Fan

Expansion Joints

- Metallic (Carbon/Carten steel) Expansion joints of all the ducting.

Grills

- 12 MT of material for repairing works of grills, steps, hand rails and provision of additional platforms at economizer and LTSH areas. The area of replacement to be identified by customer.

Igniter & Scanner fan

- New scanner cum gun cooling air system with scanner fan, ducting, dampers and piping for cooling of scanners and oil guns.
- Since HEA igniters are envisaged, igniter air fans are not required for the offered system. Hence not considered. Compressed air to be provided for HEA igniters by customer.

COAL MILLS

The existing XRP 763 Bowl Mill will be modified to XRP 803 consisting of the following major assemblies:

A) MILL DRIVE AND BOWL ASSEMBLY

B) MILL SIDE AND LINER ASSEMBLY

C) SEPARATOR BODY & SEPARATOR TOP ASSEMBLY.

D) ROLLER JOURNAL ASSEMBLY

E) MILL DISCHARGE VALVE & MULTIPLE PORT OUTLET ASSEMBLY

F) TRAMP IRON & SPOUT VALVE ASSEMBLY

G) PYRITE HOPPER ASSEMBLY.

A) ***MILL DRIVE AND BOWL ASSEMBLY***

Mill drive assembly consists of a set of bearings and worm gear reduction set, which reduces the motor speed to the speed of the bowl. The worm shaft is coupled to the motor by a flexible coupling. Two nos of oil coolers are assembled to mill base filled with lube oil to worm shaft axis level. Gearing and bearings is sump lubricated

The mill base assembly is coupled to the bowl assembly by means of bolts. Bullring assembly is assembled on the bowl. The velocity of the primary air can be adjusted to the optimum so that foreign material, pyrites and stones are rejected out of the mill. This optimizes the bowl pressure drop.

MECHANICAL FACE SEAL ASSEMBLY:

Since the mill is pressurized, to prevent coal air mixture from entering into gearbox, mechanical face seal assembly with high-pressure seal air supply from a seal air system is provided. Face contact between seal

and seal runner acts as a positive seal enveloped by seal air exiting into the mill side. (seal air-piping connection to each mill from seal air fan is not in the scope of Pulveriser manufacturer)

B) MILL SIDE & LINER ASSEMBLY:

Hot primary air required for drying and carrying pulverized coal from the mill enters the mill side and liner assembly. The mill side and liner assembly is insulated internally by thick insulation on the sides and the bottom to take care of high hot air temp, and temperature of rejected tramp iron, foreign material and stones to the pyrite hopper. A cut out is provided in the Mill Base for ejecting the rejected material to pyrite hopper.

C) SEPARATOR & SEPARATOR TOP ASSEMBLY:

The separator body assembly houses Roller journal assly and spring assys. The spring assembly is mounted on the journal opening cover of the separator body assembly. Spring assembly supplies force on to the roller journal assembly for crushing the coal. These spring assemblies are provided on each of the roller journal assemblies. Uniformly distributed hot air flow is provided all around the bowl through specially fabricated ports (part of MPSP system). Powdered coal is lifted up by this upcoming air stream and carried to the stationary classifier (assembled inside separator top) mounted on the top of the separator body. The stationary classifier assembly consists of externally adjustable classifier vanes, which can be adjusted in position. The vanes impart spin to the coal air mixture. The heavier particles are thrown out of the stream and returned to the bowl for further grinding by sliding back on the inner-surface of the classifier cone. The classifier cone is lined internally with highly wear resistant ceramic liners. The classifier product enters the outlet venturi, which distributes the coal air mixture from the classifier equally into the four outlets. Outlet venturi has four lined vanes, one each for each outlet, which break the coal air, stream vortex and stream line the flow as the coal/air mixture enters the multiple port outlet.

D) ***ROLLER JOURNAL ASSEMBLY:***

This consists of Grinding Roll mounted on an assembly consisting of Journal bearings. Journal housings, Journal heads and Trunnion shaft with end caps.

The grinding force from the pressure spring assembly is transmitted through the Journal assembly on to the coal on the bowl. When coal comes between the Roller and the Bull ring assembly, the roller

assembly lifts compressing the pressure spring. There is no metal to metal contact between the Roller and Bull ring assembly when the Bowl is empty. The Roller assembly can be raised or lowered by means of stop bolt arrangement. The Roller assembly moves up and down on the Bowl depending on the coal bed, between the Roller and Bull ring assembly. The Roller assembly oscillates up and down about the trunion shaft, which is supported on rubber bushings in the separator body. The bearings are sump lubricated separately for each assembly.

E) ***MILL DISCHARGE VALVE & MULTIPORT OUTLET ASSEMBLY***:

This assembly is mounted on top of the Separator Top. The multiport outlet is lined for wear resistance. The Mill Discharge Valve assembly consists of flap type closure plates, which can be titled out of the path of coal stream with pneumatically, operated air cylinder. The mill discharge valve flap will be closed.

1) When the mill is under maintenance.
2) When the mill is full of coal after a trip and the new/additional coal/oil elevation is being put into operation.

Since the flap of MDV is out of coal stream, it is not subjected to wear. The Mill is fully isolated from the furnace, so as to ensure safety during maintenance and operation of boiler with coal-laden mills, by closing the MDV.

Ceramic liners are provided in the mill discharge valve to prevent valve body erosion. Purge air is provided above the mill discharge valve to keep the fuel pipe purged continuously whenever the mill discharge valve is closed. Pulverized coal sampling point tapping are provided on the mill discharge valve at two points, at right angles, in each of the four discharge valves. The multiple port outlet plate is provided with Nihard liners.

F) TRAMP IRON & SPOUT VALVE ASSEMBLY::

Tramp iron, pyrites and stones in the raw coal, being heavy, fall through the primary air stream around the bowl into the mill side and liner assembly. This is scraped and dumped into the pyrites hopper assembly through the tramp iron and spout valve, by means of scraper assemblies, which are rotating with the bowl. The tramp iron spout valve is normally kept open to prevent accumulation of coal, tramp iron and pyrites in the mill side assembly. Since the mill is pressurized, whenever the pyrites hopper is emptied and tramp iron and spout valve has to be closed to prevent hot primary air leakage out into the atmosphere.

G) PYRITES HOPPER ASSEMBLY:

This assembly is a storage bin for the tramp iron, stones and pyrites falling down from the bowl. The tramp iron valve has to be closed whenever pyrites hopper is periodically emptied of its contents.
Stub for steam inserting is provided in the mill side and liner assembly and an emergency water quenching provision is provided in the raw coal feed pipe from raw coal feeder. Mill outlet temperature is used for detection of fire in the mill. All wear parts in the mill are easily replaceable to minimize downtime during maintenance. Special tools and accessories are provided along with the mill, like spring compression kit, roll removal equipment, gear removal fixture and journal endplay fixture etc. The instruction manual gives step by step procedure for maintenance of the mill.

THE FOLLOWING ITEMS WILL BE SUPPLIED BY BHEL-HYDERABAD FOR EE R&M OF THE EXISTING XRP 763 BOWL MILL - 6 NO.'s/ UNIT FOR UPGRADATION TO XRP 803 SIZE AT KORADI TPS 1x210MW

SL NO	ITEM DESCRIPTION	QTY/ UNIT
01	SET OF INSERT TYPE GRINDING ROLLS	SIX SETS
02	SET OF MATCHING BULL RING SEGMENTS	SIX SETS
03	AIRPORT RING ASSEMBLY	SIX NO.'s
04	SUITABLE MILL MOTOR COUPLING	SIX NO"s
05	CERAMIC LINED INNER CONE (BOTH INSIDE AND OUTSIDE)	SIX NO.'s
06	CERAMIC LINED VENTURI VANE SET	SIX SETS
07	VENTURI , COLLAR, INVERTED CONE ASSEMBLY	SIX NO.'s
08	BEARINGLESS SPRING ASSEMBLY	SIX NO.'s
09	MECHANICAL FACE SEAL ASSEMBLY	SIX NO.'s
10	MILL DISCHARGE VALVE (FLAP TYPE)ASSEMBLY	SIX NO.'s
11	OIL SEAL WITH WEAR SLEEVE FOR WORM SHAFT	SIX SETS
12	VICTAULIC COUPLING BETWEEN MDV AND PC PIPES SET	SIX SETS
13	APPLICABLE FASTENERS FOR ABOVE SET	SIX SETS
14	MDV MAINTENANCE PLATFORM WITH LADDER	SIX NO.'s
15	SPECIAL TOOLS AND TACKLES	ONE SET

Items other than mentioned above to be arranged by MSPGCL (MAHAGENCO) as Spares and make ready before the planned shutdown for R&M work implementation.

NOTE:

1. AS THE R&M JOB INVOLVES ONLY EXISTING MILL UPGRADATION FROM XRP 763 TO XRP 803 FOR ENHANCING THE MILL OUTPUT.

2. THE CAPACITY OF 32.93 TPH (89% LOADING) WILL BE DEMONSTRATED WITH DESIGN COAL FOR ONE MILL WITHIN 3000 HOURS.

3. ONLY GRINDING ELEMENTS (6500 hours) AS WELL AS THE CERAMIC LINING LIFE ON CLASSIFIER CONE (25000 hours), VENTURI VANE (25000 hours) AND MDV (15000 hours) AS WELL AS THE MECHANICAL SEAL LIFE (20000 hours) SHALL BE GUARANTEED.

4. EXISTING MILL MOTOR CAPACITY 320 KW WILL NOT MEET THE XRP 803 BOWL MILL REQUIREMENTS. HENCE, THE MOTOR NEEDS TO BE REPLACED WITH HIGHER CAPACITY OF 340 KW HAVING SAME FOUNDATION LOCATION.

SPECIAL TOOLS AND TACKLES

SL NO	DESCRIPTION	QTY/ BOILER
01	BOX WRENCH TRUNION SHAFT END CAP	3 NOS.
02	DRIVE CAP JOURNAL SHAFT	1 NO.
03	SAMPLING DEVICE ASSEMBLY	1 NO.
04	OIL DIP STICK	3 NOS.
05	SPRING PRE-LOAD FIXTURE	1 NO.

25:-AIR PREHEATER

Regenerative Air Preheater – Trisector

APH Size & Qty **- 27.0 VIMT 2000** (72° PA), 2 Nos / Boiler

General

The Regenerative Air Pre-heater proposed shall be of **Tri-sector** type in which both the Primary Air & the Secondary Air are independently heated up in the same Air Heater.

In this type of Heat Exchanger, the heating surfaces are alternatively heated up by the Flue Gas passing through and cooled by the Air passing over it. The heat is absorbed by the heat transfer matrix from the Flue Gases and released to the Air. The design of the Air Heater is such that it can give trouble free service for extended periods of time, without plugging of flow areas between Heating Element sheets. The Regenerative Air Pre-heater will have a gas tight insulated casing and rest on necessary Steel Structures.

Description

Each Air Pre-heater shall consist of the following salient components / assemblies.

1. Modular Rotor
2. Rotor Housing & Connecting Plates
3. Heating Elements
4. Sealing System
5. Support Bearing & Guide Bearing
6. Lubricating Oil Circulation System
7. Drive Mechanism including Auxiliary Drive
8. Access Doors
9. Observation Port & Light Assembly
10. Cleaning & Washing Devices
11. Rotor Stoppage Alarm
12. Deluge System
13. Element Handling Arrangement
14. Fire Sensing Device

1. Modular Rotor

The rotor is made up of 12 numbers of Modules having 24 sectors that are attached to the Rotor Post by pinned connections. The modules are loaded with the Heating Elements and shipped to site for easy, speedy and quality erection.

2. Rotor Housing & Connecting Plates

The housing consists of the following: two Main Pedestals, one Side Pedestal (gas side), one Primary Pedestal, one Secondary Pedestal, four other Panels, and top & bottom Connecting Plates with integral support beams. Sandwiched between the top & bottom Connecting Plates are the Pedestals & Panels, which form an integral structure to take Axial & Radial loads and also forms a Gas tight enclosure for the flow of Fluids.

3. Heating Elements

The Air Pre-heater is provided with multi-layers of Heating Elements packed into baskets for convenience of handling. The Cold End Element baskets can be easily removed & replaced from the sides. Hot End & Hot Inter Element baskets can be removed from the top of the Gas Ducts.

4. Sealing System

Over many years of continuous operation, the sealing system has proved to be effective with minimum maintenance requirements. The design takes advantage of the normal Thermal growth to keep the Sealing Surfaces in proper alignment.

The Rotor is divided into equal Sectors each forming a separate Air or Gas Passage through the Rotor. Fixed Leaf Type Metal Seals are Radially & Axially attached to the Rotor structure between each Sector. The Sector shaped unrestrained Radial Seal Plates provide the Sealing surface that divides the Rotor into Primary Air, Secondary Air, and Gas Passages.

Because the Seals are applied to the shortest leakage path and the Sealing Surfaces are externally adjustable, the most effective & continuous Leakage control is assured. The Sealing Surfaces are adjustable from outside by loosening the Nuts. But this adjustment is to be done with care.

Bypass Seals are provided to prevent the Air & Gas from bypassing the Rotor through the small space between the Rotor and Housing. The Bypass Seals can be adjusted only from inside of the Rotor. As these seals control only bypassing of flow through rotor and since the leakage in that path is actually being controlled by axial seals, there is no need to adjust them from outside.

5. Support Bearing & Guide Bearing

The Support Bearing is of Spherical Roller Thrust type & is located at the bottom center section. The Guide Bearing is of Spherical Roller Type & is located at the top center section. The Bearing Housings are designed to act as the Oil Reservoirs for the Oil Circulation System.

6. Lubricating Oil Circulation System

Both the Support & Guide Bearings are provided with independent Oil Circulation Systems. The Oil Circulation System consists of Oil Pump, Oil

Cooler, Pressure gauges, Temperature indicators, Flow Switches, and Relief Valves. The Lubricating Oil system proposed is a proven design. An identical unit is also connected as standby.

7. Drive Mechanism including Emergency Drive

The drive system envisaged is of Peripheral Pin Rack - Pinion type. It consists of an Electric Motor for main drive, another Electric motor as a standby drive and an air motor for emergency drive coupled to a three-input Speed Reducer with built-in Over-running Clutch, Fluid Coupling / Flexible Couplings, and a Pinion for meshing with the Pin Rack of the rotor.

Normally the drive is through the main drive Electric Motor. In the event of an electrical trip out in the main drive Electric Motor, the standby Electric Motor has to be started automatically from the Control system. During emergency, the Solenoid Valve automatically admits the compressed air to the Air Motor and brings it into operation. The airline is fitted with necessary Filter Lubricator.

8. Access Doors

Adequate numbers of Access Doors are provided, both at the top and bottom Connecting Plates, and also in the Housing Panels for inspection and maintenance.

9. Observation Port & Light Assembly

Observation Port and Vapour Proof Light are provided. These are suitably located at the Air Inlet Side to have a complete view of the Cold End Heating Elements while in operation.

10. Cleaning & Washing Devices

a) Cleaning Device

The Air Pre-heater is provided with a Twin Nozzle Swiveling Arm type Power Driven Cleaning device at Gas Outlet side for the on-load cleaning of the Air Pre-heater Elements. The Cleaning Device unit is located on the Cold end centre section with the Swiveling Arm Nozzle traversing horizontally in an area across the radius of the rotor, a short distance away from the Element packs.

b) Off-Load Water Washing Device

Two Fixed Multi Nozzle Washing pipes are fitted in the Gas Side, one above & one below the Rotor. The terminal points of the Pipes to which the surface connection can be given are located adjacent to Rotor Housing.

11. Rotor Stoppage Alarm

Rotor Stoppage Alarm is provided to indicate the slowing down of the rotor. This mainly consists of a Vane Operated Limit Switch and vanes that are mounted on the Trunnion. If the Vanes fail to pass under the Limit Switch within the set time interval, the DCS / DDCMIS will give an alarm, to warn the operator that the Rotor is slowing down.

Control Requirement

An alarm or annunciation is to be provided through the DCS / DDCMIS to indicate the rotor slowing down condition.

12. Deluge System

Two Fixed Multi Nozzle Fire Fighting Manifolds are fitted, one above & one below the Rotor in the Gas Side. The terminal points of the Pipes to which the surface connection can be given are located adjacent to the Rotor Housing. During an Air Heater fire, both the Fire Fighting & the Water Washing Manifolds must be used.

13. Element Handling Arrangement

The Air Pre-heater is provided with a Hoist & Trolley for handling of Hot End Elements from inside the Air Pre-heater to the Air Pre-heater operating floor.

14. Fire Sensing Device: Thermocouple Type

Individual Thermocouple Elements are mounted at fixed distance at Air Outlet and the Gas Outlet of the Center Section in radial direction close to Rotor face such that there is a measuring point between each tangential wall (stay plates) of the Rotor.

The increase in Temperature, due to fire, causes a momentary and recurring increase of the Thermo-electric Voltage and the signal released by the Thermocouple-elements is given to the DDCMIS at UCB for suitable alarm / annunciation.

In the event of a Fire Alarm, the Deluge System Valves & the Water Washing System Valves shall be opened manually. This is essential, because in the event of a Fire Alarm, the inspection of the Rotor / Air Pre-heater is a must before deluging the Rotor with water.

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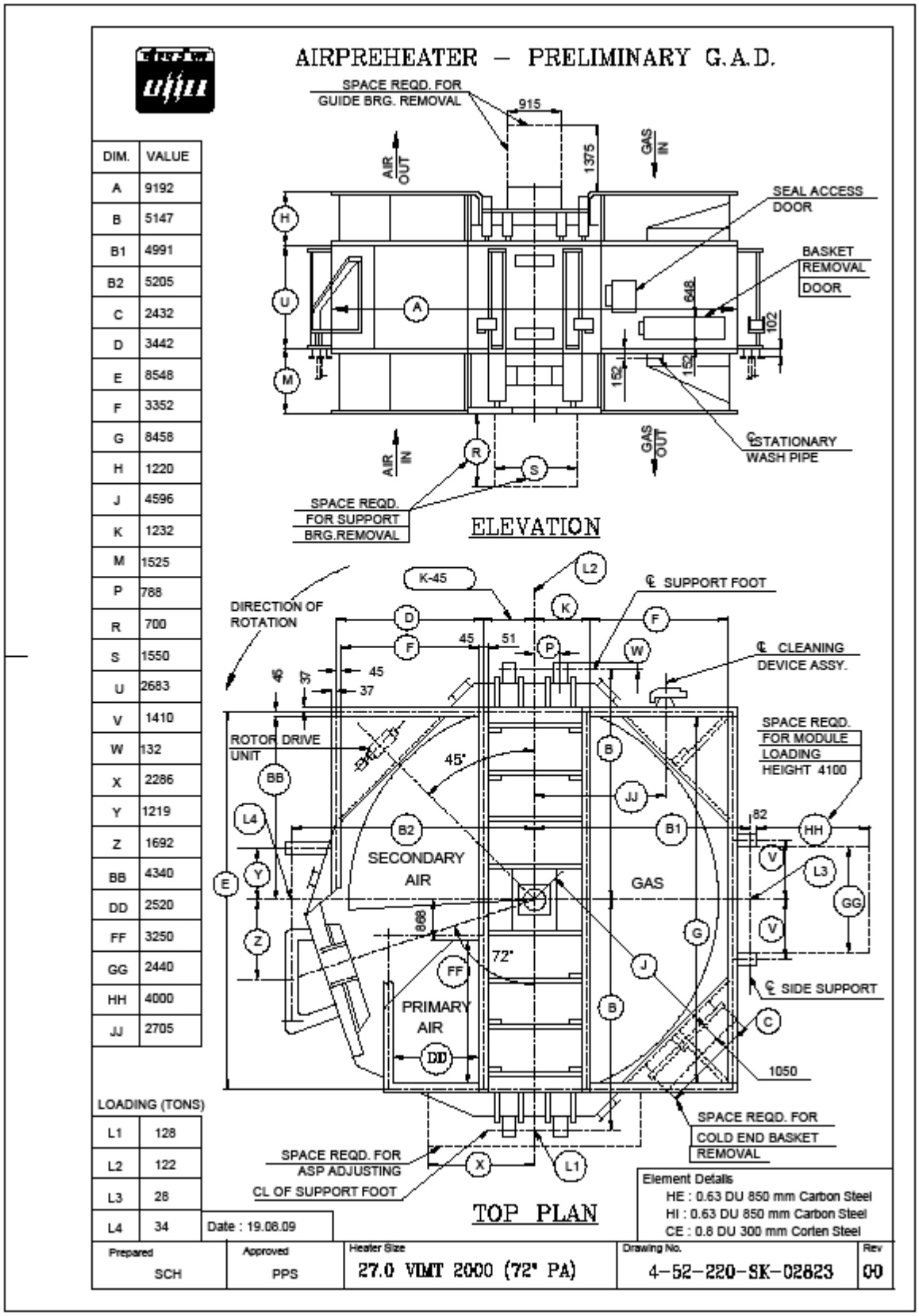

DIM.	VALUE
A	9192
B	5147
B1	4991
B2	5205
C	2432
D	3442
E	8548
F	3352
G	8458
H	1220
J	4596
K	1232
M	1525
P	788
R	700
S	1550
U	2683
V	1410
W	132
X	2286
Y	1219
Z	1692
BB	4340
DD	2520
FF	3250
GG	2440
HH	4000
JJ	2705

LOADING (TONS)	
L1	128
L2	122
L3	28
L4	34

ERECTION

The scope of the work will comprise of but not limited to the following:

13.13.1 Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection.

13.13.2 All the dampers, valves, lifting equipments, power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre commissioning. The bearings of dampers shall be properly cleaned, serviced and lubricated before commissioning at no extra cost. Even after commissioning in the equipments, if there are problems in the operation they have to be attended by the contractor during the tenure of the contract.

13.13.3 In the case of structural members / ducts in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connect the joints at no extra cost.

13.13.4 Any other systems / Components which are integral to Boiler & auxiliaries, supplied by BHEL manufacturing units are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lump sum value.

13.13.5 **Insulation & cladding:** With respect to insulation and cladding it shall be for the complete Boiler and Auxiliaries.

13.13.6 Erection & dismantling of air blowers and connecting pipes & ducts, providing blanks/ dummies at the required locations and conducting gas-tightness test is in the scope contract and shall be carried out within the quoted rate.

13.13.7 Fine fittings and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

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

13.13.9 It shall be the responsibility of the contractor to provide ladders on column for initial works till such time stairways are completed. For this the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.

13.13.10 Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.

13.13.11 Certain extra lengths of various tubes/pipes and fabricated ducts are provided as erection allowance and the same have to be cut/adjusted to suit the site conditions and layouts or certain small lengths may have to be added for adjustments to suit the site conditions. For any mismatch while matching the joints in tubes, the cutting, adjusting, re welding, addition spool pieces should be done by the contractor to match site conditions without any extra payment.

13.13.12 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain are reliable and complete installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. (Any machining or threading is involved will only be done by BHEL).

13.13.13 HSFG Bolts are to be tightened by turn of nut method/Torque Wrench, as per the instruction of BHEL Engineer. The bolted joints shall be jointly checked by BHEL/Customer and contractors personnel for the required tightness and retightened wherever necessary. The tightened bolts shall be identified by color paints. Facility for random checking with calibrated Torque Wrench shall also be provided by contractor.

13.13.14 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.

13.13.15 D.S.L / equivalent system for hoisting equipments are also to be erected and commissioned including load testing by the contractor

within the quoted rates. Required manpower including electricians is to be arranged by the contractor for carrying out commissioning of electrical hoist and load testing of the above electrical hoist. Required loads will be provided by BHEL free of cost.

13.13.16 The temporary structures/items welded to permanent members/pipes are to be cut and removed without any damage. Any damage so to be made good by the contractor at his cost.

13.13.17 Before lifting the heavy components, soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch. The end caps provided at shop for various stubs are to be removed during final fit up only.

13.13.18 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be removed/attended as per BHEL engineer. Fixing, welding of necessary instrumentation tapping points, to be provided on auxiliaries covered within the scope of this specification will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer. The fixing / welding of all the above items will be contractor's responsibility even if the

i) Product groups under which these items are not specifically indicated in the Tender Specification.

ii) Items are supplied by an agency other than BHEL

13.13.19 For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.

13.13.20 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.

13.13.21 All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints assemble and other components as per instruction of BHEL Engineer during erection at the quoted rate.

13.13.22Wherever equipments are supplied in pre-fabricated assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.

13.13.23All the bearings, Gearboxes etc., of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing/gear boxes etc., with kerosene or some other agent if necessary by dismantling some of the parts of the equipment during erection and shall arrange for re-greasing/lubricating them with recommended lubricants and assembling back.

13.13.24Certain instruments like pressure switches, gauges, air sets, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismantle such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.

13.13.25Attachment, welding of necessary instrumentation tapping points, to be provided on Boiler / its auxiliaries or pipelines covered within the scope of this tender will also be the responsibility of the contractor and the same will be done as per the instruction of BHEL Engineer.

13.13.26All the motors/pumps shall be stripped opened, thoroughly serviced with proper care and re-assembled properly before erection by the contractor. During servicing, pre-commissioning & commissioning, if any deficiency is observed the same should be taken up with BHEL Engineer at site and rectified at site without any delay.

13.13.27All site-fabricated pipes will be issued in running meters as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. All the attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor. Fittings like bends, tees, elbow, MITRE bends, reducers, flanges etc., will be supplied as loose items.

13.13.28Additional platforms of permanent nature for approaching different equipments, as per site requirement which may not be indicated in drawings shall be fabricated and installed by the contractor. However the contractor will be paid for this work on accepted tonnage rate for

erection. The material required for platform will be supplied by BHEL free of cost.

13.13.29 Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing.

13.13.30 In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.

13.13.31 All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope.

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

13.13.33 Erection of flow switches, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL/Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

13.13.34 Contractor shall also weld small length of piping with root valve to the pressure, flow and level tapping points on piping or flow nozzles/orifices/ metering elements fixed on piping as per the instructions of BHEL Engineer.

13.13.35 Welding of all thermo wells, draft, pressure and temperature instrumentation points and all other instrumentation points on piping and auxiliaries and welding of thermocouple pads are in the scope of work.

13.13.36 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.

13.13.37 Wherever hanger and support materials are not received from manufacturing unit in time to suit the erection schedule, contractor

shall erect the system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports.

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

13.13.39 Contractors has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive is within the quoted / accepted rate.

13.13.40 Adjustments like removal of oval ties in pipes and opening or closing the fabricated bends piping to suit the layout shall be considered part of work and the contractor is required to carry out such work free of cost, as per instructions of BHEL.

PROGRESS OF WORK

The scope of the work will comprise of but not limited to the following:

14.14.1 Refer forms F -14 to F-18 of volume I D of volume -I book-II. Plan and review will be done as per the formats.

14.14.2 Contractor is required to draw mutually agreed monthly erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

14.14.3 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

14.14.4 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer as per the format enclosed with this tender document.

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

14.14.6 The monthly report ending on 24th of every month shall be submitted as a booklet and shall contain the following details :-

a) Color Progress photographs to accompany the report should be submitted.

b) Erection progress in terms of tonnage, welding joints, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.

c) Site Organization chart of engineers & supervisors as on 24th of the month with further mobilization plan

d) Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operations and helpers. Data will be split up under the work area of Boiler

e) Consumables report giving consumption of all types of gases and electrodes during the previous month.

f) Availability report of cranes

g) Safety implementation report in the format

h) Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

14.14.7 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

14.14.8 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.

15.0 WELDING

The scope of the work will comprise of but not limited to the following:

15.15.1 All welders including tack welders, structural and high pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification AND performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

15.15.2 Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welders having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

15.15.3 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor’s expense. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the quality engineer.

15.15.4 All expenses for testing of contractor's welders including destructive and Non- destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost.

15.15.5 Only BHEL approved electrodes and filler wire will be used. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot.

15.15.6 The contractor shall also be equipped for carrying out other NDT like LPI /MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates.

TESTING AND COMMISSIONING

The scope of the work will comprise of but not limited to the following:

16.1 TESTING , PRE – COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

(All the works mentioned hereunder shall be carried out within the quoted and accepted rate)

16.1.1 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer.

16.1.2 The contractor shall carry out all the required tests on the equipments erected such as gas tightness test for ducts, kerosene leak test, air flow test, etc., using contractor's own consumables, labor and scaffoldings.

16.1.3 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications. All the tests should be repeated till all the equipments satisfy the requirement / obligation of BHEL to their customer. All the repairs (shop welded or site welded) arising out of the failures during testing shall be done by the contractor as part of the work.

16.1.4 For conducting gas tightness test, it may be required to erect the blowers and connecting ducts and commission the same for tightness test. It is the responsibility of the contractor to erect the blowers & dismantle once the test is over. Contractor shall carry out the work within the quoted rate and BHEL will provide only the required materials, like Blowers venture meter and dummies free of hire charges for conducting the test. Agency to arrange required cable for power supply for the Blowers.

16.1.5 Fixing dummy plates at required locations for conducting tightness test and normalizing after the test is over, is also covered in the scope of contract and shall be carried out within the quoted rate. BHEL will provide raw materials for the dummy plates.

16.1.6 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

16.1.7 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part are required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.

16.1.8 During commissioning, opening / closing of valves, changing of gaskets, Re-alignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price /rates shall also include all such work.

16.1.9 Commissioning of the equipments will involve, trial runs of all the equipments erected, blowing through the lines, flushing of all the lines by air, oil or steam as the case may be, trial run of the equipment and any other works incidental to commissioning.

16.1.10 In case any erection defect is detected during various tests / operations trial runs such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and realignments are necessary the same shall be done as per BHEL Engineer's instructions. If any part needs repairs rectification and replacement the same shall be done by the contractor at no extra cost. The parts to be replaced shall be provided by BHEL free of cost if insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

16.1.11 The contractor shall carry out cleaning and servicing of valves and dampers / gates actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and actuators are left un-serviced.

16.1.12 Replacing / Cleaning and servicing of all the filters of the erected equipments during pre-commissioning / commissioning stages shall be done by the contractor within the accepted price.

16.1.13 Contractor may have to replace old/damaged gaskets / packing etc. in the erected equipments and the same shall be carried out by contractor as per requirement. Materials will be given by BHEL.

16.1.14 In case any erection defect is detected during various tests / operations trial runs, such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary

corrective measures. The parts to be replaced shall be provided by BHEL free of cost. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

16.1.15 Contractor shall cut / open works if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning opening of valves, changing of gaskets, attending to leakages, minor modification / rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.

16.1.16 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part commissioning assistance.

16.1.17 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

16.1.18 It shall be specifically noted that the contractor and employees of the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers / customer officials. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers/supervisors.

16.1.19 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.

16.1.20 Contractor shall lay all necessary electric cables and switches etc. required for the tests and maintain the system till the tests are completed satisfactorily.

16.1.21 All lubricants and chemicals required for pre-commissioning, commissioning, testing and lubricants for trial runs of the equipment shall be

supplied by BHEL / BHEL's client **at free of charges**. All services including labor and T&P will be provided by the contractor for handling, filling, emptying, refilling etc. The consumption of lubricants / chemicals shall be properly accounted for. Surplus material if any shall be properly stacked / tagged and returned to BHEL / Customer stores at no extra cost to BHEL. BHEL reserves the right to recover costs for wastage by the contractor**.**

16.1.22 Transportation of oil drums from customer's / BHEL's stores. Filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly transport of chemicals for various pre-commissioning, commissioning activities and related processes and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.

16.1.23 The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition checking aligning and coupling the motor to the respective driven equipment. Before starting the motor, IR values of insulation shall be recorded and if found necessary the contractor shall dry out to improve the IR value at no extra cost.

16.1.24 Necessary scaffolding and approaches for conducting the tests shall also be within the scope of the contract.

16.1.25 Assistance for calibrating / testing the power cylinders / actuators / valves, gauges, instruments, etc. and setting to actuators shall be provided by contractor within the quoted rates.

PAINTING

The scope of the work will comprise of but not limited to the following:

17.17.0 FINAL PAINTING

17.17.1 The scope of work shall also include supply and application of final painting of all the erected equipments as required and specified for the components of Boiler and its auxiliaries.

17.17.2 In the case of steel fabricated items, raw steel after fabrication has to be cleaned and subsequent painting to be carried out.

17.17.3 All the exposed metal parts of the equipments including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer and required number of finish coats as indicated in the Painting Specification in TCC which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL engineers for painting. Afterwards the above parts shall be finished with as per the instructions of BHEL/Customer official.

17.17.4 Paint shall be applied by brushing or by spray painting as per the instruction of BHEL Engineer. Spray painting gun and compressed air arrangement has to be made by the contractor himself. It shall be ensured that brush marks are minimum.

17.17.5 Before applying the subsequent coats the thickness of each coat shall be measured and recorded with BHEL / Customer.

17.17.6 Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready mix type in original sealed containers as packed by the paint manufacturer. No thinners shall be permitted. Paint manufacturer's instructions shall be followed in method of application, handling, drying time etc.,

17.17.7 The scope of painting includes application of color bands, lettering the names of the systems equipments; tag Nos. of valves, marking the directions of flow and other data required by BHEL within the quoted rate.

17.17.8 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated spots. Each coat (Primer, intermediate, finish) shall have a minimum thickness of

dry film thickness (DFT) in microns and the DFT of finish paint shall not be less than the specified. Necessary instrument for measuring the thickness of paint applied is to be arranged by the contractor.

17.17.9 Finish coat paint, No of coat and DFT shall be as indicated in the painting specification enclosed in this tender / relevant BHEL document/ customer's specifications. The painting specification which is forming part of this tender as in TCC shall be used as guidelines to be followed.

17.17.10 The actual colour to be applied shall be approved by the customer before starting of actual painting work.

17.17.11 Primer & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the **BHEL / Customer approved agencies** only, and the paints should be as per the customer painting specification. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities.

17.17.12 No paint shall be applied when the surface temp is above 55 deg. Centigrade or below 10 deg. Centigrade, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather.

17.17.13 If needed and insisted either by BHEL / Customer in certain cases, spray painting has to be carried out within the Quoted rates.

17.17.14 Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.

17.17.15 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL/ Customer.

17.17.16 PRESERVATION / TOUCH UP PAINTING

17.17.16.1 Contractor shall carryout cleaning and preservation / touch up painting for the materials / equipments under this tender specification right from pre- assembly stage to till the equipment is cleared for final painting.

17.17.16.2 Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of red oxide primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.

17.17.16.3 Mostly the equipment / items/ components will be supplied with one coat of primer paint and one coat of finish paint. However during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final color.

17.18 PAINTING SYSTEM

Sl. No.	Description of Item to be painted	Operating Temperature (Deg. C)	Surface Preparation	Primer		Finish Paint	
				Specification	No. of Coats (Total DFT Micron)	Specification	No. of Coats (Total DFT Micron)
1.	General Steel (except areas where acid/alkali high build epoxy is handled) piping, equipment. Etc.	Upto 65	SA - 2.5	Epoxy Based Zinc Phosphate	2 (60)	Polyamide cured high build epoxy	2 (150)
2.	External surfaces of Furnaces, stacks, ducts (Including their Structure), valves, flanges etc. & equipment	65 to 300	SA – 2.5	Ethyl Silicate Zinc Rich	1 (65)	Heat Resistant Aluminium	2 (30)
3.	External surfaces of Furnaces, stacks, ducts (Including their Structure), valves, flanges etc. & equipment	Above 300	SA – 2.5	Ethyl Silicate Zinc Rich	1 (65)	Heat Resistant Silicone Aluminium	2 (24)
4.	Cold Insulated Piping & equipment		SA – 2.5	Epoxy Zinc Rich	2 (100)	Epoxy Coal tar	2 (200)
5.	External surface of site		SA – 2.5	Epoxy Based Zinc Phosphate	2 (60)	Polyamide cured high build epoxy	2 (150)
6.	External Surface of bottom plates of Tanks		ST - 2			Bituminous	2 (200)
7.	Steel piping, equipment structures, effluent / sludge pit/ sump etc. (where acid / alkali is handled)		SA - 2.5	Epoxy Based Zinc Phosphate	2 (130)	Polyamine cured high build epoxy	3 (75)
8.	Insulated Piping		SSPC –	Alkyd based	2 (30)		

			SP3 Power tool cleaning	Red Oxide Zinc Phosphate			
9.	Un-insulated piping		SSPC – SP3 Power tool cleaning	Alkyd based Red Oxide Zinc Phosphate	2 (30)	Synthetic enamel paint long alkyd	2 (20)
Note: Areas, where it is not possible to sandblast, may be cleaned by power brushing as per ST-3 with consent of BHEL / Customer.							
Detailed shades, VOS and properties of paints will be informed to Contractor at the time of application of paints.							

Painting Scheme for Gates and Damper:

Surface exposed to atmosphere
Surface Preparation: Power Tool Cleaning
Primer: One coat of red oxide Zinc Phosphate primer to IS 12744, DFT = 30 µm (min)
Finish Paint: Two coat synthetic of enamel to IS 2932 smoke gray shade no 692 IS 5 to a DFT of 40 µm

Total DFT – 70 µm (min)

Surface under insulation and flue gas path (including Gate frame)
Primer: Two coat red oxide Zinc Phosphate primer to IS 12744, DFT = 60 µm (min)

Machined components and gate blades are protected with temporary rust preventive application.