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NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited

Ref: BHEL/NR/SCT/UNCHAHAR/BOILER /957

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NOTICE INVITING TENDER (NIT)

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

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To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHEL/NR/SCT/UNCHAHAR/BOILER /957**	
ii	**Broad Scope of job**	" Erection, Testing, Commissioning, Trial operation & handing over of Boiler, ESP, Rotating machines, its auxiliaries, power cycle piping , painting ,insulation etc including supply of paints at 1x500 MW,STAGE-IV, FGUTPP, NTPC UNCHAHAR, U.P."	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :*** ***Start : 23/05/2014 , Time : 0900 HRS*** ***Closes: 13/06/2014 , Time : 1200 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 : 13/06/2014 , Time : 1500 HRS*** ***Place : Noida***	*Applicable*
vi	**OPENING OF TENDER**	***Date : 13/06/2014,*** *(within 2 hours of the latest due date and time of offer*	*Applicable*

		submission). *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the opening of tender*	
vii	**EMD AMOUNT**	*Rs 2,00,000/-*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Date:* ***02/06/2014*** *Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	**Being appointed; will be advised separately**	*Applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

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

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

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

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

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
- One set of tender documents shall be retained by the bidder for their reference

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

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

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO :	

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

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

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

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

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

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

9.0 Assessment of Capacity of Bidders:

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

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

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

i). Total number of Packages

Total number of Packages in hand = P

Where

- 'P' is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced, excepting packages which are on HOLD due to reasons not attributable to Bidder..

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

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

i). Calculation of Overall 'Performance Rating' for 'similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) $P_1, P_2, P_3, P_4, P_5, \ldots P_N$ etc be the packages (**under execution**/ executed during the 'Period of Assessment' in all Regions) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (ie $P_T = P_1 + P_2 + P_3 + P_4 + .. P_N$)

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

c) Sum 'S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$,…. $S_{1\text{-}N}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}N}$). Similarly S_2 for package P_2 for period T_2, S_3 for package P_3 for period T_3, etc for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e 'S_T'= $S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

d) **Overall Performance Rating 'R_{BEHL}' for the similar Package/Packages** (**under execution**/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL)**:**

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

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

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

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

Sl no	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No of similar packages for all Regions = $\mathbf{P_T}$ ie Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	---------
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

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

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

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

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

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

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

III. 'Assessment of Capacity of Bidder':

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

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

Note:

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

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

IV. **Explanatory note**:

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

b) Identified Packages (Unit wise)

Table-1

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

			xi). Material Handling & Material Management xii). Others (Mechanical)

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

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

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

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

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

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

d) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders' or due to non-approval by Customer, then BHEL at its discretion reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating '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 Not used.

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 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.

27.0 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 RA.

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."

Information and General Terms and Conditions governing RA shall form part of the RFQ/ Enquiry.

28.0 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.

29.0 **Micro and Small Enterprises (MSE)**

Any Bidder falling under MSE category, shall furnish the following details & submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer

Type under MSE	SC/ST owned	Others
Micro		
Small		

Note: - If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.

MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with attested copy of a CA certificate (format enclosed as Annexure – 3 where deemed validity of EM-II certificate of five years has expired) applicable for the relevant financial year (last audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer. .

30.0 Order of Precedence

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

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

g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03. Annexure-3: Chartered Accountant certificate for MSMED
04. Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING REQUIREMENTS

JOB	**Erection, Testing, Commissioning, Trial operation & handing over of Boiler, ESP, Rotating machines, its auxiliaries, power cycle piping , painting ,insulation etc including supply of paints at 1x500 MW,STAGE-IV,FGUTPP,NTPC UNCHAHAR, U.P."**
TENDER NO	**BHEL/NR/SCT/UNCHAHAR/BOILER /957**

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**	**Applicable**	
B	**Technical Criteria** Bidder who wish to participate should have executed works of similar nature of at least one Boiler of 190 MW unit or of higher rating	**Applicable**	
C-1	Financial Criteria TURNOVER Bidders should have achieved an average annual financial turnover (Audited) of Rs. 1860 Lacs or more over last three Financial Years (FY) i.e 2010-11, 2011-12, 2012-13	**Applicable**	
C-2	NETWORTH Net worth of the bidder based upon 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 on latest Audited Accounts.	**Applicable**	
	Relevant documents meeting above requirement at 'B' and 'C' shall be submitted by bidder		
D	Assessment of Capacity of Bidder to execute the work as per Sl no. 9 of NIT	**Applicable**	By BHEL
E	Approval of Customer	**Applicable**	BY BHEL
F	Consortium criteria	**Not Applicable**	BY BHEL

Explanatory Notes for QR 'B'

1. For B , 'Executed' means the Boiler should have been light up by the date of Technical Bid opening.
2. If the qualifying work is completed in the Seven (7) years period specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.
3. 'Similar' work means – Boiler consisting of Pressure parts, Structures/ESP and IBR/Power cycle piping of the same unit as a stand alone bidder.
4. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as given above along with all annexure.

ANNEXURE - 2

CHECK LIST

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

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

18	Tie Ups/Consortium Agreement are submitted as per format	~~Applicable~~/Not Applicable	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable/~~Not Applicable~~	YES/NO
20	Analysis of Unit rates	Applicable/~~Not Applicable~~	YES/NO

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE - 3

Certificate by Chartered Accountant on letter head

This is to Certify that M/S ..... , (hereinafter referred to as 'company') having its registered office at ..... is registered under MSMED Act 2006, (Entrepreneur Memorandum No (Part—II) ..... dtd:..... , Category: ..... (Micro/Small)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as per the latest audited financial year..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No. S.O.1722(E) dated October 5, 2006:
   Rs.....Lacs

2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the **MSMED** Act, 2006:
   Rs.....Lacs

(Strike off which is not applicable)

The above investment of Rs.....Lacs is within permissible limit of Rs.....Lacs for ..... Micro / Small **(Strike off which is not applicable)**

Category under MSMED Act 2006.

Or

The company has been graduated from its original category (Micro/Small) (Strike off which is not applicable) and the date of graduation of such enterprise from its original category is ..... (dd/mm/yyyy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S.O. No. 3322(E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by Ministry of MSME.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant

ANNEXURE - 4

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

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).

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

2. 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 actionby BHEL as per extant guidelines in vogue.

3. 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.

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

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

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

7. 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 non-compliance 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.

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

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

10. 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, as provided on case-to-case basis to Service provider within two working days of Auction without fail.

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

12. 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.

13. 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.

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

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

ANNEXURE – 4

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

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

INTEGRITY PACT

Between

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

and

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

Preamble

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

_____

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

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

Section 1 – Commitments of the Principal

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

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

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

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

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

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

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

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved

in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

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

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

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

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

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

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

Section 4 – Compensation for Damages

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

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

Section 5 – Previous Transgression

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

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

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

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

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

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

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

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

Section 8 –Independent External Monitor(s)

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

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

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

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

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

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

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

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the

Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

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

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

Section 9 – Pact Duration

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

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

Section 10 – Other Provisions

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

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

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

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

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

For & On behalf of the Principal

(Office Seal)

For & On behalf of the Bidder/ Contractor

(Office Seal)

Place----------

Date----------

Witness: _____

(Name & Address) _____

_____

Witness: _____

(Name & Address)_____

_____

Rev 01
1st June
2012

TECHNICAL CONDITIONS OF CONTRACT (TCC)

(Document No PS:MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/UNCHAHAR/BOILER/957

FOR

ERECTION,TESTING,COMMISSIONING,TRIAL OPERATION & HANDING OVER OF BOILER, ESP, ROTATING MACHINES, ITS AUXILIARIES, POWER CYCLE PIPING, PAINTING, INSULATION ETC. INCLUDING SUPPLY OF PAINTS AT 1X500 MW, STAGE-IV,FGUTPP, NTPC UNCHAHAR, U.P.

PART- I OF TCC

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

1.0 PROJECT INFORMATION

Name of the Owner	:	**NATIONAL THERMAL POWER CORPORATION LTD.(NTPC)**
Name of Customer	**:**	**NTPC BHEL POWER PROJECTS PVT. LTD. (NBPPL)**
Address	:	NTPC Unchahar Thermal Power Plant Village: Mustafabad , Tehsil - Unchahar District– Raebareli, Uttar Pradesh
New Installation	:	1 x 500 MW
Nearest Railway station	:	Unchahar Railway Station on Kanpur-Allahabad line (1 Km from site)
Nearest Road	:	UnchaharLucknow-Allahabad Road (115 Km from Lucknow)
Nearest City	:	Raebareli
Nearest Airport	:	Lucknow-115 KM Allahabad- 85 KM
Highest Temperature	:	45 deg C
Lowest Temperature	:	1 deg C
Elevation	:	354.77 metres

2. 0 SCOPE OF WORK

2.1 BHEL has been awarded the work of Design, Engineering Manufacture, Supply, Erection, Testing & Commissioning of Boiler, Turbine, Generator equipment along with its auxiliaries for Feroze Gandhi Unchahar Thermal Power Project Stage-IV(1x500 MW), Unchahar, Distt. Raebareli, Uttar Pradesh.

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

2.3 (A) Service Portion

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

1. Taking delivery of the materials to be erected by contractor, loading & transportation from the project storage yard to erection site. **(Approx. distance of stores from erection site is 4 km.)**
2. Their preservation, safe keeping, watch and ward.
3. Checking, dressing, chipping, leveling & grouting of foundations.
4. Pre-assembly, erection, alignment of structures, pressure parts, non-pressure parts, rotating machines, ESP, trim and integral piping, , pulveriser fuel piping, Power cycle piping etc.
5. Welding, heat treatment, radiography, UT and other non-destructive tests wherever required
6. Hydraulic testing, air leak test, clean air flow test and other pre commissioning tests,
7. Carrying out of Special processes as per clause 4.39 of Part-II of TCC.
8. Insulation, touchup and finish painting including supply of paints etc.
9. Assistance during Chemical cleaning, alkali boil out, acid cleaning and passivation, PG test as per the scope given in the tender
10. Steam blowing and safety valve floating including erection and dismantling of all temporary piping, valves, pumps, tanks etc. required for above operations and other commissioning activities including post commissioning operations and stabilisation of the unit.
11. Transportation /dragging of boiler drum from unloading bay to inside boiler Structures and positioning on ground, erection using strand jack method including final alignment. ***Strand & Jack is in BHEL scope*.**
12. Unit trial operation, resolving any deficiencies observed and handing over of Boiler, ESP, Rotating Machinesat1X500 MW FGUTPP at Unchahar**.**

(B) Supply Portion

Procurement of Paints

Contractor has to supply all paints, primers and other consumables for painting of relevant area of boiler & auxiliaries of Unit-I. BHEL reserves the right to reject any

material not found satisfactory. Contractor shall produce manufacturer's test certificate.

Note:

1. Material which will be supplied by contractor as per supply rate schedule for which separate order shall be issued. Price for supply items as per supply rate schedule remains firm i.e. price variation compensation close mentioned in clause no. 2.17 of GCC and overrun compensation in clause no. 2.12 of GCC of contract shall not be applicable for supply order.
2. Paints, primers etc to be procured from NTPC/BHEL approved suppliers.
3. Contractor has to supply paints required for painting the total scope of work as envisaged in service portion of contractor.
4. Separate order shall be issued for service items (A) and Supply items (B).

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

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

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

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

2.3 Approx. weight to be erected for the Boiler (Structure, Pr. & Non pr. Parts), ESP, Rotating Machines, insulation & Power cycle piping etc.for the unit shall be 35646 MT as indicated in Annexure-I.

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

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

2.4 The contractor under this contract shall also provide free of cost services of skilled persons for a total period of 384 Man-months exclusively for use by BHEL.This manpower will be required for following services

Qualified computer operator for office work. (64 man- months)

Skilled workers for working in store, office and colony. (128man-months)

Unskilled workers for working in store, office and colony. (192 man-months)

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

In case contractor fails to provide above-mentioned man-power as desired by BHEL, the latter shall have right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man-months as per above provision, fully or partly, recovery at the rate of the prevailing minimum wages plus 25.08% (for statutory payments) at UNCHAHAR for the workers categories stated above plus 10% will be made from the final bill of the contractor. For Computer operator if the minimum wage is not available in schedule it shall be taken as minimum wage for skilled worker plus 10 %.

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

Contractor shall ensure following:

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

- Male nurse (in shifts)
- Oxygen set up
- Breathing apparatus
- Eye wash facility

- Stretcher
- Trauma blanket
- Medicines.

The contractor against this contract is required to arrange and maintain ambulance at site for entire contract period including extended period if any. The above emergency facility set up including ambulance, male nurse etc. will be shared by BHEL and its other contractors working at this project at no extra cost to BHEL and its sub-contractors. In case, under unavoidable circumstances, if the ambulance is not available / being used elsewhere, the contractor will have to arrange for the same as under clause Sl. No. 1 of Cl no 2.5.

In the event of the failure of contractor to bring ambulance and other facilities as above, BHEL will be at liberty to arrange the same at the risk and cost of contractor including transportation cost and BHEL overhead at the rate of 5 % of the total cost incurred by BHEL and shall be deducted from contractor bill. Till the time BHEL is unable to provide ambulance with above facility a lumpsum amount Rs. 1.1 Lac per month or part there of (considering 30 days/month) shall be deducted from the bill of the contractor for the period for which ambulance is not deployed. Decision of BHEL in this regard shall be final and binding on contractor.

2.6 The contractor shall comply with following towards Social Accountability;

a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.

b) The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.

c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.

d) The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimation/ Corporal punishment for failure in meeting with relevant requirements.

e) The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.

f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.

g) The Contractor shall arrange potable drinking water to its employees & workers.

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

3.0 FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

S.No.	Description	Scope /to be taken care by		Remarks
		BHEL	**CONT.**	
1.1.0	**ESTABLISHMENT**			
1.1.1	**FOR CONSTRUCTION PURPOSE**			
A.	Open space for office	**YES**		Free of charge. As and where made available by customer M/s NTPC/NBPPL/BHEL
B.	Open space for storage	**YES**		Free of charge. As and where made available by customer M/s NTPC/NBPPL/BHEL
1.1.2	**FOR LABOUR COLONY**			
A	Open space	**YES**		Contractor have to make own arrangement
1.2.0	**ELECTRICITY**			
1.2.1.	Electricity for construction purposes (chargeable/free)			
1.2.1.1	Single point source	**YES**		FREE OF CHARGE
1.2.1.2	Further distribution for the work to be done which include supply of materials & execution		**YES**	
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:			
1.2.2.1	Distribution from single point including supply of materials & service		**YES**	
1.2.2.2	Supply, Installation & connection of material of energy meter including operation & maintenance		**YES**	

1.2.2.3	Duties & deposits including statutory clearances for above		**YES**	
1.2.2.4	Demobilization of the facilities after completion of works		**YES**	
1.2.2.5	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above lines		**YES**	**Chargeable** As per UPPCL standard rates Contractor shall install calibrated energy meter for metering electricity consumption.
1.3.0	**WATER SUPPLY**			
1.3.1	**FOR CONSTRUCTION:**			
1.3.1.1	Making the water available at single point	**YES**		Free.As and where made available by BHEL/ NBPPL/NTPC
1.3.1.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**	
1.3.2	**LABOUR COLONY:**			
1.3.2.1	Making the water available at single point			Contractor have to arrange on his own.
1.3.2.2	Further distribution as per the requirement of work including supply of materials & execution			
1.4.0	**LIGHTING**			
1.4.1	For construction work (supply of all materials) 1. At office storage area 2.At preassembly area 3.At construction site/area		**YES**	
1.4.2	For construction work (execution of lighting work/arrangements) 1. At office storage area 2. At preassembly area 3. At construction site/area		**YES**	
	Providing the necessary consumables like bulbs, Switches, etc during the course of construction		**YES**	
1.5.0	**Communications facilities for site operations of the bidder**			
1.5.1	Telephone, fax , internet ,intranet, email etc.		**YES**	

1.6.0	**COMPRESSED AIR SUPPLY**			
1.6.1	Supply of compressor and all other equipments required for compressor & compressed air system including pipes, valves,storage system etc.		**YES**	
1.6.2	Installation of the above system and operation & maintenance of the same		**YES**	
1.6.3	Supply of all the consumables for the above system during the contract period.		**YES**	
	ERECTION FACILITIES			
2.1.1	Providing erection drawings for all the Equipments covered under this scope	**YES**		
2.1.2	Drawings for construction method	**YES**	**YES**	In consultation with BHEL
2.1.3	As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site		**YES**	**do**
2.1.4	Shipping lists etc for reference & planning the activities	**YES**	**YES**	**do**
2.1.5	Preparation of site erection schedules and other input requirements		**YES**	**do**
2.1.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	**YES**	**YES**	**do**
2.1.7	Weekly erection schedule based on Sl. No.2.1.5		**YES**	**do**
2.1.8	Daily erection/work plan based on Sl. No.2.1.7		**YES**	**do**
2.1.9	Periodic visit of senior official of bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two month		**YES**	
2.1.10	Preparation of preassembly bay		**YES**	

3.1 BHEL will not be responsible for any loss or damage to the contractor's equipment as a result of variation in voltage or frequency or interruptions in power supply.

3.2 The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

3.3 Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS,

ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.**The energy meter to be installed by the contractor & shall be tested and certified by State Electricity Board or any other agency approved by the NTPC/NBPPL at his cost.**

3.4 The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.

a) All electrical installations should be as per Indian Electricity rules.

b) All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.

c) Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.

d) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.

e) Contractor have to make their own earthing arrangement for their equipment / DB earthing.

f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.

g) Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.

h) Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.

i) For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.

3.5 ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.

3.6 In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

3.7 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed, as per instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expanses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.

3.8 Compressor required capacity for construction purposes shall be arranged by Contractor.

3.9 The construction and dismantling of the foundations required for the passenger lifts is included in the scope of the contractor. Erection of CONSTRUCTION ELEVATOR / PASSENGER LIFT, including the construction

and dismantling of the foundations required for the passenger lifts, is in the scope of the contractor. However BHEL will assist in commissioning of the same. The periodic upkeep and maintenance of the elevator is to be carried out by the contractor. Required spare parts other than rubber items and consumables shall be given by BHEL free of cost.

4.0 T&P AND MMD DEPLOYED BY CONTRACTOR

Sl. No.	*Equipment*	**Capacity**	**Minimum Qty.**
1	TYRE MOUNTED / Crawler CRANE	100 T	1 No
2	TYRE mounted mobile CRANE withTelescc boom	36 / 40 T	2 No.
3	Tyre mounted mobile crane	18/ 20T	2 No.
4	Tyre mounted mobile crane / Hydra	14 / 20T	4 No.
5	TRAILER WITH PULLING UNIT	20 MT	4 No.
6	Low Bed Trailer	60 MT	APR
7	Air Compressor	210 CFM	1 No.
8	ELECTRIC WINCH	2/3/5/10/15 MT	APR(Min. 30 Nos)
9	Hydraulic Jacks	10/20/50/100 MT	APR
10	Welding sets with accessories and ovens for welding electrodes backing and holding		APR
11	Heat treatment and Stress relieving sets		APR
12	Hydraulic Pipe Bending Machine (Manual and Motorised) of various sizes		02 no. Each/APR
13	Radiography arrangement including source	Iridium 192	4 sources
14	Pipe chamfering machine		APR
15	Pipe cutting &beveling machines		Adequate nos.
16	Chain pulley blocks of various & suitable capacities		APR
17	Three phase distribution board with complete setup for drawl & distribution of construction power		APR
18	Electric cables for drawl & distribution of construction power, heating machines		APR
19	Sleepers of suitable sizes		APR

20	Various sizes of clamps/ fixtures for assembling		APR
21	Dewatering pumps		APR
22	Portable hardness tester		APR
23	Recordable UT test Equipment suitable to meet the requirements (KRAUTKRAMMER MODEL USN 50 or EQUIVLENT)		APR(MIN 2 NOS)
24	Hardness testing equipment (Equotip or Microdur make) 33 Stress relieving equipment with temperature		APR (MIN 2 NOS)
25	Magnetic particle testing equipment-DRY & WET Type		APR
26	Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable		APR
27	Spectrometer for metal testing		APR
28	Alco meter for paint thickness checking		APR
29	Hand Operated Megger 500 / 1000 V		APR
30	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy		APR
31	Digital and Analogue Millimetres		APR
32	U Tube Manometer 0-2000 mm Water Column		APR
33	Inclined Manometer 0-50 mm Water Column		APR
34	Calibrated Pneumatic Torque wrench		APR
35	Bolt Tension Calibrator		APR
36	Special Slings for Erection of Ceiling Girders & other heavy components		APR
37	Scaffolding Pipes		Min .12000 nos/APR

NOTES:

1. The above major T & P list is indicative only and mobilization to be ensured as per project requirement as per front and material availability to maintain schedule of work in line with clause no. 2.9 of the GCC. Additional T & Ps if required, have to be mobilized by the contractor within the quoted / accepted rate to sustain the desired progress of work. Contractor shall be responsible for adequate deployment of T & P as per site requirement for ensuring successful and timely execution of the work covered within the scope of their tender.

2. If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to get work done at the risk &cost of contractor without prejudice to right of BHEL as in GCC. Risk & cost will cover, cost incurred by BHEL along with overhead charges @ 5%.

3. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.

4. Other terms and conditions regarding above items shall be as per T&P clause in SCC,

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

LIST OF T&P BEING PROVIDED BY BHEL ON FREE OF HIRE CHARGES AND ON SHARING BASIS				
Sl. No.	**Equipment**	***Capacity***	**Qty.**	**Remarks**
1	High capacity crane	600 MT	1 No	On sharing basis for limited period during the erection of structures like upper tiers of boilers, ceiling girders, roof top structures etc for which high capacity crane is required
2	Mid range crawler/ tyre mounted crane	200 MT	1Nos	On sharing basis
3	Crawler/ tyre mounted General Purpose Crane	100/135 MT	1Nos	On sharing basis
4	Strand Jack Arrangement		1 Set	For Boiler Drum Erection
5	Motorized Hydraulic Test Pump	0-600kg/cm2	1 nos	
6	Construction Elevator		1 no.	
7.	Huck Bolting M/c		APR	
8.	Induction heating machine with DG set		APR	
9.	Chemical Cleaning Arrangement		1 set	By BHEL agency
10.	Aneometer 0-15 M / Sec		1 No.	
11.	Pitot Tube		1 No.	

NOTES:

1. **Cl.4.2.2.16 c.)of SCC**shall read as day-today upkeep and running maintenance like filling topping up of lubricants, changing filters, etc including repair of self starter, batteries and dynamo of these cranes shall be the responsibility of the contractor. If on checking it is found that the same is not followed, BHEL will exercise its right to get the job/works done at the risk and cost of contactor.BHEL may also provided cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance shall be excluded from scope of contractor.

2. **Cl.4.2.2.16 e.) of SCC**The **operatorfor** BHEL's cranes **100 MT & above capacity** being provided by BHEL free of cost. **Further, Helpers and fuel for**

operation of all BHEL cranes, shall be provided by contractor within the final accepted rates.

3. **These Cranes (S. No.1,2&3) will be provided on sharing basis on specific instruction of the BHEL Engineer as per the work requirement.**

4. **The contractor shall make necessary arrangement like lying of steel plates,assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of crane.**

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

6. **The spares of Huck Bolting Machines i.e. anvils, carbon brushes, nose assembly, jaw sets, trigger switch & service kit for installation tools will be in contractor's scope.**

6.0 TIME SCHEDULE

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

6.2 Entire work for first package as detailed in the tender specifications shall be completed within **32 months** from the Zero date as per programme / milestones indicated by BHEL Engineer. Contractor has to mobilize adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

In case due to reasons not attributable to the contractor, the work gets delayed and additional manpower / resources have to be mobilized so as to expedite the work to meet various milestones, same shall be done within the quoted rates as per Rate Schedule, at no extra cost to BHEL. In the event the contractor fails to respond to these requirements, BHEL shall take appropriate actions to meet customer's commitments in line with the provisions of General Conditions of Contract.

6.3 The various milestones dates to be achieved for BOILER **u#6**, as per the current status of contract are as below:

MILE STONES	**MONTH**
Start of Erection	ZERO
Drum Lifting	5th month
Boiler Hydro Test (drainable)	16th Month
Boiler Light up & ABO	22nd Month
Steam Blowing	25th Month
Synchronisation& Coal Firing	28th Month
Full Load	30th Month
Trail Operation& Handing over	31th Month

6.4 The contractor has to ensure that work is completed in all respects leaving no pending points. However the punch list/ pending points, which are

possible to be attended at site, shall be fully liquidated within two months from successful trial operation of the unit.

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

7.0 TERMS OF PAYMENT

7.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

7.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

7.3 Subject to any deduction, which BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder.

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

7.3.2. PROGESSIVE PAYMENT ON PRORATA BASIS

I. 85 % of unit rates
(Applicable for ITEM. No. 1 to 6 of Rate Schedule)

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

	treatment,**(if not applicable, then this portion to be paid along with welding)**						
6.	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC			5 %			
7.	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC			5 %			
8.	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES			5 %			
9.	COMPLETION OF ATTACHMENT WELDING, FIN WELDING, SUPPORTS	5 %					
10.	COMPLETION OF ROOF SKIN CASING	5%					
11.	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG						10%
12.	EQUIPMENT TRIAL OPERATION				10%		
13.	HYDRAULIC TEST OR PNEUMATIC TEST						5%
	TOTAL FOR PRO RATA PAYMENTS	85%	85%	85%	85%	85%	85%

II. STAGE/MILESTONE PAYMENTS (15%)

1.	Completion of Drum lifting		0.5%
2.	Completion of Hydro test (drainable and non-drainable)		1%
3.	Completion of air & gas tightness test for Boiler and ducting		1%
4.	Completion of gas tightness test for each pass of ESP	4X0.25%	1%
5.	Completion of Charging of all ESP fields	4X0.25%	1%
6	Completion of Boiler light up and ABO/ acid/ EDTA/ chemical cleaning		1.5%
7.	On completion of steam blowing & Safety Valve floating		1%
8.	Coal firing		1%
9.	Full loading		1%
10.	Completion of Painting		3.0%
11.	Area cleaning, temporary structures cutting/removal and return of scrap		1%
12.	Liquidation of pending points		1%
13.	Completion of all contractual Obligation and de mobilization of site office.		1%
	Total		**15%**

Note:

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

III. SUPPLY PORTION: 100% payment after completion of finish painting as certified by BHEL Engineer.

A. TAXES, DUTIES, LEVIES FOR SERVICES CONTRACT

8.0 TAXES, DUTIES, LEVIES

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

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

8.1 Service Tax &Cess on Service Tax

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

Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the

Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract.For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted :

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

1. The name, address and registration number of the contractor

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

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 for payment of Service Tax by BHEL.

Where more than one nature of Service under Service Tax Rules is involved, the invoice mentioned above shall contain the break up of all values for each nature of Service.

8.2 VAT (Sales Tax /WCT)

The rates quoted by the Contractor shall be inclusive of VAT/Sales Tax and BHEL shall not reimburse any amount on this account due to any reason whatsoever.

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.

Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted.

In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing all their material, plant and equipment etc at site for the execution of the work, including arrangement of Road Permits if and as applicable under the relevant VAT Act.

8.2.1 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for dischargingthe liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with

regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the contractor.

8.2.2 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 PriceBid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

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

B. TAXES, DUTIES, LEVIES FOR SUPPLY CONTRACT

8.4 TAXES AND DUTIES:

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

Contractor shall get his organisation registered with concerned Sales tax/ VAT authorities within 15 days of award of this contract and forward the same to BHEL. The delay on this account and delay in bringing the material shall be to contractors account and no extension of time shall be allowed on this account. In case the contractor is already registered for Sales tax/ VAT with Govt. Authorities, the same must quote his registration no. While submitting their tender.

9.0 Any other requirement

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

IMPORTANT CONDITIONS

10.1 In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be as mentioned in Notice inviting tender.

10.2Modification/ deletion in Price Variation Compensation Clause no. 2.17of GCC:

I. Clause No. 2.17.5 of GCC shall be 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 delivery period as defined in clause no 6.0 of TCC (Part-I)

II. Clause No. 2.17.9 shall be modified as:-

PVC shall be applicable only **for the extended period of contract (if any) after the schedule completion date.** However, the total Quantum of Price Variation amount payable/recoverable shall be regulated as follows:

- For the portion of backlog attributable to the contractor, **no PVC shall be paid.**
- For the period of Force Majeure, the PVC (if applicable) will be limited to the indices applicable at the beginning of the force majeure period.
- For the portion of backlog attributable to BHEL, the PVC will be as per the indices applicable for the respective months
- The total amount of PVC shall not exceed 20% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works.

All other terms & conditions of clause no. 2.17 shall remain same

Annexure – I

WEIGHT SCHEDULE

AA: SUMMARY OF WEIGHTS

SN	Description	Wt	unit	Annexure
1	Pressure Parts:	5896	MT	IA
2	Structure& Non-Pressure parts:	14731	MT	IB
3	ESP & auxiliaries	7471	MT	IC
4	Rotating Machines:	3512	MT	ID
5	Insulation	2284	MT	IE
6	Power Cycle & Boiler piping	1752	MT	IF
	TOTAL TONNAGE	**35646**	**MT**	

Annexure – IA

BB:Product Group (PG) Wise Weight Schedule For1X500MWBoiler

SL NO	PRODUCT GROUP	DESCRIPTION OF PG	APPROX WEIGHT (IN MT)
1.0	**PRESSURE PARTS**		
1.1	04	BOILER DRUM & SUSPENSION	246
1.2	05	FURNACE WATER WALL HEADERS	342
1.3	06	FURNACE WATER WALL PANELS	546
1.4	07	FURNACE RISERS, SCREEN TUBES ,MIXING SPHERE,SPIRAL WALL	351
1.5	08	BUCKSTAYS & FURNACE GUIDES	662
1.6	09	SEAL BOXES FOR FURNACE OPENING & INSTRUMENT INSERTS	14
1.7	10	SUPER HEATER HEADERS	172
1.8	11	SUPER HEATER COILS	905
1.9	12	SH SPACER TUBES, SAT. LINKS, DESH & DESH LINKS, SH HANGERS & SUPPORTS	454
1.10	15	REHEATER HEADERS	77
1.11	16	REHEATER COILS ETC.	502
1.12	17	REHEATER LINKS & SUSPENSIONS	135
1.13	18	FURNACE ROOF SKIN CASING	24
1.14	19	ECONOMISER COILS, HEADERS & PIPES	883
1.15	20	SOOT BLOWERS	77
1.16	21	SOOT BLOWING STEAM PIPING	28
1.17	22	HP & LP BYPASS	10
1.18	24	BOILER TRIM PIPING, SAFETY VALVES, SILENCERS, NAME PLATES ETC.	330
1.19	28	FURNACE DOORS & FASTENERS	15
1.20	41	OIL & GAS BURNERS, IGNITORS ETC.	4
1.21	42	OIL SYSTEM PIPINGS	119
		SUB TOTAL(IN MT)	**5896**

Annexure – IB

2.0	**STRUCTURE & NON-PRESSURE PARTS**		
2.1	30	MAIN BOILER ENCL.	204
2.2	35	MAIN BOILER STRUCTURES	4888
2.3	36	BOILER MAIN FLOORS, STAIRS & LADDERS ETC.	3232
2.4	38	INTERCONNECTING STRUCTURES & PLATFORMS	606
2.5	39	COLUMNS & FRAMES FOR DUCTING, FAN HANDLING STRUCTURES ETC.	1370
2.6	43	IGNITOR, SCANNER & SEAL AIR SYSTEM	81
2.7	45	COAL BURNERS	141
2.8	47	PULVERISED FUEL PIPING & SUPPORTS + CERALIN BENDS	455
2.9	48	AIR DUCTS, FLUE GAS DUCTS, DAMPERS, EXPANSION JOINTS/ NMEJS, DUCT SUPPORTS ETC.	2852
2.10	50	STEAM COIL AIR HEATER	23
2.11	57	DAMPERS & GATES	636
2.12	81	MISC TANKS (PUMPS,CLEAN DRAIN FLASH TANK/ CW STORAGE TANK, MAKE UP STORAGE TANK ETC)	30
2.13	99*	MISC HANDLING EQUIPMENT	55
		SUB TOTAL(IN MT)	**14731**

Annexure – IC

3.0	**ESP& auxiliaries**		
		WEIGHT SCHEDULE	
S.NO.	**PGMA**	**DESCRIPTION**	**WT.(In MT)**
1	79-301	ESP Supports	34
2	305	Sub Delivery Items	0.60
3	6	Insulator Housing Assembly	62
4	8	Gas Distributor Assembly	74
5	9	GD Rapping System	13
6	10	GD Drive Arrangement	1
7	11	Gas Screening	10
8	13	Emitting System Suspension	20
9	14	Support Insulator	9
10	15	Emitting Electrode	30
11	16	Emitting Electrode Rapping	39
12	17	Drive Arrangement For Emitting System	38
13	19	Suspension Arrangement For Collecting Electrode	135
14	20	Collecting Electrode	1360
15	21	Frame Of Emitting System - Top	122
16	22	Frame Of Emitting System - Bottom	154
17	23	Inspection Doors	22
18	24	Shock Bars	107
19	25	Collecting Electrode Rapping Mechanism	102
20	26	Drive Arrangement For Collecting Rapping	8
21	28	ESP Roof Beam	170
22	30	Electrical Sub Delivery Components Of ESP	17
23	31	Geared Motors For Rapping Mechanism	22
24	332	Frame Of Emitting System - Middle	212
25	37	Junction Box & Push Button Stations	2
26	42	Outer Roof	267
27	43	Hopper Ridges	86
28	44	Hopper Upper Part (6 mm thick)	348
29	45	Hopper Lower &Midddle Part (6 mm thick)	580
30	46	Insulator Support Panels (6 mm thick)	106
31	47	Roof Panel Assembly (6 mm thick)	151
32	48	Casing (Structure)	432
33	49	Casing (Shell, Side Panels, Cables & GD Housing) - 6 mm thick	565
34	50	ESP Funnels (5 mm thick)	172
35	55	Penthouse	172
36	57	Splitter & Guide Vanes	29
37	59	Control room inserts	58
38	60	Cables	121
39	61	ESP Test Equipments	1
40	62	Earthing, Cable Trays, Tray Supports, Channels & Angles	167
41	63	Ash Level Indicator	3
42	65	Hopper Approach Platform	105

43	66	Water Washing System	6
44	72	Interlocks	1
45	73	Electrically Operated Hoists & Accessories	7
46	74	Opacity Monitor & Accessories	0.8
47	78	BAPCON & accessories	0.5
48	80	Foundation Materials For ESP	25
49	81	Supporting Structures For ESP	815
50	90	Heating Elements & Thermostats	1
51	91	PANEL TYPE HOPPER HE	25
52	92	Auxiliary Control Panel	38
53	93	Rapper Control Panel	1
	94	STATCON Panel	1
54	95	IOS Panel	0.3
55	7X-988	Commissioning Spares	0.4
56	7X-996	Tools & Tackles	0.1
57	89	Galleries and Railings Roof Hand Rails, Floor grill, pent house roofing,	313
58	-	Transformer	110
			7471

Annexure – ID

4.0	**ROTATING MACHINES**		
3.1	52	ROTARY REGENERATIVE AIR HEATER	1458
3.2	55 & 56	FD, ID & PA FANS WITH SUB-DELIVERIES	395
	-	MOTORS (ID, FD, PA, MILLS, SA, SC ETC)	250
3.3	61	COAL MILLS & SUB-DELIVERIES	1250
3.4	65	COAL FEEDERS	56
3.5	67	MILL PLANT AUXILIARIES	103
		SUBTOTAL	**3512**

Annexure – IE

5.0		**INSULATION (One Boiler)**	IN MT
1.	PG-31	SKIN CASING & COMPONENTS	17
2.	PG-32	FIXING COMPONENTS FOR INSULATION	206
3.	PG-33	INSULATION WOOL	1179
4.	PG-37	OUTER CASING	76
5.	79-367	Mineral wool ESP & Fixing comp.	367
6.	89	Insulation cladding ESP	74
7.	81	MINERAL WOOL MATTRESS/CLADDING/FIX COMP	115
		PEM (Supply)	250
		TOTAL (IN MT)	**2284**

Annexure-IF

WEIGHT SCHEDULE
(PIPING SYSTEMS)

Sl. No.	PG MA	POWER CYCLE PIPING (One Boiler)	WT. (in MT)	
1	80-300	MS UPTO STOP VALVE	34	P 91
2	80-301	MS FROM BOILER STOP VALVE TO ESV	104	P 91
3	80-303	MS HEADER TO AUX PRDS	12	P 22
4	80-304	MS HEADER TO HPBP VALVE	20	P 91
5	80-307	HP AND LP BYPASS WARM UP	2	
6	80-310	HRH FROM REHEATER TO INTERCEPTOR VALVE	167	P 22
7	80-311	HRH FROM INTERCEPTOR VALVE TO TURBINE	15	P 22
8	80-312	LPBP VALVE UPSTREAM & DOWNSTREAM	54	P 22
9	80-320	CRH FROM TURBINE TO REHEATER	134	
10	80-321	HPBP VALVE TO CRH PIPING	12	P 22
11	80-322	CRH PIPING TO DEAERATING HEATER	7	
12	80-323	STEAM TO BFP DRIVE TURBINE	2.3	
13	80-324	CRH HEADER TO AUX.PRDS	1	
14	80-329	EXTRACTION STEAM TO BFP DRIVE TURBINE	9	
15	80-340	AUX STEAM HEADER	4	
16	80-341	AUX STEAM HEADER INTERCONN BETWEEN UNITS	35	
17	80-342	AUX STEAM TO SCAPH	14	
18	80-343	AUX STEAM TO AH SOOT BLOWERS	3	
19	80-344	AUX STEAM TO FO SYSTEM TP	70	
20	80-345	AUX STEAM TO DEAERATING HEATER	3	
21	80-351	AUX STEAM TO UNLISTED USERS - SG SCOPE	12	
22	80-355	STEAM TRACING PIPING	7	
23	80-365	CBD TANK VENT/SV EXHAUST TO ATMOSPHERE	1.5	
24	80-366	IBD TANK VENT TO ATMOSPHERE	11	
25	80-368	SCAPH DRAIN TANK VENT/SV EXHAUST TO ATM	3	
26	80-373	AUX STEAM HEADER SV EXHAUST	5	
27	80-395	AUX STEAM ATOMISING	0.9	
28	80-425	BFD FROM FINAL HPH TO SG TP	117	
29	80-430	SPRAY WATER TO HPBP	4	
30	80-431	SPRAY WATER TO AUX PRDS	2.3	
31	80-432	SPRAY WATER TO BOILER DESH UPTO SG TP	17	
32	80-450	CBD AND EMERGENCY DRUM DRAIN	3.8	
33	80-451	BOILER INTEGRAL PIPING DRAINS	14	

34	80-452	HP PIPING DRAINS - SG SCOPE	30	
35	80-454	SCAPH DRAINS	7	
36	80-455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	8	
37	80-460	SG AUX COOLING WATER UNIT SYSTEM	78	
38	80-471	BOILER WATER WASH TO & FROM UNIT	20	
39	80-473	DEMINERALISED WATER SYSTEM	3	
40	80-477	SERVICE WATER PIPING	5	
41	80-480	FIRE WATER-OTHER AREAS	20	
42	80-612	SERVICE AIR FOR INDIVIDUAL UNITS	17	
43	80-614	INST AIR COMP SUC & DIS TO RECEIVER	25	
44	80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	15	
45	80-650	FUEL OIL SUPPLY AND RETURN PIPING	110	
46	80-399	STEAM BLOWING PIPING-TEMPORARY	65	
47	80-901	SUB DELIVERY VALVES FOR LIGHT UP	3	
48	80-920	H&S FOR HYDRO TEST	10	
49	80-921	H&S FOR LIGHT UP STEAM LINE	155	
50	80-927	H&S OF TEMP. PIPING –Steam Blowing	8	
51	80-934	STANDARD HANGER COMPONENTS	35	
52	80-940	AUX STRUCTURE FOR CRITICAL PIPING-SG	230	
53	80-992	IMPORTED ELECTRODES	5.8	
54	80-993	MISC ERECTION MATERIALS	1.1	
		TOTAL FOR A BOILER(IN MT)	**1752**	

NOTES:

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

ANNEXURE –II

TENTATIVELIST OF HP ERECTION JOINTS

1	RH Stage I Inlet Header Nipple + RH Stage I Coil	SA 213 T11 + SA 213 T11	·47.63 x 4.5	148
2	RH Stage I Inlet Header Nipple + RH Stage I Coil	SA 213 T11 + SA 213 T11	·47.63 x 8.6	222
3	RH Stage I Inlet Header Nipple + RH Stage I Coil	SA 213 T11 + SA 213 T11	·47.63 x 10.0	148
4	RH Stage I Coil + RH Stage I Outlet Header Nipple	SA 213 T91 + SA 213 T91	·54.0 x 5.0	74
5	RH Stage I Coil + RH Stage I Outlet Header Nipple	SA 213 T91 + SA 213 T91	·54.0 x 4.0	444
6	RH Stage I Outlet Header + Links + RH Stage II Inlet Header	SA 335 P22 + SA 335 P22	·660.4 x 40.0	6
7	RH Stage II Inlet Header Nipple + RH Stage II Coil	SA 213 T22 + SA 213 T22	·63.5 x 4.0	74
8	RH Stage II Inlet Header Nipple + RH Stage II Coil	SA 213 T22 + SA 213 T22	·63.5 x 12.0	370
9	RH Stage II Coil + RH Stage II Outlet Header Nipple	SA 213 T91 + SA 213 T91	·54.0 x 5.0	888
10	S.C.Spacer Tube + Tube	SA 210 GR.C + SA 210 GR.C	·51 x 5.0	3
11	S.C.Spacer Tube + Tube	SA 210 GR.C + SA 213 T11	·51 x 5.0	15
12	S.C.Spacer Tube + Tube	SA 213 T11 + SA 213 T11	·51 x 6.6	74
13	R.G.Plug + Pipes	SA 105 + SA 106 GR.C	---	22
14	R.G.Plug + HDR	SA 105 + SA 106 GR.C	---	3
15	ECO Feed Pipe + Vavle	SA 106 GR.C + SA 234 WCB	·457.2 x 50	1
16	Reducer + Eco Inlet HDR	SA 234 WPC + SA 106 GR.C	·508 x 75	1
17	ECO.Inlet HDR Split	SA 106 GR.C + SA 106 GR.C	·508 x 75	1
18	ECO.Inlet HDR Nipple + Loose Tube	SA 210 GR.A1 + SA 210 GR A1	·38.1 x 5.3	316
19	Loose Tube + ECO..Lower Coil	SA 210 GR.A1 + SA 210 GR A1	·38.1 x 5.3	316
20	ECO. Lower Coil + ECO.Inter Coil	SA 210 GR.A1 + SA 210 GR A1	·38.1 x 5.3	316
21	ECO.Inter Coil TO + ECO.Upper Coil	SA 210 GR.A1 + SA 210 GR A1	·38.1 x 5.3	316
22	ECO.Upper Coil + Loose Tube & Header Nipple	SA 210 GR.A1 + SA 210 GR A1	·38.1 x 5.3	32

23	ECO.Upper Coil + ECO. Outlet HDR	SA 210 GR.A1 + SA 210 GR A1	·38.1 x 5.3	260
24	ECO.Outlet HDR (split)	SA 106 GR.C + SA 106 GR.C	·406.4 x 60	1
25	R.G.Plug + Pipe	SA 106 + SA 106 GR.C	---	3
26	s	SA 106 GR.C + SA 234 WP.C	·406.4 x 45	2
27	Link + Link	SA 106 GR.C + SA 106 GR.C	·368 x 40	13
28	Link + Link	SA 106 GR.C + SA 106 GR.C	·323.5 x 35	6
29	Link + Drum Nozzle	SA 106 GR.C + SA 106	·323.0 x 32	3
30	SH.Conn. Pipes Pipe + Pipe	SA 106 GR.C + SA 106 GR.C	·159 x 18	63
31	RAD Roof Inlet HDR (Split)Pipe + Pipe	SA 106 GR.C + SA 106 GR.C	·273 x 45	1
32	Radiant roof tube +tube	SA 213 T 11 + SA 213 T11	·63.5 x 6.3	152
33	Tube +Tube	SA 213 T 11 + SA 213 T11	·57 x 6.0	150
34	Tube +Tube	SA 213 T 11 + SA 213 T11	·57 x 6.0	158
35	RAD Roof Outlet HDR (Split)	SA 106 GR.C + SA 106 GR.C	·406.4 x 6.0	1
36	Rad.Roof Outlet HDR + Side Wall In HDR Pipe + Pipe	SA 106 GR.C + SA 105 GR.C	·406.4 x 37.4	2
37	Side Wall Tube Front + HDR. Nipple	SA 210 GR.C + SA 210 GR.C	·63.5 x 6.3	110
38	Side Wall Rear + HDR Nipple	SA 210 GR.C + SA 210 GR.C	· 51 x 5.0	56
39	Tube + Tube	SA 210 GR.A1 + SA 210 GR.A1	·76.1 x 12.5	6
40	Tube + Tube + HDR Nipple	SA 210 GR.C + SA 210 GR.C	·63.5 x 6.3	330
41	Tube + Tube + HDR Nipple	SA 210 GR.C + SA 210 GR.C	·51 x 5	168
42	Side Wall Out HDR + Front Wall In HDR Pipe + Pipe	SA 106 GR.C + SA 106 GR.C	·406.4 x 65	2
43	Front Wall Inlet HDR (Split) Pipe + Pipe	SA 106 GR.C + SA 106 GR.C	·406.4 x 65	1
44	Front Wall Tube + Tube	SA 210 GR.C + SA 210 GR.C	·51 x 5	126
45	Front Wall Tube + Tube	SA 210 GR.C + SA 210 GR.C	·63.5 x 6.3	4
46	Nipple + Tube	SA 210 GR.C + SA 210 GR.C	·38.1 x 5.0	276
47	Front Wall Tube + Hanger Tube Front Wall + Front Wall HDR	SA 210 GR.C + SA 210 GR.C	·51 x 5.0	252
48	Tube +Tube	SA 210 GR.C + SA 210 GR.C	·51 x 5.0	126

49	Rear Roof Tube + Hanger Tube	SA 210 GR.C + SA 210 GR.C	·51 x 5.0	126
50	Tube + Tube	SA 210 GR.C + SA 210 GR.C	·38.1 x 5.0	276
51	Tube + Eco.HDR Tube	SA 210 GR.C + SA 210 GR.C	·38.1 x 5.0	276
52	Hanger Tube + Hanger Tube	SA 210 GR.C + SA 210 GR.C	·44.5 x 7.1	552
53	Hanger Tube + Nipple	SA 210 GR.C + SA 210 GR.C	·44.5 x 7.1	276
54	SH. Supp.Tube + Tube	SA 210 GR.C + SA 210 GR.C	·51.0 x 11.0	20
55	LTSH hgr Tube + HDR Nipple & HGR Tube + HGR Tube	SA 210 GR.C + SA 210 GR.C	·51.0 x 11.0	744
56	HGR Tube + HGR Tube	SA 210 GR.C + SA 210 GR.C	·51.0 x 11.0	248
57	HGR Tube + HGR Tube	SA 210 GR.C + SA 210 GR.C	·51.0 x 11.0	438
58	Rear Wall Tube + HDR Nipple	SA 210 GR.C + SA 210 GR.C	·51 x 5	137
59	Tube + Tube	SA 210 GR.C + SA 210 GR.C	·51 x 5	137
60	HDR Nipple + Tube	SA 210 GR.C + SA 210 GR.C	·51 x 5	137
61	Side Wall out HDR. RR Wall Lower HDR. Pipe + Pipe	SA 106 GR.C + SA 106 GR.C	·323.9 x 50	2
62	RR Wall Lower HDR (Split) Pipe + Pipe	SA 106 GR.C + SA 106 GR.C	·323.9 x 50	1
63	Bifurcate Tube + Tube	SA 210 GR.C + SA 210 GR.C	·51 x 5	4
64	Tube + Tube	SA 210 GR.C + SA 210 GR.C	·63.5 x 6.3	6
65	HDR Nipple + Tube	SA 210 GR.C + SA 210 GR.C	·44.5 x 4.5	137
66	Tube + Header Nipple	SA 210 GR.C + SA 210 GR.C	·44.5 x 4.5	137
67	Bifurcate HDR Nipple	SA 213 T 11 + SA 213 T11	·47.63 x 6.0	372
68	Bifurcate + Coil Tube	SA 213 T 11 + SA 213 T11	·47.63 x 6.0	744
69	Lower + Inter Coil Tube + Tube	SA 213 T 11 + SA 213 T11	·47.63 x 6.0	744
70	Inter + Upper Coil Tube + Tube	SA 213 T 11 + SA 213 T11	·47.63 x 6.6	744
71	Upper Coil + Pendent Tube	SA 213 T 11 + SA 213 T11	·47.63 x 6.6	744
72	Pendent Coil + HDR Loose Tubes	SA 213 T 11 + SA 213 T11	·47.63 x 6.6	744
73	Loose Tubes + Nipple	SA 213 T 22 + SA 213 T22	·47.63 x 6.6	744

74	Disk Links Elbow + Link	SA 335 P12 + SA 335 P12	·457.5 x 50	4
75	Desh + Links	SA 335 P12 + SA 335 P12	·457.5 x 60	4
76	Desh + Links + Links + Div. In HDR	SA335 P12 + SA 335 P12	·457.2 x 56	6
77	Pipe + Pipe	SA335 P12 + SA 335 P12	·457.2 x 56	2
78	SH.DIV.Panellett Nipple + Loose Tubes & Loose Tubes + Coil Tube	SA 213 T11 + SA 213 T11 & SA 213T11 +SA 213 T22	·51 x 6	480
79	SH.DIV.Panellett Nipple + Loose Tubes & Loose Tubes + Coil Tube	SA 213 T11 + SA 213 T11 & SA 213T11 +SA 213 T22	·51 x 6.3	480
80	SH.DIV.Panel + Coil + Loose Tubes (Outlet Side)	SA 213T11 +SA 213 T22	·44.5 x 7.1	384
81	SH.DIV. Panel Lett Coil + Loose Tubes (Inlet Side)	SA 213T11 +SA 213 T22	·44.5 x 5	384
82	Links + Platen Inlet HDR. Pipe + Pipe	SA 335 P12 + SA 335 P12	·508 x 65	6
83	SH Platen Coil + Inlet Nipple	SA 213 T22 + SA 213 T22	·63.5 x 9.1	26
84	SH Platen Coil + Inlet Nipple	SA 213 T22 + SA 213 T22	·51 x 5.6	50
85	SH Platen Coil + Inlet Nipple	SA 213 T22 + SA 213 T22	·51 x 7.1	50
86	SH Platen Coil + outlet Nipple	SA 213 T22 + SA 213 T22	·63.5 x 12	25
87	SH Platen Coil + Inlet Nipple	SA 213 T22 + SA 213 T22	·54 x 6.3	25
88	SH Platen Coil + Inlet Nipple	SA 213 T22 + SA 213 T22	·51 x 8.0	100
89	SH Platen Coil + Inlet Nipple	SA 213 T22 + SA 213 T22	·44.5 x 5.6	75
90	SH Platen Coil + Inlet Nipple	SA 213 T22 + SA 213 T22	·44.5 x 8.6	25
91	SH Platen Coil + Inlet Nipple	SA 213 T22 + SA 213 T22	·44.5 x 9.0	50
92	SH Platen Coil + Outlet Nipple	SA 213 T22 + SA 213 T22	·54 x 12	75
93	SH Platen Coil + outlet Nipple	SA 213 T22 + SA 213 T22	·51 x 11	25
94	SH Platen Coil + outlet Nipple	SA 213 T22 + SA 213 T22	·44.5 x 11	100
95	SH Platen Coil + outlet Nipple	SA 213 T22 + SA 213 T22	·44.5 x 9.0	175
96	Tube + Tube	SA 213 TP 347 H + SA 213 TP 347 H	·63.5 x 8.0	12

97	Nipple + Tube	SA 213 T11 + SA 213 T22	·63.5 x 8.0	6
98	Tube + Tube	SA 210 C + SA 210 C	·51 x 5	3
99	Tube + Tube	SA 213 T11 + SA 213 T11	·51 x 5.6	9
100	Tube + Tube	SA 210 GR.C + SA 213 T11	·51 x 5	1
101	SC Spacer Tubes Tube + Tube	SA 213 T 22 + SA 213 T22	·63.5 x 8	12
102	Tube + Tube	SA 213 TP 347 H + SA 213 TP 347 H	·51 x 6.0	60
103	Tube + Tube	SA 213 T22 SA 213 T22	·63.5 x 8.8	12
104	RG Plues With Pipes	SA 106 C + SA 105	---	24
105	PL Flgr HDR Pipe + Pipe	SA 106 GR C + SA 106 GR C	·219.1 x 36	4
106	R.G.Plugs With Pipes	SA 335 P12 + SA 182 F22	---	11
107	DC Pipe Drum Nozzle	SA 106 GR.C SA 105	·368 x 38	6
108	DC Pipe DC Pipe	SA 106 GR.C SA 105	·368 x 38	24
109	DC Pipe S.M. HDR	SA 106 GR.C SA 105	·368 x 38	6
110	S.M.HDR Suct.Spool	SA 234 WP C SA 106GR C	·457.2 x 45	3
111	Suct.Spool CC Pump	SA 106 GR C SA 234 WCB	·457.2 x 45	3
112	CC Pump Disc Line	SA 234 WC B SA 515 GR 70	·323.9 x 36.0	6
113	Disc Line Disc Line	SA 515 GR 70 SA 515 GR 70	·323.9 x 36.0	6
114	Disc Line Bottom HDr	SA 515 GR 70 SA 105	·323.9 x 36.0	6
115	Lower Ring Headers	SA 515 GR 70 SA 515 GR 70	·914.4 x 95.0	4
116	WW Outlet Headers	SA 106 GR 70 SA 106 GR C	·273.0 x 50.0	2
117	WW Outlet Headers	SA 106 GR 70 SA 106 GR C	·273.0 x 40.0	3
118	Suction Mani. HDR	SA 106 GR.C SA 106 GR.C	·508.0 x 55.0	1
119	Acid Wash Connection	SA 106 GR.C SA 106 GR.C	··127.0 x 20.0	1
120	Riser Pipes	SA 106 GR.C SA 106 GR.C	· 159.0 x 18.0	329
121	WW Panels UCT.LCT	SA 210 GR.C SA 210 GR.C	··51.0 x 5.6 · 51.0 x 6.0	6
122	WW Panels UCT.LCT	SA 210 GR.C SA 210 GR.C	·63.5 x 7.6	607
123	Extd. Side Wall Panel	SA 210 GR.C SA 210 GR.C	·63.5 x 7.6	184

124	WW Hange Tubes	SA 210 GR.C SA 210 GR.C	·63.5 x 11.0	88
125	WW Screen Tubes	SA 210 GR.C SA 210 GR.C	·63.5 x 7.6	498
126	Rear Arch Tubes	SA 210 GR.C SA 210 GR.C	·51.0 x 6.0	275
127	WW. BOT .HDR Nipples	SA 210 GR A1 SA 210 GR.C	·51.0 x 6.0	1062
128	Rear Arch Tubes	SA 210 GR.C SA 210 GR.C	·63.5 x 7.1	36
129	Rear Arch Tubes	SA 210 GR.C SA 210 GR.C	·63.5 x 7.6	212
130	**Total number of HP Joints**			20625

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

ANNEXURE-A

UNPRICED RATE SCHEDULE

Item No.	DESCRIPTION OF WORK	Total Value In Rupees (In figures and words "A")
1.0	**Total Lumpsum price for Handling, Erection, Testing, commissioning, Trial Operation & Handing over of Boiler including auxiliaries, Pressure Parts & Non-pressure parts, ESP Rotating Machines, Insulation, Power Cycle Piping & Final Painting including supply of paints at 1X500 MW, NTPC Unchahar, Stage-IV for 35646 MT (As per tender specification)**	

Note:

The rates of different items for the entire scope shall be worked out & awarded as per Annexure "B".

ANNEXURE-B

Calculation ratio for different items based upon the total value as per rate schedule

A	**SERVICE PORTION**		
Sl. No	**DESCRIPTION OF WORK**	**Qty in MT**	**Rate per MT in Rupees (In figures and words)**
1	Rate in **Rupees per MT** for erection, testing, commissioning, trial operation and handing over of **Pressure parts etc**as per tender specifications **(Detail as per Annexure- IA)**	**5896**	A X 3.5504 / 100000
2	Rate in **Rupees per MT** for erection, testing, commissioning, trial operation and handing over of **Structures & Non pressure parts etc**as per tender specifications **(Detail as per Annexure- IB)**	**14731**	A X 2.7301 / 100000
3.	Rate in **Rupees per MT** for erection, testing, commissioning, trial operation and handing over of **ESPetc**as per tender specifications **(Detail as per Annexure- IC)**	**7471**	A X 1.9854 / 100000
4	Rate in **Rupees per MT** for erection, testing, commissioning, trial operation and handing over of **Rotating Machines etc**as per tender specifications **(Detail as per Annexure- ID)**	**3512**	A X 1.6973 / 100000
5.	**RATE in Rupees per MT**for complete scope of work as per tender specification for **insulation and sheeting**, etc.for Boiler, ESP, pipingas per specifications. **(Detail as per Annexure- IE)**	**2284**	A X 2.6611 / 100000
6.	**Rate in Rupees per MT** for erection, testing, commissioning, trial operation and handing over of **Piping systems** (including valves, flanges etc) as per tender specifications (**Detail as per Annexure –IF)**	**-**	-
A	P91 Piping	**158**	A X 9.5998 / 100000
B	P 22 Piping	**260**	A X 7.4938 / 100000

C	Other Piping Material	**1334**	A X 6.3637 100000
	TOTAL	**35646**	
B	**SUPPLY PORTION**		
1.	Supply of all paints, primers & other consumables required for complete painting of boiler and Aux. As per Tender specification (Equivalent to 1.5% of total quoted value)	LS	LS

NOTES:

1. The quantities indicated above are tentative and are liable to vary depending upon the site requirement. The contractor has to supply / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work.

2. Separate order shall be issued for service items (A) and Supply items (B).

3. Evaluation of bids shall be done on total price against this Rate Schedule.

4. 1.5% of quoted value for supply portion will remain fixed with no compensation for variation in quantities, escalation of rates etc during the contract period.

5. In case of any mismatch in Rate and amount on Price discrepancy, the same will be dealt as per clause No. 1.4 of GCC.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ UNCHAHAR/ BOILER/ 957

FOR

ERECTION,TESTING,COMMISSIONING,TRIAL OPERATION & HANDING OVER OFBOILER, ESP, ROTATING MACHINES, ITS AUXILIARIES, POWER CYCLE PIPING, PAINTING, INSULATION ETC. INCLUDING SUPPLY OF PAINTS AT 1X500 MW, STAGE-IV,FGUTPP, NTPC UNCHAHAR, U.P.

PART- II OF TCC

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

1.0 GENERAL

1.1 The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / lump sum price shall deem to be inclusive of all such contingencies.

1.2 The contractor shall carry out the work in accordance with standard practices / codes / instructions / drawings / documents / specification/manuals supplied by BHEL from time to time.

1.3 The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during execution. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be affected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.

1.4 Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices.

1.4.1 Provision as required of all types of labour, supervisors, engineers, watch and ward, tools & tackles, calibrated inspection, measuring and test equipments as specified and otherwise required for the work, consumables for erection, testing and commissioning including material handling.

1.4.2 Proper out-turn as per BHEL's plan and commitment

1.4.3 Completion of work as per BHEL Schedule.

1.4.4 Good quality and accurate workmanship for proper performances of equipment.

1.4.5 Repair and rectification

1.4.6 Preservation / Re-conservation of all components during storage / erection till handing over.

1.4.7 HOUSE KEEPING-The contractor is supposed to carryout house keeping of the work area on regular basis to keep the work place neat and tidy and available for the SAFE Working. The scrap, generated daily during the Execution activities, is to be dumped at designated area as decided by BHEL/ NTPC on daily basis. The erection materials issued to the contractor and kept near the work area should also be staged properly at site. Compliance report on above shall be submitted by the contractor to BHEL on Daily basis. In case the contractor fails to do so, BHEL have rights to carryout the same from the other party at the Risk and cost of the contractor. The cost applicable with BHEL overheads shall also be recovered from the monthly running bills of contractor.

2.0 CIVIL WORKS, FOUNDATION, GROUTING

2.1 BHEL/NTPC shall provide all equipment foundations. For the correctness of these foundations as per drawings, the contractor shall check the dimensions & locations of the foundations, pockets, anchor-bolt pitch. Further, top elevation of foundations shall be checked with respect to benchmark. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 50 mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.

2.2 While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with prussian blue to get the required contact with frames.

2.3 The contractor shall ensure perfect matching of packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer. If required the packer plates may have to aligned and fixed on the foundations using special high strength, non-shrinking and quick-setting grouts. The minimum thickness below the packer plate should be 20 mm. The material required for this has to be arranged for by the contractor at his cost.

2.4 **Complete grouting of structures equipments, including anchor / foundation bolts, beneath base, base hollows etc. as may be applicable, is included in the scope of contractor.** Arranging all labour, building materials including cement as applicable (ordinary Portland as well as Quick setting – free flow – non-shrink grout mix (e.g. shrink comp , conbextra etc)), form work, shuttering, and any other requirements is in the contractor's scope. Contractor shall obtain approval of BHEL for applicable cement (ordinary as well as quick setting – free flow – non-shrink grout mix) prior to procurement and use.

Cleaning of foundation surfaces, pocket hole sand anchor bolt pits and de-watering and making them free of oil, grease, sand another foreign materials by soda washing, water washing, compressed air and other approved methods, are within the scope of this specification / work.

The contractor shall arrange for sand, stone chips, gravels, anti shrink compound, plasticizer, shuttering, grout mixing machine, labors etc at his cost. The contractor shall prepare th e required test pieces/test cubes to ensure the strength of grout and get the same tested in laboratory at his cost. Test cube shall also be taken during grouting for testing in the laboratory and shall be tested at his cost. All necessary arrangement along with watering till complete curing has to be arranged by the vendor After the grouting has finally set and cured, alignment of equipments involved shall be checked again to verify for any disturbance or any other reason.

If required, decoupling of equipments has to be done for conducting the verification. In case any disturbance is noticed the cause, if any, shall be removed and re-alignment done as
part of work.

2.5 The contractor shall check and verify the alignment of equipment. The Grouting of all the equipments will have to be carried out by the Contractor. The contractor has to

arrange for all materials required for carrying out the grouting including supply of the Special Grout as indicated in the drawings and as approved by the Engineer.

2.6 The contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor

2.7 The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.

2.8 Besides grouting as above, any civil works required for safe and efficient operation of tools and tackles like grouting / excavation/ casting of foundation / anchor points for derricks, winches, guy ropes fastening, etc / foundations required for chemical cleaning pumps, tanks and any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement and required facilities will have to be arranged by contractor at his own cost.

3.0 ERECTION

3.1 All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include,

- Scaffolding and rigging operations,
- Machine / flame / electric cutting, grinding, welding, radiography and stress relieving
- Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, as cleaning, checking, leveling, blue matching, aligning and assembly.
- Machining, surface grinding, drilling, doweling, shaping
- Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication.

Insulation and painting

3.2 Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost.

3.3 No members of any ladder / structure / platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / customer without any additional cost.

3.4 The contractor shall erect scaffolding / temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion and removed from work site.

3.5 It shall be the responsibility of the contractor to provide ladders on columns for initial work till such time stairways are completed. For this, the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL. In case it is absolutely necessary then the contractor shall cut the temporary structure and rectify the column as directed by the engineer.

3.6 The contractor is strictly prohibited in using the Boiler / Auxiliary Components for any temporary supporting or scaffolding works etc. In case of such misuse a sum of determined by Engineer will be recovered from contractor's bills.

3.7 Boiler auxiliary columns are plate formed box section and the erection joint is welded type where as the columns are butt type with HSFG bolted flange and partition plates, boiler main column are having flange with splice plates and bolted connections. However, the contractor has to carry out work at site as per drawing.

3.8 Certain adjustment in length may be necessary while erecting pipelines / ducts / casings etc. The contractor should remove the extra lengths / add extra lengths to suit the

final layout after preparing edges afresh by adopting specified heat treatment procedures.

3.9 Economizer, super-heaters, re-heater coils, burner panels may have to be hydraulically tested individually, if required, before erection as instructed by BHEL Engineer within finally accepted rates.

3.10 Suspensions for ducting will be supplied in running lengths, which shall be cut to size and adjusted as required. Ducts / expansion bellows are dispatched to site in loose walls plates / pieces and these are to be assembled and welded at site along with stiffeners etc., before erection within the finally accepted rates. All joints connecting duct expansion piece and dampers shall be seal welded on inside as well as on outside.

3.11 Assistance in mechanical work associated with the power cylinders, valves, valve actuators etc., coming under various groups shall be provided by contractor within the finally accepted rates.

3.12 Hanger rods are shown in the pressure parts arrangement drawings for boiler. Any cutting / welding of these hangers rods will be done by the contractor. The hangers for pressure parts will be tested for even distribution of load with the help of a torque wrench.

3.13 The headers are provided with hand holes. The contractor, shall as per requirement, carry out removal and re-fixing of hand hole plates within finally accepted rates.

3.14 Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before installation.

3.15 Skin casing sheet for covering the boiler roof panels, rear arch tube and other areas will be supplied by BHEL. Any cutting, addition and re-fabrication to suit the site conditions shall be carried out within the finally accepted rates.

3.16 The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition. Checking of alignment and re-coupling of the motor to the driven equipment as per instructions of BHEL engineer and to their satisfaction.

3.17 The contractor shall fabricate pipe, special bends etc., threading and welding as required for installing lube oil system and carry out the acid cleaning of the fabricated piping. The contractor shall also service the lube oil system, carrying out the hydraulic test of oil coolers etc.

3.18 Contractor shall carry out kerosene testing of all bearing housings of various rotating equipment like pumps, fans etc., as per BHEL engineer's instructions. Performance of hydro test of oil coolers of rotating machines and hydro test of SCAPH and other equipment as per BHEL engineer's instructions is included in the scope of work.

Forced lube oil system of motors or rotating equipment form parts of the work under this specification.

3.19 Certain rotating machinery after initial runs and commissioning of the equipment have to be hot aligned as per the instructions of BHEL engineer. Cleaning air pre-heater, fans, boiler ducting etc., free of extraneous steel, scaffolding materials electrodes, all foreign materials etc., before trial run of rotating machinery, and at various stages of pre-commissioning activities as per BHEL engineer's instruction, is within the scope of work.

3.20 Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with kerosene or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.

3.21 After initial trial of rotating equipment, control and power cabling for motors and other equipment / instrumentation shall have to be disconnected for checking alignment and re-setting / re-alignment / hot alignment. Contractor shall have to arrange for disconnecting control and power cabling as per BHEL engineer's instructions and clearance and reconnect the control and power cabling after realignment. Quoted tonnage rate shall be inclusive of the above.

3.22 Packer plates supplied may have to be machined to the correct dimensions. It may also be necessary to blue match the same with each other/ with equipment / with foundations as per BHEL instructions.

3.23 Contractor shall arrange changing of preservative oil in the gearboxes, journal and other bearing assemblies of rotating equipment when in storage areas or after erection of equipment as the case may be as per the instructions of BHEL engineer. Necessary lubricants / oil will be supplied by BHEL and the same will be drawn by contractor from BHEL / customer's stores and transporting to site. No additional payment will be made for such works even though supply of lube oil might have been made under regular dispatch-able unit (DU) number against product group main assembly (PGMA) and appearing in the shipping list. Prior to the commissioning of the equipment, oil should be drained and collected in drums provided by BHEL and returned to BHEL / customer's stores.

3.24 The air-preheater rotor may be disturbed during the initial operation. This may change the original clearances. It requires rechecking and correction of seal clearances. Contractor shall carry out such checks and resetting of clearances as per the instructions of BHEL engineer. The resetting may have to be repeated till satisfactory results are obtained.

Checking of air gaps and adjustment of stator / rotor for magnetic center of HT motors shall be carried out as part of erection.

3.25 The fans, mills and other rotating machines shall be checked for clearances and other vital tolerances. The IGV unit shall be serviced. Necessary assistance for balancing

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

3.26 Complete penetration of water wall (Panel to Panel) welding shall be achieved either by one side or both sides welding.

3.27 Whenever required the contractor shall arrange for pre-qualification of process task performers.

3.28 All attachments welding including those for insulation works coming on pressure parts / non-pressure parts which the contractor has erected shall be done by IBR / BHEL tested welders only.

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

3.30 Non specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.

3.31 Instrument tapping coming on the ESP to be welded/fitted by the contractor within the quoted price

3.32 ESP collecting electrode may require straightening and repair due to minor transportation damage before erection and spot heating in position to get correct alignment. Contractor shall carry out this within his quoted rate.

3.33 Layer of insulation mattress on roof top of ESP (inner roof) shall be applied before outer roof is placed.

3.34 Fixing of deflection plates in the inlet screen sheet of ESP as per flow model report drawing. However, adjustment / re-positioning of the plates may be required to be done by the contractor during gas distribution test within the quoted rate.

3.35 All the collecting and emitting electrode suspension frames are to be checked in dimension and pitches before erection. All the readings are to be logged. Straightening of frames distorted during transportation shall be carried out by the contractor within quoted price.

3.36 Erection of electrical equipment like high voltage rectifier transformer, heating elements, rapping gear motor, cabling, glanding of control panels, C&I, etc. are included in the scope of the contractor. Filtration of the Transformer oil also need to be done by the vendor within his quoted rate and for carrying out the same, vendor must deploy suitable capacity oil filtration machine as per site requirement

3.37 Removal of all temporary supports, foreign materials, scraps, debris etc. from inside of the ESP and other erected components and thorough cleaning to achieve clearance / IR values between collecting and emitting system shall be done by the contractor.

3.38 For all plate welding , seal welding from inside and stitch welding from other side is to be followed as per drawing.

3.39 Roof top sheeting & side cladding over ESP pent house to be done by the vendor within his quoted price. Required corrugated sheets and fixing hardwares will be supplied by BHEL under regular supply. Minor consumables
like bitumen washers, putty etc. need to be arranged by the vendor within his
quoted price.

3.40 Minor straightening of plates of inner / outer roof, funnels, GD screen sheets, hopper panels damaged during transportation shall be carried out by the vendor within his quoted rate.

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

3.42 Instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal / speed switches of motors etc. which are received in assembled condition as integral part of equipments ,shall be dismounted, calibrated and re-erected by Contractor as per requirement.

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

3.44 Suspensions of ESP are to be tightened by Calibrated torque wrench.

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

3.46All the shafts of rotating equipment shall be properly aligned to those of the matching equipment within design tolerances All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

3.47All the motors and equipment shall be suitably doweled after alignment of shafts with taper / parallel machined dowels as per the direction of the Engineer. Dowel pins required are be machined by the contractor at his own cost. However the materials for dowel pins shall be issued by BHEL free of cost.

3.48The HT motor bearings shall be blue matched at site and checked for bearing clearances. The contractor if required shall carry out scraping of bearing housing. No extra claim for blue matching up to 1mm initial gap will be entertained.

3.49The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.

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

3.51 All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR valve, before they are energized. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.

3.52 The contractor shall completely erect and test all the piping systems, covered in the specification including sampling lines up to and including sample coolers, hangers & supports, valves and accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning and painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged, screwed or other type joints are specified or sown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings.

3.53 Pipes sent in standard length shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends upto 65-mm nominal bore will have to be fabricated at site. Only cold cutting methods are to be employed for cutting of pipes and tubes irrespective of the size and material . Gas Cutting , if any ,will be allowed only in CS LP piping

3.54 The contractor shall ensure lowering of pipes in position with adequate precautions as to avoid any damage to either material or men. Only the anchoring points earmarked for the purpose of lowering the pipes are to be used.

3.55 It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.

3.56 Wherever piping erected by the contractor is connected to equipment / piping

erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor who is erecting the piping under this specifications.

3.57 Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes within the scope of the work.

3.58 All fittings like `T'-pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or overhauled in full or in part before erection after chemical cleaning and during commissioning.

3.59 The contractor shall be responsible for correct orientation of all valves so that seats, stems and hand wheels will be in desired location. It is the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.

3.60 Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.

3.61 The adjustment of all hangers & supports erected in both cold & hot conditions for maintaining the proper slopes towards the drain pots and application of cold pull in the piping wherever required is also included in the scope of the contractor.

3.62 No temporary supports should be welded on the pressure parts and piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases the contractor if required, shall carry out heat treatment.

3.63Spring suspensions / constant load hangers have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrests / locks etc., have to be carried out as and when required.

3.64Contractor shall install piping in such a way that no excessive or destructive expansion forces exists in either the cold condition or under conditions of maximum temperature and pressure. All bends, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.

3.65The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Other means shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the pipe and building structure.

3.66Layout of small-bore piping in boiler, oil systems etc. as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines even after completion of erection or from aesthetic point of view. Contractor at no extra cost should carry this out. As built drawing is to be submitted by the contractor after erection completion.

3.67All the valves, including motorized valves, flap valves, dampers, actuators, etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and

during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates.

3.68 Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermo-wells, valves, battery of first root valves, condensing vessels, flow nozzles and control valves to be provided on, auxiliaries and pipe lines are covered within the scope of this specification. This will be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer. The welding of all the above items will be contractor's responsibility even if the:

a. Product groups, under which these items are released, are not covered in the scope of this tender.

b. Items are supplied by any agency other than BHEL.

3.69 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The methods used the tools and the equipment deployed shall be subject to the approval of Engineer. The competent technicians shall carry out the bolting work.

3.70 The contractor shall prepare as built piping drawing & submit to BHEL Engineer for approval & verification of material used..

3.71 Erection of power cylinders, motorised valves, valve actuators etc.coming under various groups is covered under the scope of this specification. However C&I calibration / commissioning for pneumatic valves & power cylinders shall be arranged by BHEL through C&I agency at no cost to the contractor for this package. The contractor will however be responsible for drawing the materials from the stores and handing over to the agency that is to commission these. Any damage / loss in their custody will be the contractors account. The alignment and any mechanical adjustments including link adjustment, opening & reconnection of links, replacement of valve / actuator or any mechanical part, air filter & regulator cleaning etc. required during calibration and operation, the same shall be carried by the contractor for this package. However, if re-calibration is required till handing over of the equipments the same shall be organised by the contractor for this package as detailed above with in the final accepted rates. The contractor will however be responsible for drawing the materials from the stores and handing over to the agency that is to commission these. Any damage / loss in their custody will be the contractors account.

3.72 The erection of all pneumatic power cylinders for the burner-tilt mechanism and SADC is covered within the scope of this specification. BHEL will get these power cylinders for the burner-tilt mechanism and SADC calibrated & commissioned. The contractor for this scope of work shall assist and co-ordinate for the same with the agency engaged by BHEL to calibrate such pneumatic actuators.

3.73 The Erection, testing and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.

3.74 Welding of P91,T23, T91,T92 materials in Boiler is to be carried out as mentioned in clause nos. 4.39 of this tender.

3.75 Scope of Work for Chemical Cleaning for the Boiler system has been covered under clause no. 4.40of this tender.

ERECTION OF ESP

3.76 The details of equipments to be erected under this work are generally as per the weight schedule given in Annexure IC. these details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved, actual quantum and type of equipments will be based on the erection documents, which will be furnished in the course of erection.

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

3.78 All site welds for casing, inlet & outlet duct connections have to be kerosene tested for establishing leak proof-ness.

3.79Loading of collecting electrodes either from top or bottom, to be decided suiting site conditions, shall be done with due care as per BHEL's instructions.

3.80 Straightness of all collecting electrodes has to be checked on ground prior to loading in to the field. Straightening of the collecting electrodes, if necessary, shall be done by the contractor within the quoted price as per instruction of BHEL engineer.

3.81Bundle of collecting electrodes should be handled only with special fixture suppliedfor the purpose as regular DU.

3.82 BHEL will provide huck-bolting m/c with necessary auxiliaries free of charges.However, the contractor shall arrange electrical connections, operation etc. Vendorshall also arrange for maintenance of the Huck-bolting machine, includingchanging of some frequent worn-out spares like anvils, carbon brushes, nose assembly, jaw sets, trigger switch & service kit for installation tools will be in contractor's scope.

3.83 Clearances as prescribed between collecting electrodes and with casing wall /emitting electrodes have to be maintained. Spot heating of collecting electrodes wherever called for, shall be done as part of work.

3.84Erection, alignment/ fixing in final position, of high voltage rectifiers of ESP is in the scope of work.

3.85Installation of interlocks is in the scope of work.

3.86Complete erection, alignment, testing, pre-commissioning and commissioning etc for drive motors of collecting electrodes and emitting electrode rapping mechanism is in the scope of work.

3.87 Contractor has to fabricate and erect canopies for motors, actuators etc. as per instruction of BHEL if the same is not indicated in the drawings. However, the contractor will be paid for this work on accepted extra work rate for ESP. BHEL will supply the material required for platforms/canopies in random lengths & sizes.

3.88 It shall be the responsibility of the contractor to provide temporary ladders on columns for initial works, if required, till permanent ladder/ stairways are completed. Material and fabrication of temporary ladders is in the scope of contractor. All temporary ladders are to be of bolting type and no welding on to permanent members will be permitted.

3.89 Following installation jobs are also to carried out by the contractor within his quoted price.

A) Matching flanges along with all bolts, nuts, gaskets, and all the expansion joints etc. as required to be connected to the ESPs to the duct wall.

B) Flue gas inlet distribution system complete with perforated plates, turning vanes, deflector plates, flow splitters, guide vanes and all necessary gas flow control devices in the inlet and outlet cones and duct warranted by the results of flow model test, complete duct stiffening devices, interior bracings, slide plates, access doors, brackets, supporting structures, hangers, sampling connections, etc.

C) Rapping system complete with structural supporting frame, drives, and automatic rapping control, etc.

D) Ash hoppers complete with panel type heaters, level monitors and indicators, outlet flanges, jointing material, poke holes, access doors and walkways beneath the hoppers.

E) Opacity monitors complete with all accessories at the outlet of each gas stream of each ESP but upstream of the ID Fan i.e four (4) nos. per set of ESP serving one steam generator.

F) Safety devices, safety barriers, etc.

G) Monorails with electrically operated hoists on the roof for handling transformer rectifiers. Water washing system for the precipitator and hoppers along with all piping, valves and nozzles etc.

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

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

3.91 All lifting tackles including wire-ropes slings, shackles, used by the contractor, shall be got approved by BHEL Engineer. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damages to equipment and personnel. Calibration/fitness testing certificates from recognized agency are to be submitted to BHEL site office for equipment/instrument/appliances to be used, as per requirement of BHEL/ISO system. Expenditure on such works forms a part of the scope of work.

3.92 The contractor shall erect scaffoldings/Temporary platforms supports etc required during erection before the permanent supports are erected. These should be of adequate capacity and shall never be overloaded. These should be replaced when not found suitable during erection work. All structure materials required for the above shall be arranged by the contractor at his own cost. No such material shall be supplied by BHEL in any case. Welding of temporary supports, cleats etc on the columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. Further, any cutting or alteration of member of the structure or platform or other equipment shall not be done without specific prior approval of BHEL Engineer.

3.93 Proper account of the packing wood and steel supports forming part of packing will be kept by the contractor and returned to BHEL / Customer designated stores/areas from time to time.

3.94 Temporary blanking of ESP inlet / outlet for commissioning , if required , has to be done by contractor free of cost.

3.95 Non-specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.

3.96 Instrument tapping coming on the ESP to be welded/fitted by the contractor within the quoted price.

3.97 Fixing of deflection plates in the inlet screen sheet of ESP as per flow model report, drawing ,to be provided by BHEL. However, adjustment / re-positioning of the plates may be required to be done by the contractor during gas distribution test within the quoted rate.

3.98 All the collecting and emitting frames are to be checked in dimension and pitches before erection. All the readings are to be logged.

3.99 Erection, testing & commissioning, trial operation and handing over of electrical equipment like high voltage rectifier transformer sets alongwith cable trays & cabling JBs(filled with non-inflammable silicon fluid having flash point higher than 300 deg centigrade),control panels complete with bus-sections, electronic controllers, grounding switches , controls ,leveling wheels etc., drive motors and actuators, couplings and coupling guards for all rotating auxiliaries etc., heating elements,

,rapping gear motor are included in the scope of the contractor. Erection of Insulators along with heating and ventilation system for insulator compartments ,complete with fans ,heaters and necessary controls are also in the scope of the contractor.

4.0 WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

4.1 The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.

4.2 Welding of pressure parts, equipment, piping, high tensile structural steel shall be done by certified high pressure welders who posses valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for high-pressure works.

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

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

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

4.6 The contractor shall carry out the root run welding of all HP / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.

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

4.8 The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.

4.9 **Only BHEL/CUSTOMER approved electrodes and filler wire are to be arranged and used by the contractor, within the finally quoted price. BHEL/NTPC reserve the right to test from the certified lab of approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor.** All electrodes shall be baked and dried in the electric

electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number/ batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved/ accredited test house traceable to National/ International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same.

4.10 All butt / fillet welds shall be subject to dye penetration test as per the instructions of the engineer at no additional cost.

4.11 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or other wise of the welds shall be final.

4.12 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer.

4.13 All welds shall be painted with anticorrosive red oxide paint once radiography and stress reliving works are over. Necessary consumables and scaffolding etc including paints shall be provided by contractor at his own cost.

4.14 Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.

4.15 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. The contractor should take a note of the following,

- Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
- All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.

The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of SR operations.

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

4.17 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.

4.18 Contractor for radiography work shall use iridium-192. The geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).

4.19 Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0.

4.20 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.

4.21 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.

4.22 Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification.

4.23 The joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld.

4.24 For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.

4.25 Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.

4.26 All arrangements for carrying out radiography work including dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.

4.27 The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories.

4.28 Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not

envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out

4.29 All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer.

4.30 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC / DRP certificate to be provided before taking up the work.

4.31 Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.

4.32 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.

4.33 However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.

4.34 If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.

4.35 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of progress. The contractor shall make all necessary arrangements including labour, supervisors/ Engineer required for the work as per directions of BHEL.

4.36 The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules.

4.37 The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.

4.38 Check shots as per the requirement of BHEL/NTPC will be taken at your cost.

4.39 Erection Welding Practice for Materials P91

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

etc will be carried out as per the laid out procedure.

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

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

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

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

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

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

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

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

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

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

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

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

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

-Wherever possible, solid purging gas chambers are to be used which can be removed after

welding. If not possible, only water-soluble paper is to be used.

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

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

-Preheating: Prior to start of pre-heating ensure that surfaces are clean and free from grease, oil and dirt. Pre-heating temperature shall be maintained at 220 deg. Centigrade by using induction heating. The temperature shall be ensured by using a calibrated autographic recorder and two calibrated thermocouples fixed at 0 and 180 degree positions on both pipes 50 mm away from the edge. The thermocouples shall be welded with spot welding machine. The pre-heating arrangement shall be inspected and approved by BHEL engineer. Alternate arrangements shall be made during power failure. Two numbers additional square thermocouple are to be fixed for emergency use. Gas burners shall be employed to maintain the temperature until the power resumes.

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

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

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

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

-The width of the thermal insulation beyond the heating band shall be at least two times the heating bandwidth on either side of the weldment.
-All equipment like recorder, thermocouple, compensating cable, oven, thermostat etc. should have valid calibration carried at BHEL approved labs. The calibrated reports should be reviewed and accepted by calibration In-charge at site prior to use.

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

-All the NDE i.e. LPI, MPI, UT and hardness shall be performed on the weld joints as per the standards/ specifications / direction of BHEL. The maximum allowable hardness at weld and

parent metal shall be 300 HV10. Joints having hardness above 300 HV shall be re-heat treated and hardness shall be checked again.

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

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

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

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

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

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

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

a) Induction Heating Machine with Outgoing Cables
b) Suitable Power BackUp (DG Set)
c) Spot welding Machine for Fixing of Thermocouples
d) Calibrated Thermocouples
e) Calibrated temperature Recorder
f) Contact Type calibrated temperature Gauge.

g) Electrodes and fillers for the P91/T91 welding

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

The following will have to be provided by the Contractor:

a) Qualified operator for Induction Machine and DG Set

b) All cables for connecting Induction Machine and DG Set to Main Supply along with Changeover System.

c) Welder Qualified as per ASME IX and IBR for T91/P91 Materials. Site Welder Qualification tests will be conducted also.

d) Exclusive Trained Welding Engineer for Supervising T91/P91 Welding and Heat Treatment

e) Qualified NDE Engineer (Level -II) and welding Supervisor (Level-I)

f) UT Testing and Hardness testing

g) Required GTAW and SMAW machines

h) Welding Machine for Demagnetizing along with cable and Residual Field Indicator

i) Providing Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations .

j) Providing of Argon purging for the welding operation (incuding supply of consumables eg Water Soluble Paper / Aluminiun Dam arrangement.)

k) Providing of Heating by Gas Burner as Standby Arrangement.

l) Providing of Baking ovens and portable ovens

m) Providing Band Saw/ hacksaw/ Grinder for Cutting with tools.

n) Providing machining for Edge preparation

o) Providing of LPI and MPI Facility as specified in the Welding process, including supply of all consumables.

p) Providing and applying insulation band as specified in the welding procedure.

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

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

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

4.40 Chemical Cleaning

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

5.0 APPLICATION OF INSULATION

5.1 All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length. Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work.

5.2 The mineral wool mattresses (bonded / un-bonded) / LRB mattresses are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.

5.3 The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec.

5.4 The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing.

5.5 The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important.

5.6 It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions. Closed / semi closed sheds or any other arrangements required for this will by him at his cost. If any damage occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.

5.7 Aluminum sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets, crowning the sheets if necessary will be carried out by him. Two coats of anti-corrosive black bituminous paint are to be applied on inner surfaces of the cladding. Bitumen sealing compound on the joints if necessary is included in the scope of this work. **Contractor may note that he will also supply anti-corrosive black bituminous paint & bituminous sealing compound required for above works at his cost.**

5.8 Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractors responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract.

5.9 A logbook shall be maintained by the contractor to obtain clearance for application of insulation. If the contractor does the work on his own accord without prior permission the area may have to be redone at his cost.

5.10 Contractor is liable for the exact accounting of the material issued to him and he shall make any unaccountable losses good. Wastage allowance for the material issued are as below:

1. Wool / LRB mattresses and cladding sheets 2%

2. Insulation bricks and mortar 2%
3. Castable refractory 1%

5.11 The entire surplus, unused materials etc., supplied by BHEL shall be returned to BHEL after the work is over. Materials like gunny bags and packing materials, empty containers may be returned at periodical intervals.

5.12 The contractor shall leave certain gaps and opening while doing the work as per instructions of BHEL engineer to facilitate inspection during commissioning and to fix gauges, fittings and instruments. The gaps will have to be finished as per drawings at a later date by the contractor at his cost.

5.13 If during erection and commissioning any of the parts are to be insulated temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature the same may necessitate removal and re-application of insulation and sheet metal cladding, which shall be done by the contractor and the erection rate quoted shall be inclusive of such contingencies.

5.14 Removable type of insulation shall be provided for valves, fittings, expansion joints etc as per the drawings or as directed by BHEL Engineer.

5.15 All temporary pipelines required during testing, pre-commissioning and commissioning should be insulated as directed by BHEL at no extra cost to BHEL. However required insulation material shall be issued by BHEL free of cost.

6.0 PAINTING INCLUDING FINISH PAINTING

6.1 All exposed metal parts of the equipment, structure, auxiliaries, piping, and other items (covered within the scope of this contract) after installations are to be painted. Mostly the equipment / components installed are with one coat each of primer paint and synthetic enamel / heat resistant paint. However, due to aging, the same may have got deteriorated for peeled off. The surfaces are to bethoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL. The same will be inspected and approved by the engineer before painting.

6.2 After applying the primer paints all structure / equipment / items, shall be finish painted with two coats of alloyed resin machinery enamel paints as specified by BHEL engineer. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish is achieved. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer.

6.3 Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job site shall be permitted only at times and locations approved by Engineer.

6.4 Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for finish painting. Paint is to be BHEL approved make only and painting should be as per colour scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work. No paint whose shelf life has expired should be used for painting.

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

6.6 The contractor shall provide legends with direction of flow on equipment and piping in size specified by Engineer. Letter writing shall be done in Hindi / English or in both languages.

6.7 The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work.

6.8 The contractor shall ensure availability of

- Ford Cup-4 to measure consistency of paint,
- Automatic magnetic gauge to measure the dry film thickness and
- SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.

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

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

7.1 The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would include hydraulic test of boiler, land flow test, clean air flow test, chemical cleaning of piping and boiler, water washing, oil flushing of oil system etc. as instructed by BHEL using contractors own consumables, labour and scaffoldings etc. Air leak test on pressure parts preliminary to hydraulic test by compressed air shall also be carried out to check and rectify the various leakage and defects etc.

7.2 All the chemicals required for carrying out these activities will be supplied by BHEL free of cost.

7.3 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications.

7.4 Specialized test equipment, if any, shall be provided by BHEL / its client free of hire charges. However contractor has to take proper care of the equipment issued to him.

7.5 Commissioning of ESP shall involve required tests such as air leak test, gas distribution test, motor no load test, rapping mechanism trial runs, interlock tests, charging of transformer fields, commissioning of all electrical equipment / panels, heaters and their proper tuning etc. The contractor shall provide all consumables, labour, scaffoldings and items required for satisfactory testing

7.6 After completion of erection of furnace, ducts and air heaters, a test shall be performed on the steam generator by the contractor to establish the tightness of the erected equipment from the outlet of FD fan through the steam generator up to stack.

7.7 All the tests may have to be repeated till all the equipment satisfy the requirement /obligation of BHEL at various stages. The contractor shall do all the repairs for site welded joints arising out of the failure during testing.

7.8 The scope of pre-commissioning activities cover installation of all necessary equipment including temporary piping, supports, valves, blanking, pumps, tanks, with access platforms valves, along with accessories required for hydro test, applicable steam blowing or for any other tests. The scope also covers the offsite disposal of effluents of the tests under the scope of this contract as per instruction of BHEL Engineer.

7.9 **All items / material required for conducting hydraulic test, Chemical Cleaning (alkaliboil out, acid cleaning of Boiler – as applicable) , steam blowing of erected Piping etc. will be supplied by BHEL. However, servicing, dismantling and returning of the same to stores is the responsibility of the contractor who is erecting the equipment / piping. The contractor may note that no separate payment shall be released for any temporary works that are to be carried out for conducting pre-commissioning and commissioning testseven though supply of material might have been made under regular dispatch-able unit (DU) number against product group main assembly (PGMA) and**

appearing in the shipping list. Bidders are advised to include expenses on temporary works along with the rates being quoted by them.

Broadly the work on temporary systems will be divided as under:

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

For Chemical Cleaning : Installation and operation of all equipments, temporary piping, tanks and electrical switchgear along with their accessories shall be carried outby another agency of BHEL. While agency appointed by BHEL will be responsible for the Equipments of Chemical Cleaning Operation, the Boiler Contractor shall make ready main boiler equipments required for chemical cleaning process and they will closely associate themselves with the BHEL's agency during the process for carrying out the other operations required on the Boiler for completing the Process. The Boiler Contractor will carry out the connection / installation and normalizing of terminal connection of the Main Equipment. Erection etc. of blowers and blanks and putty required for conducting air tightness test shall be carried out as part of Boiler work (Putty to be procured by the contractor without any extra cost to BHEL).

The above is only a broad breakup of the temporary works. The engineer at site will make final break up. His decision will be final and binding on the contractor. Dismantling of the temporary equipment and piping will be done by the contractor. Contractor will also responsible to return these materials to the stores.

7.10 Commissioning of the boiler will involve trial run of all the equipment erected. The boiler has to be lighted up for refractory drying, alkali boil out, acid cleaning, passivation, preservation, steam blowing and floating of safety valves. Flushing of all the lines by air, oil or steam as the case may be, trial run of the boiler, servicing of valves and any other works incidental to commissioning are to be carried out. During this period though the BHEL's customer's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, men, consumables, T&P and IMTE's till such time the commissioned units are taken over by the BHEL's customer.

7.11 It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement. Required chemicals, DM Water and other required items etc required for this purpose will be supplied by BHEL.

7.12 It shall be the responsibility of the contractor to provide various category of workers insufficient numbers along with Supervisors during Pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&P's, IMTE's etc., and any other assistance required during this period.

Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

7.13 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.

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

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

7.16 The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost.

7.17 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.

7.18 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment are necessary, the contractor at his cost shall do the same as per Engineer's instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.

7.19 All temporary supports shall be removed in such ways that pipe supports are not subjected to any sudden load. During hydraulic testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.

7.20 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left unserviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats. Cleaning and servicing of all the filters / strainers, toppings of oils coming in the system shall be done by the contractor within the accepted price.

7.21 At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the Engineer and incorporate the same at no additional cost. The contractor shall carry out any other test as desired by BHEL Engineer/ Manufacturer on erected equipment covered under scope of this contract during testing and commissioning to demonstrate the physical completion of any part or parts of the work performed by the contractor

7.22 The scope of pre-commissioning, commissioning and post commissioning activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning (Except for Feed, CEP outlet, Drip lines), steam blowing or for any other tests as the case may be and will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the off site disposal of effluents

7.23 Commissioning of the ESP will involve trial run of all the equipment erected. The boiler has to be lighted up for refractory drying, alkali boil out, acid cleaning, passivation, preservation, steam blowing and floating of safety valves. Flushing of all the lines by air, oil or steam as the case may be, trial run of the boiler, servicing of valves and any other works incidental to commissioning are to be carried out. During this period though the BHEL's customer's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, men, consumables, T&P and IMTEs till such time the commissioned units are taken over byte BHEL's customer for the entire scope awarded to contractor.

7.24 All arrangement required for steam blowing including removal, reinstallation and welding of CRH NRV and installation of steam blowing arrangements including steam blow off piping is included in the scope of work.

7.25 It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement.

7.26 The contractor shall make all necessary arrangements including making of temporary closures on piping/ equipment for carrying out the hydro-static testing on all piping equipment covered in the specification at no additional cost. The contractor shall carryout the required test on the pipelines such as Hydraulic Test (as per IBR requirement/ instruction of BHEL), of various piping systems, Ultrasonic Test for weld defects and finding thickness, Dye penetrant test, Magnetic particles test for Weld defects and materials defects etc. All facilities (manpower, materials, equipment, consumables etc.) including proper approaches wherever required shall be provided by the contractor for satisfactory conduction of above tests. Special equipment such as magnetic particle tester, Metelascope for analysis of weld material of T/P-91 pipings, ultrasonic test kit and engineers required for these tests shall be arranged by the contractor along with Qualified technician within finally accepted rates. All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests/ activities may not have been listed in these specifications.

7.27 All the above tests should be repeated till all the erected piping satisfy the requirement/obligation of BHEL and Boiler Inspectorate, if required at various stages. All the repair for site welded joints arising out of the failures during testing shall be done by the contractor as part of the work within finally accepted rates.

7.28 Contractor shall layout all necessary temporary piping, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, oil flushing, steam blow off or for any other tests as the case may be and will be carried out above activities under the scope of work as per instructions of BHEL. After the test is over, all the temporary piping, etc., will be removed and returned to BHEL store. All these form part of the scope of work. No separate payment shall be made towards erection and dismantling of these temporary works. Chemical cleaning of feed lines, CEP outletlines, and Drip lines will be carried out by a separate agency. Cleaning of all other lines is in scope of this contract. However the contractor executing this work has to render all assistance to the separate agency including removal of valves , putting loops and restoring back after cleaning .

7.29 All items required for conducting hydraulic test, oil flushing, steam blowing etc., will be supplied by BHEL. However, servicing, erection and dismantling and returning of the same to BHEL Store is the responsibility of the contractor

7.30 The valves will have to be checked, cleaned or overhauled in full or in part before erection, alkali flushing, steam blowing and during commissioning as may be necessary.

7.31 Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable deaeration/ ventilation draining points with valves as per BHEL Engineer's instruction, for performing hydro test of piping and other equipments, is within the scope of this specification. Gaskets, valves, fasteners, blank flanges, blanks or steel for blank flanges will be provided free of cost by BHEL. Contractor shall cut out steel blanks from steel provided. After completion of Hydraulic Test, welded blanks shall be cut andremoved and weld burrs ground finished and cavities/ scars of cutting weld filled ~, dground as per BHEL Engineer's instruction at no extra cost. NDT & SR if required may have to be carried out.

7.32 Hydro test of piping has to be repeated several times in consonance with technical/statutory requirements during stage of erection pre commissioning/ commissioning. Hydro test will have to be done to the satisfaction of Boiler Inspector/ Customer/ BHEL Engineer after attending repairs, Hydro test shall be repeated before Boiler Inspector/customer/ BHEL engineer to their satisfaction.

7.33 Soon after conducting: the hydro test of the piping, the same shall be preserved against corrosion either by wet preservation or by dry preservation as per the requirement of BHEL Engineer. Contractor shall carry out all the incidental jobs like filling up of water, dozing of chemicals and pressuring the system to the required pressure and keep a constant watch on the preservation work as per the instruction

of BHEL Engineer. The preservation shall be resorted to whenever the boiler is not under trial operation till the completion of commissioning activities.

7.34 While conducting hydraulic test of steam lines, water lines, either individually or grouping a few lines or in portions, blanks/ spools may have to be put up at terminal points, strainers, valves, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored. Also interconnecting piping between boiler and turbine, the hydraulic test may have to be done section wise and sometimes piping of other agencies may have to be combined. Contractor shall carry out all such incidental work.to satisfactorily conduct the Hyd. Test. Wherever work is involved in the terminal points, contractor shall carryout the same as per instruction of BHEL Engineer. The decision of BHEL Engineer is final and the same is binding on the contractor.

7.35 The contractor shall carry out any other tests as desired by BHEL engineers on erected equipment covered in the scope of this contract during testing and commissioning to demonstrate the satisfactory completion of any part or whole of work performed by the contractor. During Hydraulic Test, the pipes being tested shall be isolated from the equipments to which they are connected. In certain places blanking has to be resorted prior to Hydraulic test and spool piece shave to be erected in place of control valves, orifices and other fittings and these spool pieces have to be subsequently replaced with the regular valves/ fittings by the contractor at no extra cost.

7.36 During this period though the BHEL's/ client's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, consumables, labour, T&P and IMTEs required till such time the commissioned units are taken over by the BHEL's customer.

7.37 It is possible that due to any reason the final supporting may not be completed before conducting Hydraulic Test. The contractor may have to strengthen or install any additional supports as per instruction of BHEL. This work is a part of the work and no additional payment shall be made on this account

7.38 Commissioning of the ESP will involve:

1. Gas tightness test of ESP and ducts by kerosene test / soap solution test with own consumables, labour, scaffolding and other items , if any.

2. Gas distribution test / flow test with own consumables, labour , scaffolding and other items , if any.

3. Trial run of collecting rapping , emitting rapping and GD rapping mechanism as per instruction of BHEL engineer.

4. Checking IR value of the ESP fields.

5. Air load test of ESP along with all fields.

6. Charging of ESP with flue gas during light-up / synchronization / coal firing.

7.39 All the rapping motors, if necessary, shall be stripped open , thoroughly serviced with proper care and re-assembled before erection. During servicing if any deficiency in noticed, the same should be brought to the notice of BHEL without any delay.

7.40 All the shafts of the equipment shall have to be properly aligned to that of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid over-heating of bearings or other conditions, which may tend to shorten the life of the equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and lubricated as per recommendations of BHEL engineer.

7.41During commissioning changing of gaskets , tightening of bolts, realigning of rotating and other equipment, attending to leakage and minor adjustments of erected equipment may arise. The quoted rate of contractor shall be inclusive of all such works.

7.42Lubricating oil units of the rotating machines are to be cleaned thoroughly before pouring of final lubricating oil. Topping up of lubricants during running of the set till handing over to be done by the vendor. Required lubricants both for first filling and topping up are to be supplied by BHEL free of cost. The empty containers of the lubricating oils should be returned to BHEL stores/place indicated by BHEL from time to time.

7.43The instruction of the motor manufacturer regarding storage of the motors and re-conservation must be strictly followed without any deviation.

7.44All the shaft equipment shall have to be properly aligned to those of matching equipment to perfection , accuracy as required and the equipment shall be free from excessive vibrations so as to avoid over heating of bearings or other conditions , which may tend to shorten the life of the equipment . All bearings, shafts and other rotating parts shall be thoroughly cleaned and lubricate das per the recommendations of BHEL Engineer before starting.

7.45All the bearings, gear boxes etc of the equipment and electrical motors to be erected are provided with protective grease only. Contractor shall arrange for cleaning the bearings , gears etc. with kerosene or some agent , as and when required by BHEL Engineer, by dismantling some of the parts of the equipment during erection and shall arrange for re - greasing / lubricating them with recommended lubricants ,which will be supplied by BHEL free of cost.

7.46Lubricating oil units of the rotating machines are to be cleaned thoroughly before pouring of final lubricating oil.