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

TENDER NO. BHEL/NR/SCT/GADARWARA/PIPING/PACKAGE- A&B/1002

FOR

"COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD, TRANSPORTATION TO SITE,ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF POWER CYCLE PIPING, ITS INSULATION AND FINAL PAINTING OF PACKAGE-A (UNIT NO. 1 & AUX. BOILER) & PACKAGE-B (UNIT NO.2) INCLUDING SUPPLY OF PAINTS AT 2X800 MW, GADARWARA STPS OF NTPC, GADARWARA MP."

PART I – TECHNICAL BID

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

ISO 9001, ISO 14001,
OHSAS 18001 & SA 8000
certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120- 2416440/ 2416292
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TENDER NO. BHEL/NR/SCT/GADARWARA/ PIPING/PACKAGE- A&B/1002

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

Rev 01
1st Jun
2012

NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited

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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/GADARWARA/PIPING/PACKAGE-A&B/1002***	
ii	**Broad Scope of job**	**"COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD, TRANSPORTATION TO SITE, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF POWER CYCLE PIPING, ITS INSULATION AND FINAL PAINTING OF PACKAGE-A (UNIT NO. 1 & AUX. BOILER) & PACKAGE-B (UNIT NO.2) INCLUDING SUPPLY OF PAINTS AT 2X800 MW, GADARWARA STPS OF NTPC, GADARWARA MP."**	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	**1. Sale from BHEL PS Regional office at :** **Start : 03/07/15 , Time : 0900 HRS** **Closes: 27/07/15 , 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 : 27/07/15 , Time : 1500 HRS** **Place : Noida**	*Applicable*

vi	**OPENING OF TENDER**	**Date : 27/07/15** *(Within 2 hours of the latest due date and time of offer submission).* *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	***Rs 2,00,000/-***	*Applicable*
viii	**COST OF TENDER**	***Rs 2000/-.***	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	**Date: 13/07/2015** *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)**	***Mrs. Pravin Tripathi, IA & AS (Retd.)*** ***D-243, Anupam Gardens, Lane IB, Neb Sarai, Sainik Farms,*** ***New Delhi – 110 068*** ***Email: pravin.tripathi@gmail.com***	***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 , …. 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, or before price bid opening, attested copies of either EM-II certificate having deemed validity (two years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with CA certificate (format enclosed as Annexure - 3) applicable for the year, certifying quantum of investment in plant and machinery within the permissible limit as per the act for relevant status (Micro or Small) where the deemed validity of EM-II is over. Date to be reckoned for determining the deemed validity will be last date of technical bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents.

MSEs shall be exempted from payment of earnest money at the time of tender deposit. However, there is no exemption of security deposit submission

No benefits shall be applicable for that particular enquiry if the required documents are not submitted before price bid opening.

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. Annexure-4: General Terms And Conditions Of Reverse Auction (RA)
05. Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process
06 Annexure-6 Modification in standard GCC clauses
07 Annexure-7: Feedback Form: From where did you get information reg. this tender
08 Annexure-8: Integrity Pact
09 Other Tender documents as per this NIT

ANNEXURE - 1

PRE QUALIFYING REQUIREMENTS

JOB	**COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD, TRANSPORTATION TO SITE, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF POWER CYCLE PIPING, ITS INSULATION AND FINAL PAINTING OF PACKAGE-A (UNIT NO. 1 & AUX. BOILER) & PACKAGE-B (UNIT NO.2) INCLUDING SUPPLY OF PAINTS AT 2X800 MW, GADARWARA STPS OF NTPC, GADARWARA MP.**
TENDER NO	**BHEL/NR/SCT/GADARWARA/ PIPING/PACKAGE- A&B/1002**

SL NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria
A	**Submission of Integrity Pact duly signed**	**Applicable**
B B-1 B-1.1 B-1.2	**Technical Criteria** Bidder who wish to participate should have 'Executed' works of similar nature of at least **One Boiler of rating 400 MW or higher** or **Power Cycle Piping of One unit of rating 400 MW or higher** during last 7 years, as on the date of opening of Technical Bid.	**Applicable**
C C-1 C-1.1 C-1.2	**<u>Financial Criteria</u>** <u>TURNOVER</u> **For Package-A (Unit No. 1 & Aux. Boiler)** Bidders should have achieved an average annual financial turnover (Audited) of Rs. 540 Lacs or more over last three Financial Years (FY) i.e 2011-12, 2012-13, 2013-14. **For Package-B (Unit No. 2)** Bidders should have achieved an average annual financial turnover (Audited) of Rs. 510 Lacs or more over last three Financial Years (FY) i.e 2011-12, 2012-13, 2013-14.	**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**
D	Relevant documents meeting above requirement at 'B' and 'C' shall be submitted by bidder	**Applicable**
E	Assessment of Capacity of Bidder to execute the work as per Sl no. 9 of NIT	**Applicable**

F	Approval of Customer by BHEL	**Applicable**
G	Consortium criteria	**Not Applicable**

Explanatory Notes for QR 'B'

1. For B , 'Executed' means :

1.1 Completion of '**BOILER LIGHT UP'** in respect of Boiler
1.2 '**STEAM BLOWING COMPLETION'** in respect of Power Cycle Piping
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

3.1 **For Power Cycle Piping** : Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass Lines
3.2 **For Boiler** : Boiler works

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 on date..... 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.0.1722(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

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.

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 - 5

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	

ANNEXURE - 6

Modification / Deletions in Standard Clause of General Conditions of Contract (GCC) or Special Conditions of Contract (SCC)

1	**Modification/ deletion in Price Variation Compensation** Clause no. 2.17 of GCC:
2	**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)**
3	**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:
4	For the portion of backlog attributable to the contractor, **no PVC shall be paid.**
5	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
6	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.
7	All other terms & conditions of Clause No. 2.17 of GCC shall remain same.

ANNEXURE - 7

Feedback Form: From where did you get information reg. this tender

1	NEWSPAPER ADVERTISEMENT (NAME OF NEWSPAPER)	
2	BHEL WEBISTE (TENDER NOTIFICATION) (www.bhel.com)	
3	CENTRAL PUBLIC PROCUREMENT PORTAL OF GOVERNMENT OF INDIA (CPP PORTAL) (www.eprocure.gov.in)	
4	EMAIL COMMUNICATION FROM BHEL	
5	ANY OTHER SOURCE (GIVE DETAILS)	

Annexure - 2

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

Place----------

Date----------

Witness: _____	Witness: _____
(Name & Address) _____	(Name & Address)_____
_____	_____

Rev 01

1st June

2012

TECHNICAL CONDITION OF CONTRACT (TCC)

(Document No. PS: MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED

FOR OFFICIAL USE ONLY **TENDERER'S COPY**

NOT FOR PUBLICATION **ORIGINAL COPY**

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/NR/SCT/GADARWARA/PIPING/PACKAGE- A&B/1002

FOR

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD,TRANSPORTATION TO SITE,ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF POWER CYCLE PIPING, ITS INSULATION AND FINAL PAINTING FOR POWER CYCLE PIPING OF PACKAGE-A (UNIT NO. 1 & AUX. BOILER) PACKAGE-B (UNIT NO.2) INCLUDING SUPPLY OF PAINTS

OF 2X800 MW GADARWARA STPP OF NTPC AT DISTT. NARSINGHPUR, GADARWARA M.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)

Sl. No.	Title	Description
1.	Name of the Owner	**NATIONAL THERMAL POWER CORPORATION LTD. (NTPC)**
2.	Address	Gadarwara Thermal Power Station, near Chichli&Umaraiya villages, Tehsil –Gadarwara,District– Narsinghpur Madhya Pradesh, Pin- 487551
3.	New Installation	2 x 800 MW
4.	Nearest Railway station	Gadarwara Railway Station
5.	Nearest Road	Gadarwara is located on the MP SH 22
6.	Nearest City	Jabalpur
7.	Nearest Airport	Nearest Airport is Dumna Airport, Jabalpur-129 KM and Raja Bhoj Airport, Bhopal -209 KM
8.	Highest Temperature	45 deg C
9.	Lowest Temperature	1 deg C
10.	Elevation	354.77 metres

2.0.0	BHEL has been awarded the work of Design, Engineering, Supply, Erection, Testing & Commissioning & Handing over of BTG package and Mill bay structures & bunker of 2X800 MW Super Critical Thermal Power plant at Gadarwara, M.P. by **National Thermal Power Corporation (NTPC).**
2.1.0	**Scope of Work :** The scope of work under this tender consists of following:
2.1.1	**SERVICE PORTION (PIPING)**
2.1.1.1	The scope of work under this tender consists of "Handling at site stores/ storage yard, transporting to site, inspection, pre-assembly, erection, alignment, welding, NDT, fixing of hangers & supports, / acid pickling, oil flushing, water/mass flushing, hydro testing & steam blowing, application of insulation and cladding, application of finish paints as per requirement/ as given in the drawing including labeling & flow direction on the piping/ over insulation, pre-commissioning, commissioning, trial operation & handing over of **Power Cycle Piping of Package A and Package B** of 2X800 MW Super Critical Thermal Power plant at Gadarwara, M.P. **However, there will be two separate packages for the two units, as follows:** **1. Package-A -- Erection, Testing, Commissioning & Handing over of Piping of Unit No. 1 and Piping of Aux. Boiler** **2. Package-B -- Erection, Testing, Commissioning & Handing over of Piping of Unit No. 2** **The above two packages shall be awarded to two separate contractors The scope here under is given applicable for both the packages**
2.1.1.2	**The scope of work under this tender for Erection ,Testing, Commissioning & Handing over of 1x800 MW Piping broadly consists of:**
2.1.1.2.1	Receipt of materials/ components from BHEL/ Customer Stores, Transportation to Erection Site, stacking, storage and preservation.
2.1.1.2.2	Erection, Testing & Commissioning of Piping including pipes & fittings, valves, flanges, hanger & supports, fasteners, tank & vessels etc. as required, making the system complete in all respects.
2.1.1.2.3	Lifting, laying, erection, bolt tensioning, bolt torque tightening, supporting and installation, pre and post weld heat treatment, inspection, non-destructive testing

	including radiography, MPI, UT and hydrostatic test, water/ steam flushing, air drying, nitrogen purging, steam blowing and other testing of piping installations, above and below ground.
2.1.1.2.4	Open ends of piping valves shall be protected with wooden blanking plates securely fastened with wire or by plastic insert plugs.
2.1.1.2.5	Fabrication and installation, setting and commissioning of pipe supports, guides, anchors and spring supports as required.
2.1.1.2.6	Erection and dismantling of all temporary piping, valves, pumps, tanks etc. required for Steam Blowing operations and other commissioning activities including post commissioning operations and stabilisation of the unit,
2.1.1.2.7	Obtain clearance and approvals from all applicable statutory/ Government agencies e.g. IBR etc.
2.1.1.2.8	Testing of Welds/ flanged joints, DPT, RT, MPI as per Drawings/Quality Plans/Customer Requirement
2.1.1.2.9	Wrapping and Coating of ACW Piping
2.1.1.2.10	Installation of Platforms/ structures for operation of valves
2.1.1.2.11	Assistance in Chemical Cleaning
2.1.1.2.12	Installation of Insulation and Cladding
2.1.1.2.13	Execute Final painting of all equipments, piping and structures like platform, supports etc.
2.1.1.2.14	Completion of punch points and assistance for handing over of unit (s) to customer. Execution of all Mechanical jobs identified during OWNER Technical audits, check list of pre-commissioning and commissioning. Erection of additional supports required to restrain pipe movement avoiding interference with nearby structural / piping
2.1.1.2.15	Unit trial operation of equipments, systems, of 800 MW Unit (s) as a whole, resolving any deficiencies observed and handing over of **Unit No. 1 (Package A) and Unit No.2 (Package B) of 2X800 MW, NTPC GADARWARA STPP at Narsinghpur, M.P.**
2.1.2	**Supply Portion (PIPING)**
2.1.2.1	**Procurement of Paints** Contractor has to supply all paints, primers and other consumables for painting of relevant area of Piping of Package-A (Unit No.1, Aux Boiler Piping) &

	Package-B (Piping of Unit No. 2) as applicable. BHEL reserves the right to reject any material not found satisfactory. Contractor shall produce manufacturer's test certificate.
2.1.2.2	**Note:**
2.1.2.2.1	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 clause 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.
2.1.2.2.2	Paints, primers etc to be procured from NTPC/BHEL approved suppliers.
2.1.2.2.3	Contractor has to supply paints required for painting the total scope of work as envisaged in service portion of contractor.
2.1.3	**Separate order shall be issued for Service Portion (Piping)and Supply Portion(paints).**
2.2.0	**SITE VISIT**
2.2.1	The bidder shall visit the site, to acquaint themselves with the conditions prevailing at site and in & around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid.
2.3.0	**SITE ORGANISATION**
2.3.1	The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL: 1. Overall planning, monitoring & control. 2. Quality control and quality assurance. 3. Materials management. 4. Safety, fire & security. 5. Industrial relations and fulfilment of labour laws and other statutory obligations.
2.3.2	The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.
2.3.3	On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves

	the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by BHEL, will have to be posted at site and deviations in this regard will not generally be permitted.
2.3.4	The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.
2.3.5	The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the contractor shall ensure providing one qualified supervisor against deployment of 15 workmen.
2.4.0	**ERECTION SCHEDULE**
2.4.1	Contractor shall submit within 30 days of LOI date, detailed program (L2 schedule) of construction / erection / commissioning, for approval to Site In-Charge/Project Manager-Noida. L2 schedule shall be the working level document demonstrating contractor's ability and methods of completing the work within the key milestones identified in the tender specification. These program would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring, The three monthly rolling program with the first month's program being tentative based on the site conditions would be prepared based on these program. The Contractor shall also be involved along with the Customer/BHEL to tie up detailed resource mobilization plan over the period of time of the contract matching with the performance targets. Other requirements are as per Clause No. 2.9 of GCC.
2.5.0	**The contractor shall comply with following towards Social Accountability:**
2.5.1	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.
2.5.2	The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.
2.5.3	The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.

2.5.4	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.
2.5.5	The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.
2.5.6	The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.
2.5.7	The Contractor shall arrange potable drinking water to its employees & workers.

S.No.	Description	Scope /to be taken care by		Remarks
3.0	**Facilities in the scope of Contractor/ BHEL**	BHEL	CONTRA -CTOR	
3.1	**ESTABLISHMENT**			
3.1.1	FOR CONSTRUCTION PURPOSE			
3.1.1.1	**Open space for office**	YES		Limited space (free of charge) As and where made available by customer M/s NTPC
3.1.1.2	**Open space for storage**	YES		**Limited space(free of charge) As and where made available by customer M/s NTPC**
3.1.2	FOR LABOUR COLONY			
3.1.2.1	**Open space**		**YES**	**Contractor have to make their own arrangement**
3.2	**ELECTRICITY**			
3.2.1	**Electricity for construction purposes (-415 V) (chargeable/free)**			**Free of Cost**
3.2.1.1	Single point source	YES		
3.2.1.2	Further distribution for the work to be done which include supply of materials & execution		**YES**	
3.2.2	**Electricity for the office, stores, etc of the bidder which include:**	YES		**Free of cost**
3.2.2.1	Distribution from single point including supply of materials & service		**YES**	
3.2.2.2	Supply, Installation & connection of material of energy meter including operation & maintenance		**YES**	
3.2.2.3	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above Lines		**YES**	**Contractor have to make their own arrangement**
3.2.2.4	Duties & deposits including statutory clearances for above		**YES**	
3.2.2.5	Demobilization of the facilities after completion of works		**YES**	

3.3	**WATER SUPPLY**			
3.3.1	**FOR CONSTRUCTION:**			
3.3.1.1	Making the water available at single point		**YES**	Contractor have to make bore wells itself wherever approved by M/s NTPC. For pre-commissioning and commissioning activities,NTPC will provide water.
3.3.1.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**	
3.3.2	**LABOUR COLONY:**			
3.3.2.1	Making the water available at single point		**YES**	**Contractor have to arrange on his own.**
3.3.2.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**	
3.4	**LIGHTING**			
3.4.1	For construction work (supply of all materials) 1. At office storage area 2.At preassembly area 3.At construction site/area		**YES**	
3.4.2	For construction work (execution of lighting work/arrangements) 1. At office storage area 2. At preassembly area 3. At construction site/area		**YES**	
3.4.3	Providing the necessary consumables like bulbs, Switches, etc during the course of construction		**YES**	
3.5	**Communications facilities for site operations of the bidder**			
3.5.1	Telephone, fax , internet ,intranet, email etc.		**YES**	
3.6	**COMPRESSED AIR SUPPLY**			
3.6.1	Supply of compressor and all other equipments required for compressor & compressed air system including pipes,		**YES**	

	valves, storage system etc.			
3.6.2	Installation of the above system and operation & maintenance of the same		**YES**	
3.6.3	Supply of all the consumables for the above system during the contract period.		**YES**	
3.7	**ERECTION FACILITIES**			
3.7.1	Providing erection drawings for all the Equipment's covered under this scope	YES		
3.7.2	Drawings for construction method	YES	**YES**	
3.7.3	As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site		**YES**	
3.7.4	Shipping lists etc for reference & planning the Activities	YES		
3.7.5	Preparation of site erection schedules and other input requirements		**YES**	
3.7.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	YES	**YES**	
3.7.7	Weekly erection schedule based on Sl. No. 3.7.5		**YES**	
3.7.8	Daily erection/work plan based on Sl. No. 3.7.7		**YES**	
3.7.9	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**	
3.7.10	Preparation of preassembly bay		**YES**	All necessary materials required for preparation of preassembly bed shall be arranged by contractor at his own cost
3.8	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.			
3.9	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.			
3.10	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 Customer at their own cost.**
3.11	**The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points:**
3.11.1	All electrical installations should be as per Indian Electricity rules.
3.11.2	All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.
3.11.3	Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.
3.11.4	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.
3.11.5	Contractor has to make their own earthling arrangement for their equipment / DB earthling.
3.11.6	All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
3.11.7	Contractor should use “MCCB” and“ELCB” either on incoming or outgoing connections to the DBs.
3.11.8	Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.
3.11.9	For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.
3.11.10	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.
3.11.11	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.
3.12.0	On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled 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 expenses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in

	this regard shall be final.
3.13.0	Compressor required capacity for construction purposes shall be arranged by Contractor.

4.0	**T&P AND MMD DEPLOYED BY CONTRACTOR**			
			For Package-A	**For Package-B**
Sl No.	**Item Description**	**Capacity**	**Qty**	**Qty**
4.1	Crawler/Tyre mounted Crane	40T	1 No.	1 No.
4.2	Hydra Crane	12 T / 14 T/18T	4 no	4 no
4.3	Trailer	20 T/ 30T cap	2 no	2 no
4.4	Winches	3T/5T/10T	APR	APR
4.5	Welding sets, TIG Welding Machine with accessories and ovens for welding electrodes backing and holding	APR	APR	APR
4.6	Oxy-acetylene gas cutting set	-	APR	APR
4.7	Hydraulic Test Pump	20 Kg/cm2	01 No.	01 No.
4.8	Heat Treatment & Stress Relieving sets		APR	APR
4.9	Hydraulic Pipe bending machine (manual)	Suitable for pipes upto 2 ½"	01 No.	01 No.
4.10	Hydraulic Pipe bending machine (motorized)	Suitable for pipes upto 2 ½"	01 No.	01 No.
4.11	Radiography Arrangement including source		02 Nos.	02 Nos.
4.11.1	Iridium 192		APR	APR
4.12	Pipe Chamfering machine		APR	APR
4.13	Pipe cutting & bevelling		Adequate Nos.	Adequate

	machines			Nos.
4.14	Chain pulley blocks and pulleys of suitable capacities	3T/4T/5T/10T/20T	APR	APR
4.15	Three phase distribution board with complete set for distribution of construction power	400 Amps	APR	APR
4.16	Electric cables for distribution of construction power		APR	APR
4.17	Hardness Testing Equipment (Eqotip or Microdur make)		APR	APR
4.18	Recordable UT test Equipment suitable to meet the requirements (KRAUTKRAMMER MODEL USN50 or EQUIVALENT)		APR	APR
4.19	Stress relieving equipment		APR	APR
4.20	Magnetic particle testing equipment – DRY &WET Type		APR	APR
4.21	Temperature Recorder for 0-1000 deg C 6/12 points with thermocouples/ rod and compensating cable		APR	APR
4.22	Torque Wrench		02 Nos.	02 Nos.
4.23	Various sizes of clamps/ fixtures for assembling		APR	APR
4.24	Dewatering Pump			
4.25	Portable hardness tester		APR	APR

4.26	Alchometer		APR	APR
4.27	Scaffolding Pipe		4000 Nos.	4000 Nos.
4.28	Sleeper		APR	APR
	APR- As per requirement (Contractor shall have to deploy the T&P whenever required at site as decided by BHEL ENGINEER) # Deployment period of the T&P shall be as per initial/modified mutually agreed plan during course of execution.			
4.29	**NOTES**			
4.29.1	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.			
4.29.2	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.			
4.29.3	Contractor has to submit the Calibration certificates of all the precision equipement to BHEL. BHEL may ask for recalibration of the MME's /precision equipments for ensuring quality of work. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.			
4.29.4	Other terms and conditions regarding above items shall be as per T&P clause in SCC.			

5.0	**LIST OF T&P and MMD being provided by BHEL for use of contractor free of hire charges on sharing basis.**				
Sl. No.	**Description & Capacity of T & P**	**Capacity**	**Package-A Qty**	**Package-B Qty**	**Remark**
5.1	**Crawler Crane**	**250 T**	**1**	**1**	**On sharing basis**
5.2	**Crawler Crane**	**135 T**	**1**	**1**	**On sharing basis**
5.3	**EOT Crane at TG Hall w/o operator**		**2 Nos.**	**2 Nos.**	**On sharing basis**
5.4	**Induction Heating Machine**		**APR**	**APR**	
5.5	**DG Set -250 KVA/500 KVA**		**1 No.**	**1 No.**	
5.6	**Spectrometer for metal testing**		**1 No.**	**1 No.**	**On sharing basis**
5.7	**Hydraulic Test Pump**	**600-800 Kg/cm2**	**1 No.**	**1 No.**	**On sharing basis**
5.8	**NOTES:**				
5.8.1	**Cl.4.2.2.16 c. of SCC shall be 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. **Manpower for these works and other crane related works is in the scope of 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 provide cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance may be excluded from scope of contractor.				
5.8.2	**Cl.4.2.2.16 e. of SCC shall be read as-The operator for 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.**				
5.8.3	**The contractor shall make necessary arrangement like laying of steel plates, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of BHEL cranes.**				

5.8.4	**For lifting of equipments, where 40 T crane(Contractor scope) is not suitable, BHEL shall provide the cranes as stated at Clause No. 5.1, 5.2 & 5.3**
5.8.5	**The cranes at Sl. No.5.1 to 5.2 shall be made available to contractor free of hire charges for specific use like erection of pipes, hanger & supports wherever no other option is possible. These cranes shall be issued at the discretion of the BHEL Engineer.**
5.8.6	After handing over of The D/G EOT's (after commissioning of the EOT cranes) to Customer by BHEL, Customer shall provide skilled operation and maintenance personnel for EOT cranes available in TG hall and BFP buildings. **The customer will provide the EOT's on chargeable basis for erection of the Units/equipment's under this package. The EOT cranes shall be used by the contractor on chargeable basis; BHEL will deduct the EOT usage charges on actual basis as charged by the Customer for using EOT, from the running Bills of Contractor. Though the customer shall operate and maintain the EOT's, the contractor has also to arrange for skilled EOT operators for ensuring uninterrupted flow of work ,separately for day and night to meet project schedule, within the quoted rates. The regular maintenance of the EOT is in the scope of the NTPC, only after the handing over of the EOT's. The contractor may be required to extend help during the maintenance/Upkeep of the EOT and initial operation.**
5.8.7	**In case of other T&P mention above contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores.**
5.8.8	**DG Set will be provided as standby arrangement for P91 welding and the required operator, fuel, lubricants, power cables etc to be arranged by the Contractor.**

6.0	**TIME SCHEDULE**
6.1	The contractor 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 mobilisation of manpower and T&Ps by the contractor.
	Entire work as detailed in the tender specifications for package A&B: Gadarwara :Each Unit (Pkg. A & Pkg. B) shall be completed within **17 months** from the Zero date of that unit as per program/ milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.
6.2.2	The various milestones dates to be achieved for Package A& B: Gadarwara-Unit 1&2 respectively, under this tender are as: **MILE STONES** — **MONTH** Piping Erection Start — ZERO Boiler Hydro Test — 3rd Month Light Up — 11th Month Steam Blowing — 13th Month Synchronization — 15th Month Full Load — 17th Month Note: There will be phase shift of 04 Months b/w Unit No.1 & 2
6.3	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 month from Synchronization.
6.4	The work under the scope of this contract is deemed to be complete in all respects, onlywhen 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 'BHEL 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 that 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.
7.4	**Interest bearing recoverable advance: Applicable as per Clause No. 2.13 of GCC.**
7.5	**PROGESSIVE PAYMENT ON PRORATA BASIS (SERVICE PORTION)**
7.5.1	**85% of Lump sum price (Item No. 11.4.1 of Rate Schedule of Package-A & 11.11.1 of Rate Schedule of Package-B) (Applicable on items covered under ANNEXURE –I to X)**

SL.No.	**Rate Schedule Identification**			
	Package –A	**FOR RATE SHCEDULE ITEM NO.** **11.4.1.1, 11.4.1.2, 11.4.1.3, 11.4.1.4**	**FOR RATE SCHEDULE ITEM NO.** **11.4.1.6**	**FOR RATE SCHEDULE ITEM NO.** **11.4.1.5**
	Package –B	**FOR RATE SCHEDULE ITEM NO.** **11.11.1.1, 11.11.1.2, 11.11.1.3, 11.11.1.4**	**FOR RATE SCHEDULE ITEM NO.** **11.11.1.6**	**FOR RATE SCHEDULE ITEM NO.** **11.11.1.5**
	Item Description	**P91/P92, P22/ AS, CS/Other materials/ PEM supply (except insulation) , SS Piping**	**Insulation**	**Temp. Piping**
7.5.1.1	COMPLETION OF PRE-ASSEMBLY, (IF NOT APPLICABLE THIS PORTION SHALL BE CLUBBED WITH PLACEMENT IN POSITION)	10%	-	-

7.5.1.2	PLACEMENT IN POSITION	15%	50%	-
7.5.1.3	ALIGNMENT	15%	-	-
7.5.1.4	WELDING /BOLTING/FIXING / CLADDING AS REQUIRED	15%	35%	-
7.5.1.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be paid along with Welding)	10%	-	-
7.5.1.6	INSTALLATION OF TEMPORARY PIPING INCLUDING ALL WORKS LIKE PLACEMENT IN POSITION ,ALLIGNMENT,WELDING/FIXING,NDT,INSULATION (IF REQD.),HANGER SUPPORT ETC	-	-	60%
7.5.1.7	DISMANTLING OF TEMPORARY PIPING , EDGE PREPARATION AND RETURN TO BHEL STORES, AREA CLEANING	-	-	25%
7.5.1.8	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DWG	10%		
7.5.1.9	HYDRAULIC TEST OR PNEUMATIC TEST	5%	-	-
7.5.1.10	FLOATING OF LINES, FINAL ADJUSTMENT OF SUPPORTS FOR COLD AND HOT VALVES (if not applicable, this portion to be clubbed along with hydraulic test/ pneumatic test)	5%	-	-
	TOTAL FOR PRO RATA PAYMENTS	**85%**	**85%**	**85%**

7.5.2	STAGE/MILESTONE PAYMENT (15%) applicable for item no. 11.4.1 of Rate schedule of Package A and item no. 11.11.1 of Rate Schedule of Package-B			
	Rate Schedule Identification			
	Package –A	**FOR RATE SHCEDULE ITEM NO.** **11.4.1.1, 11.4.1.2, 11.4.1.3, 11.4.1.4**	**FOR RATE SHCEDULE ITEM NO.** **11.4.1.6**	**FOR RATE SHCEDULE ITEM NO.** **11.4.1.5**
	Package –B	**FOR RATE SHCEDULE ITEM NO.** **11.11.1.1, 11.11.1.2,** **11.11.1.3, 11.11.1.4**	**FOR RATE SHCEDULE ITEM NO.** **11.11.1.6**	**FOR RATE SHCEDULE ITEM NO.** **11.11.1.5**
	Item Description	**P91/P92, P22/ AS, CS/Other materials/ PEM supply (except insulation) , SS Piping**	**Insulation**	**Temp. Piping**
7.5.2.1	Hydraulic Test of Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass and BFP Lines	2%	-	-
7.5.2.2	Boiler Light up	1%	-	-
7.5.2.3	Chemical Cleaning	1%	1%	-
7.5.2.2	Successful completion of Steam Blowing	2%	3%	-
7.5.2.4	Full Load	1%	1%	-
7.5.2.5	Trial operation and handing over to customer	1%	2%	-
7.5.2.6	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing	1%	-	-
7.5.2.7	Painting	2%	-	-
7.5.2.8	Area cleaning, temporary structures cutting/ removal and return of scrap	1%	3%	-

7.5.2.9	Punch list point/ pending points liquidation	1%	2%	-
7.5.2.10	Material Reconciliation	1%	2%	15%
7.5.2.11	Completion of contractual obligations	1%	1%	-
7.5.2.12	**TOTAL FOR STAGE/ MILESTONE PAYMENTS (15%)**	**15%**	**15%**	**15%**

7.6	**SUPPLY PORTION**
7.6.1	**PAYMENT FOR SUPPLY OF PAINTS**(applicable for item no. 11.5.1 of Rate Schedule of Package A and item no. 11.12.1 of Rate Schedule of Package-B)
7.6.1.1	100% payment after completion of finish painting as certified by BHEL Engineer.
	Note:-
7.6.1.2	This value for supply portion will remain firm irrespective of variation in quantities Actually erected.

8.0	**TAXES & DUTIES (SERVICE PORTION-PIPING)**
8.1	The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit. However, provisions regarding **Service Tax and Value Added Tax (VAT)** on output services and goods shall be as per following clauses.
8.2	**Service Tax & Cess on Service Tax**
8.2.1	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.
8.2.2	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.
8.2.3	For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted :
8.2.3.1	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:
8.2.3.1.1	The name, address and registration number of the contractor
8.2.3.1.2	The name and address of the party receiving taxable service (BHEL)
8.2.3.1.3	Description, classification and value of taxable service provided and
8.2.3.1.4	The Service Tax payable thereon.

8.2.4	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.
8.2.5	Name and address of the contractor should be same in the service tax invoice and monthly bill. Any change in the name and address in past should be supported by documentary evidence duly certified by the registering authority.
8.2.6	Purpose of above requirements, inter-alia, is to enable availment of CENVAT credit by BHEL. As per recent amendments, Time restrictions for taking Cenvat credit is within twelve months from date of invoice. Wherever Cenvat credit could not be availed by BHEL within statutory time limit of 12 months due to delay in submission of invoices or for any other reasons attributable to contractors, Liability towards loss of such Cenvat credit shall be passed on to contractors.
8.3	**VAT (Sales Tax /WCT)**
8.3.1	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.
8.3.2	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.
8.4	**Modalities of Tax Incidence on BHEL**
8.4.1	Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The

	option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.
8.5	**New Taxes/Levies**
8.5.1	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.
8.5.2	In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.
8.5.3	No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.
8.6	**TAXES & DUTIES (SUPPLY PORTION)**
8.6.1	Price quoted should be inclusive of all the applicable charges, taxes and duties, including entry tax. However rates of sales tax, excise duty & other statuary levies should be indicated separately. Variation in excise duty, sales tax/ VAT or any other statuary levies during contractual delivery period should be to BHEL's account. No "C" form will be issued for this supply. Contractor should arrange own road permit, if any, himself for arranging material and they have to arrange cenvatable invoice. In case of material purchased within the state, VAT shall be payable extra on submission of VAT invoices/ documentary evidence by the vendor.

9.1	**ANY OTHER SPECIAL REQUIREMENT**
9.1.1	**THE PROCEDURE FOR SELECTION & FINALIZATION OF CONTRACTORS FOR PACKAGE-A &PACKAGE-B OF THIS TENDER FOR UNIT NO. 1 & 2 AT 2X800 MW, GADARWARA STPS OF NTPC, GADARWARA is as follows:**
9.1.1.1	There will be two units of 800 MW each AT 2X800 MW GADARWARA STPS OF NTPC, GADARWARA, DISTT. NARSINGHPUR, M.P. Package A shall consist of Unit # 1 & Package B shall consist of Unit # 2
9.1.1.2	**The two packages (Pkg A & Pkg B) shall be awarded to two separate contractors i. e. no single bidder shall be awarded more than one package.**
9.1.1.3	Bidders may submit their offer either for both the packages or any one of the packages i.e. Package-A / Package-B given in this tender. However, Bidders shall specifically confirm in their bid that they have quoted for Package-A / Package-B or both of the tender.
9.1.1.4	Bidders shall submit price bid for each package separately by enclosing each price bid in a separate envelop, clearly indicating on cover of the envelop the respective package number(A/B) besides furnishing other requisite details.
9.1.1.5	RA/Price Bid opening for Package A shall be done first.
9.1.1.6	Party who is awarded the job of Package "A" shall not be considered for participating in RA/Price bid opening of package "B".
9.1.1.7	There will be two separate Contracts (i.e for Supply part and E& C part) for each Package. All the contracts will individually be treated as a separate contract and Contract Agreement for each part shall be signed separately.
9.2	**IMPORTANT CONDITIONS**
9.2.1	In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be as mentioned in Notice inviting tender.
9.2.2	**Modification/ deletion in Price Variation Compensation** Clause no. 2.17of GCC:
9.2.2.1	**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)**
9.2.2.2	**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:
9.2.2.2.1	For the portion of backlog attributable to the contractor, **no PVC shall be paid.**
9.2.2.2.2	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.
9.2.2.2.3	For the portion of backlog attributable to BHEL, the PVC will be as per the indices applicable for the respective months
9.2.2.2.4	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.
9.2.3	All other terms & conditions of Clause No. 2.17 of GCC shall remain same.

TENTATIVE WEIGHT SCHEDULE

SUMMARY OF WEIGHTS (APPLICABLE FOR PACKAGE-A & PACKAGE-B)

		Package-A (Unit#1)		Package-B (Unit#2)	
SN	**Description**	**Weight (in MT)**	**Annex U1**	**Weight (in MT)**	**Annex U2**
1	**PIPING MATERIALS**				
1.1	P-91/92 Piping	**910**	**I, III, IV, IX**	**893**	**V, VII, IX**
1.2	P-22 / Alloy Steel (AS) Piping	**97**	**I, III, IX**	**97**	**V, VII, IX**
1.3	Carbon Steel (CS) Piping/H&S/ Additional Platforms /Other Materials/PEM Supply (except insulation)	**2974**	**I, III, IV, IX, X**	**2767**	**V, VII, IX, X**
1.4	Stainless Steel (SS) Piping	**3**	**III, IX**	**3**	**VII, IX**
1.5	Temp. Piping Material	**176**	**VIII**	**176**	**VIII**
1.6	Insulation	**757**	**II**	**752**	**VI**
	Total Weight (in MT)	**4917**		**4688**	

ANNEXURE-I

SG SCOPE PIPING					
APPLICABLE FOR PACKAGE-A (UNIT NO. 1)					
SL No.	**CUST**	**PGMA**	**WBS Description**	**Weight (in Kgs)**	**Material Spec**
1	P1/7216	80-300	MS FROM SUPERHEATER TO BOILER STOP VALVE	65,873	SA335P91
2	P1/7216	80-301	MS FROM BOILER STOP VALVE TO ESV	2,76,981	SA335P91
3	P1/7216	80-303	MS HEADER TO AUX PRDS	11,000	SA335P91 AND CARBON STEEL
4	P1/7216	80-304	MS HEADER TO HPBP VALVE	34,000	SA335P91
5	P1/7216	80-310	HRH FROM REHEATER TO INTERCEPTOR VALVE	3,47,034	SA335P91
6	P1/7216	80-312	LPBP VALVE UPSTREAM AND DOWNSTREAM	1,14,670	SA335P91
7	P1/7216	80-320	CRH FROM TURBINE TO REHEATER	2,17,000	SA335P22 AND CARBON STEEL
8	P1/7216	80-321	HPBP VALVE TO CRH PIPING	24,000	SA335P22
9	P1/7216	80-324	CRH HEADER TO AUX.PRDS	2,576	CARBON STEEL
10	P1/7216	80-340	AUX STEAM HEADER	5,345	CARBON STEEL
11	P1/7216	80-341	AUX STEAM HEADER INTERCONN BETWEEN UNITS	44,713	CARBON STEEL
12	P1/7216	80-342	AUX STEAM TO SCAPH	17,457	CARBON STEEL
13	P1/7216	80-343	AUX STEAM TO AH SOOT BLOWERS	7,743	CARBON STEEL
14	P1/7216	80-351	AUX STEAM TO UNLISTED USERS - SG SCOPE	21,644	CARBON STEEL
15	P1/7216	80-370	HP DRAIN FLASH TANK VENT TO ATMOSPHERE	79,512	CARBON STEEL
16	P1/7216	80-373	AUX STEAM HEADER SV EXHAUST	5,500	CARBON STEEL
17	P1/7216	80-418	ERECTION MATERIALS FOR INSTRUMENTS	3,000	SA335P91, SA335P22 AND CARBON STEEL
18	P1/7216	80-435	UNLISTED SPRAY WATER - TG SCOPE	620	CARBON STEEL
19	P1/7216	80-451	BOILER INTEGRAL PIPING DRAINS	25,000	SA335P22,SA335P91 AND CARBON STEEL
20	P1/7216	80-452	HP PIPING DRAINS - SG SCOPE	25,000	SA335P22,SA335P91 AND CARBON STEEL
21	P1/7216	80-453	LP PIPING DRAINS - SG SCOPE	8,349	CARBON STEEL
22	P1/7216	80-454	SCAPH DRAINS	3,788	CARBON STEEL
23	P1/7216	80-455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	6,010	CARBON STEEL
24	P1/7216	80-460	SG AUX COOLING WATER UNIT	65,009	CARBON STEEL

			SYSTEM		
25	P1/7216	80-471	BOILER WATER WASH TO AND FROM UNIT	12,144	CARBON STEEL
26	P1/7216	80-477	SERVICE WATER PIPING	8,083	CARBON STEEL
27	P1/7216	80-480	FIRE WATER-OTHER AREAS	27,600	CARBON STEEL
28	P1/7216	80-545	LP CONDENSATE PIPING WITHIN TG HALL FOR	8,357	CARBON STEEL
29	P1/7216	80-612	SERVICE AIR FOR INDIVIDUAL UNITS	20,141	CARBON STEEL
30	P1/7216	80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	25,522	CARBON STEEL
31	P1/7216	80-650	FUEL OIL SUPPLY AND RETURN	94,310	CARBON STEEL
32	P1/7216	80-830	H AND S FOR CRITICAL PPG(BLR & TG AREA)	1,35,347	other
33	P1/7216	80-901	SUB DELIVERY VALVES FOR LIGHT UP	10,702	CARBON STEEL
34	P1/7216	80-901	Mandatory spares SD VALVES FOR LIGHT UP	4,172	CARBON STEEL
35	P1/7216	80-920	H AND S FOR HYDRO TEST	6,628	other
36	P1/7216	80-921	H AND S FOR LIGHT UP STEAM LINE	3,914	other
37	P1/7216	80-940	AUX STRUCTURE FOR CRITICAL PIPING-SG	1,12,828	CARBON STEEL
38	P1/7216	80-992	IMPORTED ELECTRODES	8,421	Other
39	P1/7216	80-993	MISC ERECTION MATLS	66	CARBON STEEL
40	P1/7216	81-036	CW STORAGE TANK 16-25 CUM	7,419	other
41	P1/7216	81-042	MAKE UP WATER STORAGE TANK BELOW 300 CUM	8,227	other
42	P1/7216	81-060	SPECIAL TANKS AND VESSELS	43,000	other
43	P1/7216	81-100	CONDENSATE TRANSFER PUMP	4,000	CARBON STEEL
44	P1/7216	81-110	COOLING WATER PUMP	380	CARBON STEEL
			TOTAL (IN KG)	19,53,086	
			TOTAL (IN MT)	**1953**	

ANNEXURE-II

APPLICABLE FOR PACKAGE-A (UNIT NO. 1 & AUX BOILER)					
INSULATION (PIPING CENTER SUPPLY)					
SL No.	**CUST**	**PGMA**	**WBS Description**	**Boiler U1 Insulation Weight (in Kgs)**	**Aux Boiler Insulation Weight (in Kgs**
(A)	**INSULATION (BOILER U1 & AUX BOILER PIPING)**				
1.	P1/7216	81-318	FIX COM FOR MISCELLANEOUS PPG INSULATION	40,012	793
2.	P1/7216	81-325	MINERAL WOOL MATTRESS	4,00,000	2,201
3.	P1/7216	81-341	SEALING COMPOUND FOR INSL	1,500	40
4.	P1/7216	81-350	ALUMINIUM CLADDING FOR INSULATION	92,548	1,554
			TOTAL WEIGHT (IN KGS)	**5,34,060**	**4,588**
			TOTAL WEIGHT (IN MT)	**539 MT**	
(B)	**INSULATION (PEM SUPPLY)**				
5.	-	-	THERMAL INSULATION - R-MATTRESSES/P-SECN	198,925	
6.	-	-	THERMAL INSULATION - ANCILLARY MATERIAL	18,940	
			TOTAL WEIGHT (IN KGS)	**217,865**	
			TOTAL WEIGHT (IN MT)	**218 MT**	
			GRAND TOTAL (A)+(B) = 757 MT		

ANNEXURE-III

TG SCOPE PIPING					
APPLICABLE FOR PACKAGE-A (UNIT NO. 1)					
SL No.	**CUST**	**PGMA**	**WBS Description**	**Weight (in Kgs)**	**Material Spec**
1	P1/7219	80-307	HP AND LP BYPASS WARM UP	1,846	SA335P91
2	P1/7219	80-322	CRH PIPING TO DEAERATING HEATER	21,190	CARBON STEEL
3	P1/7219	80-323	STEAM TO BFP DRIVE TURBINE	7,052	CARBON STEEL
4	P1/7219	80-329	EXTRACTION STEAM TO BFP DRIVE TURBINE	10,977	CARBON STEEL
5	P1/7219	80-332	EXTRACTION STEAM TO LP HEATER-3	14,517	CARBON STEEL
6	P1/7219	80-334	EXTRACTION STEAM TO LP HEATER-4	9,751	CARBON STEEL
7	P1/7219	80-335	EXTRACTION STEAM TO DEAERATING HEATER	14,334	CARBON STEEL
8	P1/7219	80-336	EXTRACTION STEAM TO HP HEATER NO.1	6,430	SA335P22
9	P1/7219	80-337	EXTRACTION STEAM TO HP HEATER-2	6,451	CARBON STEEL
10	P1/7219	80-338	EXTRACTION STEAM TO HP HEATER-3	6,170	CARBON STEEL
11	P1/7219	80-339	AUX STEAM TO BFD TURBINE	1,920	CARBON STEEL
12	P1/7219	80-345	AUX STEAM TO DEAERATING HEATER	7,229	CARBON STEEL
13	P1/7219	80-349	AUX STEAM TO GLAND SEALS - TG SCOPE	1,104	CARBON STEEL
14	P1/7219	80-363	EXHAUST STEAM FROM PRIME MOVERS-TG SCOPE	31,104	CARBON STEEL
15	P1/7219	80-371	DRAIN FLASH TANK VENT TO CONDENSER	3,341	CARBON STEEL
16	P1/7219	80-375	UNLISTED SV EXHAUSTS - TG SCOPE	1,937	CARBON STEEL
17	P1/7219	80-379	HPH SV EXHAUST TO FLASH TANK	3,487	CARBON STEEL
18	P1/7219	80-381	HP HEATER VENTS - TG SCOPE	4,419	CARBON STEEL
19	P1/7219	80-382	LP HEATER VENTS	1,477	CARBON STEEL
20	P1/7219	80-385	VENT FROM UNLISTED PPG/EQPT TO COND	3,657	CARBON STEEL
21	P1/7219	80-388	CONDENSER AIR EVACUATION PIPING	7,296	CARBON STEEL

22	P1/7219	80-400	CONDENSATE SUCTION	8,640	CARBON STEEL
23	P1/7219	80-401	CD FROM PUMP TO LPH1/DC INLET TEE AND RE	38,395	CARBON STEEL
24	P1/7219	80-402	CD FROM LPH1/DC INLET TEE TO TG TP	29,197	CARBON STEEL
25	P1/7219	80-403	CD FROM TG TP TO DEAERATING HEATER	15,743	CARBON STEEL
26	P1/7219	80-407	CONDENSATE FOR SEALING OF VACUUM	2,083	CARBON STEEL
27	P1/7219	80-408	CONDENSATE DUMP FROM HEADER	1,399	CARBON STEEL
28	P1/7219	80-419	DEAERATOR SAFETY VALVE EXHAUST TO ATM	5,853	CARBON STEEL
29	P1/7219	80-420	BOILER FEED PUMP SUCTION	27,805	CARBON STEEL
30	P1/7219	80-421	BOILER FEED PUMP RECIRCULATION	76,772	CARBON STEEL
31	P1/7219	80-423	BOILER FEED PUMP TO HPH INCLUDIN BYPASS	1,68,769	CARBON STEEL
32	P1/7219	80-424	BFD BETWEEN HTRS AND GROUP PROTECTION	1,84,300	CARBON STEEL
33	P1/7219	80-425	BFD FROM FINAL HPH TO SG TP	1,16,309	CARBON STEEL
34	P1/7219	80-430	SPRAY WATER TO HPBP	7,000	SA335922 AND CARBON STEEL
35	P1/7219	80-433	SPRAY WATER FROM BFP INTERSTAGE	19,961	CARBON STEEL
36	P1/7219	80-435	UNLISTED SPRAY WATER - TG SCOPE	832	CARBON STEEL
37	P1/7219	80-436	SPRAY WATER TO LPBP DESH	5,033	CARBON STEEL
38	P1/7219	80-442	GLAND STEAM COOLER DRAINS	311	CARBON STEEL
39	P1/7219	80-443	LP HEATER-1 TO CONDENSER	6,857	CARBON STEEL
40	P1/7219	80-444	LP HEATER-2/3/4/5 DRAINS AND DRIP PUMP I	8,218	CARBON STEEL
41	P1/7219	80-446	DEAERATING HEATER OVER FLOW AND DRAIN	7,699	CARBON STEEL
42	P1/7219	80-447	HP HEATER DRAINS	33,742	CARBON STEEL
43	P1/7219	80-448	DRAIN FROM UNLISTED EQPT/VESSEL-TG SCOPE	9,801	CARBON STEEL
44	P1/7219	80-449	TG CYCLE PIPING DRAINS AND VENTS	18,203	CARBON STEEL
45	P1/7219	80-452	HP PIPING DRAINS - TG SCOPE	7,011	CARBON STEEL
46	P1/7219	80-453	LP PIPING DRAINS - TG SCOPE	12,803	CARBON STEEL

47	P1/7219	80-457	MANIFOLDS FOR HP FLASH BOX AND CONDENS	1,500	SA335922 AND CARBON STEEL
48	P1/7219	80-459	HP FLASH TANK DRAIN TO CONDENSER	834	CARBON STEEL
49	P1/7219	80-463	TG AUX COOLING WATER	84,700	CARBON STEEL
50	P1/7219	80-468	MAIN CIRCULATION WATER PIPING	2,64,798	CARBON STEEL
51	P1/7219	80-473	DEMINERALISED WATER SYSTEM	2,046	CARBON STEEL
52	P1/7219	80-477	SERVICE WATER PIPING	7,347	CARBON STEEL
53	P1/7219	80-493	HP FLASH TANK VENT TO CONDENSER	2,801	CARBON STEEL
54	P1/7219	80-494	LP FLASH TANK VENT TO CONDENSER	3,931	CARBON STEEL
55	P1/7219	80-495	LP FLASH TANK DRAIN TO COND	2,875	CARBON STEEL
56	P1/7219	80-601	LOW PRESSURE DOSING PIPING	757	STAINLESS STEEL
57	P1/7219	80-610	SERVICE AIR-COMP SUCT AND DIS TO RECEI	5,475	CARBON STEEL
58	P1/7219	80-614	INST AIR COMP SUC AND DIS TO RECEIVER	6,158	CARBON STEEL
59	P1/7219	80-673	LUBE OIL PIPING SYSTEM	11,361	CARBON STEEL
60	P1/7219	80-901	SUB DELIVERY VALVES FOR LIGHT UP	1,000	other
61	P1/7219	80-928	H AND S FOR BOILER LIGHT UP – TG	34,450	other
62	P1/7219	80-930	H AND S FOR SYNCHRONISATION - TG	90,000	other
63	P1/7219	80-933	H AND S FOR LP PIPING	41,645	other
64	P1/7219	80-992	IMPORTED ELECTRODES	543	other
			TOTAL WEIGHT (IN KGS)	**15,40,647**	
			TOTAL WEIGHT (IN MT)	**1541 MT**	

ANNEXURE-IV

AUXILIARY BOILER PIPING					
APPLICABLE FOR PACKAGE-A (UNIT NO. 1) – AUX BOILER					
SL NO.	**CUST**	**PGMA**	**WBS Description**	**Weight (in Kgs)**	**Material Spec**
1	P1/7218	80-300	MS FROM SUPERHEATER TO BOILER STOP VALVE	1,007	SA335P91
2	P1/7218	80-345	AUX STEAM TO DEAERATING HEATER	3,399	other
3	P1/7218	80-366	IBD TANK VENT TO ATMOSPHERE	841	other
4	P1/7218	80-417	BOILER FEED DISCHARGE PIPING	728	other
5	P1/7218	80-418	ERECTION MATERIALS FOR INSTRUMENTS	160	CARBON STEEL
6	P1/7218	80-420	BOILER FEED PUMP SUCTION	709	other
7	P1/7218	80-421	BOILER FEED PUMP RECIRCULATION	227	other
8	P1/7218	80-446	DEAERATING HEATER OVER FLOW AND DRAIN	538	other
9	P1/7218	80-450	CBD AND EMERGENCY DRUM DRAIN	315	other
10	P1/7218	80-451	BOILER INTEGRAL PIPING DRAINS	360	CARBON STEEL
11	P1/7218	80-453	LP PIPING DRAINS - SG SCOPE	220	CARBON STEEL
12	P1/7218	80-460	SG AUX COOLING WATER UNIT SYSTEM	763	CARBON STEEL
13	P1/7218	80-473	DEMINERALISED WATER SYSTEM	675	other
14	P1/7218	80-600	HIGH PRESSURE DOSING PIPING	142	other
15	P1/7218	80-601	LOW PRESSURE DOSING PIPING	93	other
16	P1/7218	80-612	SERVICE AIR FOR INDIVIDUAL UNITS	403	CARBON STEEL
17	P1/7218	80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	441	CARBON STEEL
18	P1/7218	80-650	FUEL OIL SUPPLY AND RETURN PIPING	709	CARBON STEEL
19	P1/7218	80-901	SUB DELIVERY VALVES FOR LIGHT UP	621	CARBON STEEL
20	P1/7218	80-901	MANDATORY SPARES FOR SD VALVES FOR LUP	145	CARBON STEEL
21	P1/7218	80-920	H AND S FOR HYDRO TEST	234	other

22	P1/7218	80-921	H AND S FOR LIGHT UP STEAM LINE	7,367	other
23	P1/7218	80-922	H AND S FOR LIGHT UP - NON STEAM LINES	1,282	other
24	P1/7218	80-992	IMPORTED ELECTRODES	26	other
25	P1/7218	81-005	INTERMITTENT BLOW DOWN EXPANDER-D1500 MM	2,340	other
26	P1/7218	81-026	TRAY TYPE DEAERATOR BELOW 100 cuM/HR	22,493	other
27	P1/7218	81-034	PLATFORM AND STAIRS FOR FEED TANK AND	2,771	other
28	P1/7218	81-104	BOILER FEED PUMP	540	other
29	P1/7218	81-104	MANDATORY SPARES FOR BOILER FEED PUMP	10	other
30	P1/7218	81-127	LOW PRESSURE DOSING SYSTEM	1,000	other
31	P1/7218	81-128	HIGH PRESSURE DOSING SYSTEM	1,000	other
32	P1/7218	81-128	MANDATORY SPARES FOR HP DOSING SYSTEM	5	other
			TOTAL WEIGHT (IN KGS)	51,563	
			TOTAL WEIGHT (IN MT)	**52 MT**	

ANNEXURE-V

SG SCOPE PIPING

APPLICABLE FOR PACKAGE-B (UNIT NO. 2)

SL No.	CUST	PGMA	WBS Description	Weight (in Kgs)	Material Spec
1	P1/7217	80-300	MS FROM SUPERHEATER TO BOILER STOP VALVE	65,726	SA335P91
2	P1/7217	80-301	MS FROM BOILERSTOP VALVE TO ESV	2,60,693	SA335P91
3	P1/7217	80-303	MS HEADER TO AUX PRDS	11,000	SA335P91 AND CARBON STEEL
4	P1/7217	80-304	MS HEADER TO HPBP VALVE	34,000	SA335P91
5	P1/7217	80-310	HRH FROM REHEATER TO INTERCEPTOR VALVE	3,47,034	SA335P91
6	P1/7217	80-312	LPBP VALVE UPSTREAM AND DOWNSTREAM	1,14,670	SA335P91
7	P1/7217	80-320	CRH FROM TURBINE TO REHEATER	2,17,000	SA335P22 AND CARBON STEEL
8	P1/7217	80-321	HPBP VALVE TO CRH PIPING	24,000	SA335P22
9	P1/7217	80-324	CRH HEADER TO AUX.PRDS	2,576	CARBON STEEL
10	P1/7217	80-340	AUX STEAM HEADER	5,295	CARBON STEEL
11	P1/7217	80-342	AUX STEAM TO SCAPH	17,457	CARBON STEEL
12	P1/7217	80-343	AUX STEAM TO AH SOOT BLOWERS	7,743	CARBON STEEL
13	P1/7217	80-351	AUX STEAM TO UNLISTED USERS - SG SCOPE	21,644	CARBON STEEL
14	P1/7217	80-370	HP DRAIN FLASH TANK VENT TO ATMOSPHERE	79,512	CARBON STEEL
15	P1/7217	80-373	AUX STEAM HEADER SV EXHAUST	5,500	CARBON STEEL
16	P1/7217	80-418	ERECTION MATERIALS FOR INSTRUMENTS	3,000	SA335P91, SA335P22 AND CARBON STEEL
17	P1/7217	80-435	UNLISTED SPRAY WATER - TG SCOPE	620	CARBON STEEL
18	P1/7217	80-451	BOILER INTEGRAL PIPING DRAINS	25,000	SA335P22,SA335P91 AND CARBON STEEL
19	P1/7217	80-452	HP PIPING DRAINS - SG SCOPE	25,000	SA335P22,SA335P91 AND CARBON STEEL
20	P1/7217	80-453	LP PIPING DRAINS - SG SCOPE	8,349	CARBON STEEL
21	P1/7217	80-454	SCAPH DRAINS	3,788	CARBON STEEL
22	P1/7217	80-455	DRAIN FROM UNLISTED	6,010	CARBON STEEL

			EQPT/VESSEL-SG SCOPE		
23	P1/7217	80-460	SG AUX COOLING WATER UNIT SYSTEM	65,009	CARBON STEEL
24	P1/7217	80-471	BOILER WATER WASH TO AND FROM UNIT	12,144	CARBON STEEL
25	P1/7217	80-477	SERVICE WATER PIPING	8,083	CARBON STEEL
26	P1/7217	80-480	FIRE WATER-OTHER AREAS	27,600	CARBON STEEL
27	P1/7217	80-545	LP CONDENSATE PIPING WITHIN TG HALL FOR	8,357	CARBON STEEL
28	P1/7217	80-612	SERVICE AIR FOR INDIVIDUAL UNITS	20,141	CARBON STEEL
29	P1/7217	80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	25,522	CARBON STEEL
30	P1/7217	80-830	H AND S FOR CRITICAL PPG(BLR & TG AREA)	1,35,359	other
31	P1/7217	80-901	SUB DELIVERY VALVES FOR LIGHT UP	10,702	CARBON STEEL
32	P1/7217	80-920	H AND S FOR HYDRO TEST	6,628	other
33	P1/7217	80-921	H AND S FOR LIGHT UP STEAM LINE	3,914	other
34	P1/7217	80-940	AUX STRUCTURE FOR CRITICAL PIPING-SG	1,12,828	CARBON STEEL
35	P1/7217	80-992	IMPORTED ELECTRODES	8,421	Other
36	P1/7217	81-036	CW STORAGE TANK 16-25 CUM	7,419	other
37	P1/7217	81-042	MAKE UP WATER STORAGE TANK BELOW 300 CUM	8,227	other
38	P1/7217	81-060	SPECIAL TANKS AND VESSELS	43,000	other
39	P1/7217	81-100	CONDENSATE TRANSFER PUMP	4,000	CARBON STEEL
40	P1/7217	81-110	COOLING WATER PUMP	380	CARBON STEEL
			TOTAL WEIGHT (IN KGS)	**17,93,352**	
			TOTAL WEIGHT (IN MT)	**1793 MT**	

ANNEXURE-VI

APPLICABLE FOR PACKAGE-B (UNIT NO. 2)				
INSULATION				
SL No.	**CUST**	**PGMA**	**WBS Description**	**Boiler U2 Insulation Weight (in Kgs)**
(A)	**INSULATION (PIPING CENTER SUPPLY)**			
1.	P1/7217	81-318	FIX COM FOR MISCELLANEOUS PPG INSULATION	39,731
2.	P1/7217	81-325	MINERAL WOOL MATTRESS	4,00,000
3.	P1/7217	81-341	SEALING COMPOUND FOR INSL	1,500
4.	P1/7217	81-350	ALUMINIUM CLADDING FOR INSULATION	92,548
			TOTAL WEIGHT (IN KGS)	**5,33,779**
			TOTAL WEIGHT (IN MT)	**534 MT**
(B)	**INSULATION (PEM SUPPLY)**			
5.	-	-	THERMAL INSULATION - R-MATTRESSES/P-SECN	198,925
6.	-	-	THERMAL INSULATION - ANCILLARY MATERIAL	18,940
			TOTAL WEIGHT (IN KGS)	**217,865**
			TOTAL WEIGHT (IN MT)	**218 MT**
			GRAND TOTAL (A) + (B) = 752 MT	

ANNEXURE-VII

TG SCOPE PIPING					
APPLICABLE FOR PACKAGE-B (UNIT NO. 2)					
S NO	**CUST**	**PGMA**	**WBS Description**	**Weight (in Kgs)**	**Material Spec**
1	P1/7220	80-307	HP AND LP BYPASS WARM UP	1,846	SA335P91
2	P1/7220	80-322	CRH PIPING TO DEAERATING HEATER	20,246	CARBON STEEL
3	P1/7220	80-323	STEAM TO BFP DRIVE TURBINE	6,976	CARBON STEEL
4	P1/7220	80-329	EXTRACTION STEAM TO BFP DRIVE TURBINE	10,977	CARBON STEEL
5	P1/7220	80-332	EXTRACTION STEAM TO LP HEATER-3	14,517	CARBON STEEL
6	P1/7220	80-334	EXTRACTION STEAM TO LP HEATER-4	9,751	CARBON STEEL
7	P1/7220	80-335	EXTRACTION STEAM TO DEAERATING HEATER	14,334	CARBON STEEL
8	P1/7220	80-336	EXTRACTION STEAM TO HP HEATER NO.1	6,430	SA335P22
9	P1/7220	80-337	EXTRACTION STEAM TO HP HEATER-2	6,347	CARBON STEEL
10	P1/7220	80-338	EXTRACTION STEAM TO HP HEATER-3	6,170	CARBON STEEL
11	P1/7220	80-339	AUX STEAM TO BFD TURBINE	1,920	CARBON STEEL
12	P1/7220	80-345	AUX STEAM TO DEAERATING HEATER	7,229	CARBON STEEL
13	P1/7220	80-349	AUX STEAM TO GLAND SEALS - TG SCOPE	1,104	CARBON STEEL
14	P1/7220	80-363	EXHAUST STEAM FROM PRIME MOVERS-TG SCOPE	31,104	CARBON STEEL
15	P1/7220	80-371	DRAIN FLASH TANK VENT TO CONDENSER	3,341	CARBON STEEL
16	P1/7220	80-375	UNLISTED SV EXHAUSTS - TG SCOPE	1,937	CARBON STEEL
17	P1/7220	80-379	HPH SV EXHAUST TO FLASH TANK	3,487	CARBON STEEL
18	P1/7220	80-381	HP HEATER VENTS - TG SCOPE	4,419	CARBON STEEL
19	P1/7220	80-382	LP HEATER VENTS	1,477	CARBON STEEL
20	P1/7220	80-385	VENT FROM UNLISTED PPG/EQPT TO COND	3,657	CARBON STEEL
21	P1/7220	80-388	CONDENSER AIR EVACUATION PIPING	7,296	CARBON STEEL
22	P1/7220	80-400	CONDENSATE SUCTION	8,640	CARBON STEEL
23	P1/7220	80-401	CD FROM PUMP TO LPH1/DC	38,354	CARBON STEEL

			INLET TEE AND RE		
24	P1/7220	80-402	CD FROM LPH1/DC INLET TEE TO TG TP	29,197	CARBON STEEL
25	P1/7220	80-403	CD FROM TG TP TO DEAERATING HEATER	15,743	CARBON STEEL
26	P1/7220	80-407	CONDENSATE FOR SEALING OF VACUUM	2,083	CARBON STEEL
27	P1/7220	80-408	CONDENSATE DUMP FROM HEADER	1,399	CARBON STEEL
28	P1/7220	80-419	DEAERATOR SAFETY VALVE EXHAUST TO ATM	5,853	CARBON STEEL
29	P1/7220	80-420	BOILER FEED PUMP SUCTION	27,805	CARBON STEEL
30	P1/7220	80-421	BOILER FEED PUMPRECIRCULATION	76,993	CARBON STEEL
31	P1/7220	80-423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	1,66,829	CARBON STEEL
32	P1/7220	80-424	BFD BETWEEN HTRS AND GROUP PROTECTION	1,84,465	CARBON STEEL
33	P1/7220	80-425	BFD FROM FINAL HPH TO SG TP	1,16,309	CARBON STEEL
34	P1/7220	80-430	SPRAY WATER TO HPBP	7,000	SA335922 AND CARBON STEEL
35	P1/7220	80-433	SPRAY WATER FROM BFP INTERSTAGE	19,961	CARBON STEEL
36	P1/7220	80-435	UNLISTED SPRAY WATER - TG SCOPE	832	CARBON STEEL
37	P1/7220	80-436	SPRAY WATER TO LPBP DESH	5,033	CARBON STEEL
38	P1/7220	80-442	GLAND STEAM COOLER DRAINS	311	CARBON STEEL
39	P1/7220	80-443	LP HEATER-1 TO CONDENSER	6,865	CARBON STEEL
40	P1/7220	80-444	LP HEATER-2/3/4/5 DRAINS AND DRIP PUMP I	8,218	CARBON STEEL
41	P1/7220	80-446	DEAERATING HEATER OVER FLOW AND DRAIN	7,699	CARBON STEEL
42	P1/7220	80-447	HP HEATER DRAINS	33,742	CARBON STEEL
43	P1/7220	80-448	DRAIN FROM UNLISTED EQPT/VESSEL-TG SCOPE	9,801	CARBON STEEL
44	P1/7220	80-449	TG CYCLE PIPING DRAINS AND VENTS	18,203	CARBON STEEL
45	P1/7220	80-452	HP PIPING DRAINS - TG SCOPE	7,011	CARBON STEEL
46	P1/7220	80-453	LP PIPING DRAINS - TG SCOPE	12,803	CARBON STEEL
47	P1/7220	80-457	MANIFOLDS FOR HP FLASH BOX AND CONDENS	1,500	SA335922 AND CARBON STEEL
48	P1/7220	80-459	HP FLASH TANK DRAIN TO CONDENSER	834	CARBON STEEL
49	P1/7220	80-463	TG AUX COOLING WATER	84,700	CARBON STEEL

50	P1/7220	80-468	MAIN CIRCULATION WATER PIPING	2,64,798	CARBON STEEL
51	P1/7220	80-473	DEMINERALISED WATER SYSTEM	2,046	CARBON STEEL
52	P1/7220	80-477	SERVICE WATER PIPING	7,347	CARBON STEEL
53	P1/7220	80-493	HP FLASH TANK VENT TO CONDENSER	2,801	CARBON STEEL
54	P1/7220	80-494	LP FLASH TANK VENT TO CONDENSER	3,807	CARBON STEEL
55	P1/7220	80-495	LP FLASH TANK DRAIN TO COND	2,875	CARBON STEEL
56	P1/7220	80-601	LOW PRESSURE DOSING PIPING	757	STAINLESS STEEL
57	P1/7220	80-610	SERVICE AIR-COMP SUCT AND DIS TO RECEI	5,475	CARBON STEEL
58	P1/7220	80-614	INST AIR COMP SUC AND DIS TO RECEIVER	6,158	CARBON STEEL
59	P1/7220	80-901	SUB DELIVERY VALVES FOR LIGHT UP	1,000	Other
60	P1/7220	80-928	H AND S FOR BOILER LIGHT UP - TG	34,450	Other
61	P1/7220	80-930	H AND S FOR SYNCHRONISATION - TG	90,000	Other
62	P1/7220	80-933	H AND S FOR LP PIPING	41,645	Other
63	P1/7220	80-992	IMPORTED ELECTRODES	543	Other
			TOTAL WEIGHT (IN KGS)	**15,26,451**	
			TOTAL WEIGHT (IN MT)		

ANNEXURE-VIII

COMMON FOR PACKAGE-A (UNIT NO. 1) & PACKAGE-B (UNIT NO. 2)					
TEMPORARY PIPING					
SL No.	**CUST**	**PGMA**	**WBS Description**	**Weight (in Kgs)**	**Material Spec**
1	-	80-399	STEAM BLOWING PIPING-TEMPORARY	1,64,664	CARBON STEEL
2	-	80-927	H AND S FOR TEMPORARY PIPING - STEAM BLOWING	11,329	other
			TOTAL (WEIGHT IN KGS)	**1,75,993**	
			TOTAL (WEIGHT IN MT)	**176 MT**	

ANNEXURE-IX

TRICHY VALVES SUPPLY (Applicable for Package-A (Unit No.1) and Package-B (Unit No. 2)				
SL NO.	**DESCIPTION**	**UOM**	**WEIGHT U1 (in MT)**	**WEIGHT U2 (in MT)**
1	P91/P92 PIPING VALVES	MT	39	39
2	P22/ALLOY STEEL PIPING VALVES	MT	14	14
3	SS PIPING VALVES	MT	2	2
4	CARBON STEEL PIPING VALVES	MT	290	290
	TOTAL	**MT**	**345**	**345**
	NOTES:			
1	TG Scope valves Qty shall be 4000 Nos. approximately and Valves Size (1/2" to 38")			
2	SG Scope valves Qty shall be 2000 Nos. approximately and Valves Size (1/2" to 30")			

Note: The above valves weight is included in respective Materials of each unit.

ANNEXURE-X

	PEM SUPPLY (APPLICABLE FOR PACKAGE-A & PACKAGE-B)			
SL NO.	**Package**	**Qty**	**Weight U1 (in Kgs)**	**Weight U2 (in Kgs)**
1	AIR TRAPS	40	110	110
2	ALUMINIUM SHEETS/COILS	-	61200	61200
3	BALL VALVES	427	555	555
4	CONTROL VALVE	66	18961	18961
5	FLOW ELEMENT - NOZZLE	20	3362	3362
6	FLOW ELEMENT - ORIFICE	17	2155	2155
7	GUN METAL VALVES	128	89	89
8	ROTAMETER	76	2875	2875
9	SPRING LOADED BYPASS VALVES	4	4200	4200
10	STEAM TRAPS	32	192	192
	TOTAL WEIGHT (IN KGS)		**93699**	**93699**

Note:

1. Painting and insulation shall be in the scope of this contract.
2. Approx. weight to be erected for Piping shall be **4917 MT for Package-A (Unit No. 1 & Aux Boiler) and 4688 MT for Package-B (Unit No. 2)** as per relevant annexures for installation as per the scope mentioned in the tender specification. 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.

3. The contractor has to erect/install all the equipments/items supplied by manufacturing units/ Engineering centers for the respective package of Piping to make the system complete in all the respect eventhough if items not covered in the scope of work of the contract.

4. The PG MA list as given above is only tentative & indicative. The scope shall include all the PGMA's/ Material issued by BHEL for completing the system. BHEL Engineer's decision in this regard shall be final.

5. In the above Annexures new PGMAs may add or delete as per the final engineering documents by BHEL MUs/PEM. The contractor has to erect the actual tonnage.

ANNEXURE-A

	PACKAGE-A (UNIT NO. 1)	
11.0	**RATE SCHEDULE (UNPRICED)**	
Item No.	**DESCRIPTION OF WORK**	**Total Value In Rupees (In figures and words "A")**
11.1	**Total Lumpsum price for entire scope of handling, erection, testing, commissioning, trial operation and handing over of Piping of Unit No.1 & Aux. Boiler Piping at 2x800 MW, NTPC Gadarwara including insulation & final painting including Supply of paints as per tender specification.** **(Approx. tonnage involved is 4917 MT as per Annexure-B)**	
11.2	**Grand total amount (Rs)**	
11.3	**Note:**	
11.3.1	**The rates of different items for the entire scope shall be worked out & awarded as per Annexure "B".**	

ANNEXURE-B

	PACKAGE-A (UNIT NO. 1 & AUX. BOILER)		
Sl. No	**DESCRIPTION OF WORK**	**QTY.& UNIT**	**Rate per MT in Rupees (In figures and words)**
11.4	**PIPING (SERVICE PORTION)**		
11.4.1	Rate in Rupees per MT for erection, testing, commissioning, trial operation and handing over of **Piping of Unit No.1 & Aux. Boiler Piping** as per tender specifications. **(As per attached Annexure I,II, III,IV,VIII, IX, X)**		
11.4.1.1	P-91/P-92 Piping	**910 MT**	A X 30.2127 / 100000
11.4.1.2	P-22/Alloy Steel (AS) Piping	**97 MT**	A X 23.8286 / 100000
11.4.1.3	Carbon Steel (CS) Piping/ H&S/ Additional Platforms/ Other Materials/ PEM Supply (Except insulation)	**2974 MT**	A X 20.2929 / 100000
11.4.1.4	Stainless Steel (SS) Piping	**3 MT**	A X 38.7335 / 100000
11.4.1.5	Temporary Piping	**176 MT**	A X 7.1237 / 100000
11.4.1.6	Insulation	**757 MT**	A X 9.8732 / 100000
	TOTAL	**4917 MT**	
11.5	**PIPING (SUPPLY PORTION)**		
11.5.1	Supply of all paints, primers & other consumables required for complete painting of Unit No. 1 as per Tender specification	**Lumpsum**	A X 0.01

11.6	**NOTES:**
11.6.1	The quantities indicated above are tentative and are liable to vary depending upon the site requirement. The contractor has to supplied / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work.
11.6.2	Evaluation of bids shall be done on total price of Package-A and Package-B against this Rate Schedule/BOQ.
11.6.3	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.
11.6.4	The contractor while quoting the above rates, categorically confirms having understood the fullest implications of price escalation provisions contained in tender. Accordingly taking into consideration all aspects thereof quoted above rates. Further contractor confirms that he will not come with any other claim/compensation on account of any increase whatsoever during the entire period of execution including extended period, if any.
11.6.5	The final award value shall be based on the calculated value of ANNEXURE'B' & not quoted value of ANNEXURE 'A'

ANNEXURE-C

	PACKAGE-B (UNIT NO. 2)	
11.7	**RATE SCHEDULE (UNPRICED)**	
Item No.	**DESCRIPTION OF WORK**	**Total Value In Rupees (In figures and words "A")**
11.8	**Total Lumpsum price for entire scope of handling, erection, testing, commissioning, trial operation and handing over of Piping of Unit No.2 at 2x800 MW, NTPC Gadarwara including insulation & final painting including Supply of paints as per tender specification.** **(Approx. tonnage involved is 4688 MT as per Annexure-D)**	
11.9	**Grand total amount (Rs)**	
11.10	**Note:**	
11.10.1	**The rates of different items for the entire scope shall be worked out & awarded as per Annexure "D".**	

ANNEXURE-D

	PACKAGE-B (UNIT NO. 2)		
Sl. No	**DESCRIPTION OF WORK**	**QTY.& UNIT**	**Rate per MT in Rupees (In figures and words)**
11.11	**PIPING (SERVICE PORTION)**		
11.11.1	Rate in Rupees per MT for erection, testing, commissioning, trial operation and handing over of **Piping of Unit No.2** as per tender specifications. **(As per attached Annexure V,VI,VII, VIII, IX, X)**		
11.11.1.1	P-91/P-92 Piping	**893 MT**	A X 31.7422 / 100000
11.11.1.2	P-22/Alloy Steel (AS) Piping	**97 MT**	A X 25.0352 / 100000
11.11.1.3	Carbon Steel (CS) Piping/ H&S/ Additional Platforms/ Other Materials/ PEM Supply (Except insulation)	**2767 MT**	A X 21.3177 / 100000
11.11.1.4	Stainless Steel (SS) Piping	**3 MT**	A X 40.6950 / 100000
11.11.1.5	Temporary Piping	**176 MT**	A X 7.4842 / 100000
11.11.1.6	Insulation	**752 MT**	A X 10.3729 / 100000
	TOTAL	**4688 MT**	
11.12	**PIPING (SUPPLY PORTION)**		
11.12.1	Supply of all paints, primers & other consumables required for complete painting of Unit No. 2 as per Tender specification	**Lumpsum**	A X 0.01

11.13	**NOTES:**
11.13.1	The quantities indicated above are tentative and are liable to vary depending upon the site requirement. The contractor has to supplied / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work.
11.13.2	Evaluation of bids shall be done on total price of Package-A and Package-B against this Rate Schedule/BOQ.
11.13.3	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.
11.13.4	The contractor while quoting the above rates, categorically confirms having understood the fullest implications of price escalation provisions contained in tender. Accordingly taking into consideration all aspects thereof quoted above rates. Further contractor confirms that he will not come with any other claim/compensation on account of any increase whatsoever during the entire period of execution including extended period, if any.
11.13.5	The final award value shall be based on the calculated value of ANNEXURE 'D' & not quoted value of ANNEXURE 'C'

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ GADARWARA/PIPING/Unit No.1&2 /XXX

FOR

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD,TRANSPORTATION TO SITE,ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF POWER CYCLE PIPING, ITS INSULATION AND FINAL PAINTING FOR POWER CYCLE PIPING OF PACKAGE-A (UNIT NO. 1 & AUX. BOILER) PACKAGE-B (UNIT NO.2) INCLUDING SUPPLY OF PAINTS

OF 2X800 MW GADARWARA STPP OF NTPC AT DISTT. NARSINGHPUR, GADARWARA M.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 work shall be executed under the usual conditions existing in major power plant construction, without affecting power plant construction and in conjunction with other numerous operations and contracting agencies at site. The bidder and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
1.2	All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding of the contractor.
1.3	Contractor shall erect all items/materials etc. as per sequence prescribed by BHEL at site. BHEL engineer depending upon the availability of materials/work fronts etc will decide the sequence of erection/commissioning methodology. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods of erection/commissioning adopted in erection/commissioning of similar job or for by any reasons whatsoever.
1.4	If required by BHEL, the contractor shall change the sequence of his operation so that work on priority sectors can be completed within the projects schedule. The contractor shall afford maximum assistance to BHEL in this connection without causing delay to agreed completion date.
1.5	After completing all the works, contractor shall hand over all remaining extra materials with proper identification tags in a packed condition to BHEL stores/ Customer stores. In case of any use over actual design requirements, BHEL reserves the right to recover the cost of material used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.
1.6	The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials. The contractor may consult the Engineer-in Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.
1.7	Any wrong erection shall be removed and re-erected promptly to comply with the design requirements to the satisfaction of site Engineer.
1.8	The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
1.9	No member of the already erected structure/ platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.
1.10	No temporary support shall be welded on the pressure parts of piping. Welding of temporary supports, cleats, etc. on the boiler 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 of platform or other equipment shall not be done without specific prior approval of BHEL Engineer.
1.11	All the necessary certificates and licenses required to carry out this scope of the work are to be arranged by the contractor then and there at his cost.
1.12	The contractor shall demolish all the hutments, sheds, offices, constructed by him and shall clean the debris after the contract is over. In the event of his failure to do so, the

	same will be arranged/ removed by BHEL Engineer and the expenses incurred with overhead will be recovered from the contractors.
1.13	**BHEL-Power Sector (NR) is ISO 9001, ISO 14001 and OHSAS 18001 certified company. Quality of work, to customer's satisfaction and system requirements are the essence of these certifications. The contractor in all respects will organize his work, systems, environment, process control documentation, tools, plant, inspection, measuring and testing equipment etc. as per instructions of BHEL engineer**.

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	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.
2.3	**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).
2.3.1	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.
2.3.2	Non- shrink grout mix prior to procurement and use
2.4	Cleaning of foundation surfaces, pocket holes and 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.
2.5	The contractor shall arrange for sand, stone chips, gravels, anti shrink compound, plasticizer, shuttering, grout mixing machine, laborsetc at his cost. The contractor shall prepare the 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.
2.6	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.

2.7	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.
2.8	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 The

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:
3.1.1	Scaffolding and rigging operations,
3.1.2	Machine/ flame/ electric cutting, grinding, welding, radiography and stress relieving
3.1.3	Fitting, filing, straightening, chamfering chipping, scrapping, reaming, cleaning, checking, leveling, blue matching, aligning and assembly.
3.1.4	Machining, surface grinding, drilling, doweling, shaping
3.1.5	Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication.
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 or structure or platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify or repair in a manner acceptable to BHEL and 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/ ESP/ 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	The material for platform section shall be supplied in running meters. These shall be cut to size/ shape/ fabricated to required size/ shape and to be welded by contractor.
3.8	Certain adjustment in length may be necessary while erecting pipelines, 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	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.
3.10	Contractor has to paint all pipelines, supports, pumps, structure, hangers etc as per BHEL and NTPC approved plans.
3.11	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
3.12	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.
3.13	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.
3.14	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.
3.15	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.
3.16	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.
3.17	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.
3.18	Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.
3.19	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.
3.20	Spring 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.

3.21	Contractor 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, flanges, orifices, 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.
3.22	The 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.
3.23	Layout 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.
3.24	All 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.
3.25	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:
3.25.1	Product groups, under which these items are released, are not covered in the scope of this tender.
3.25.2	Items are supplied by any agency other than BHEL.
3.26	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.
3.27	The contractor shall submit for approval as built piping drawing for BHEL
3.28	The Erection, testing and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.
3.29	Brief list of system / sub system, approximate weight of pipes and accessories to be erected by the contractor mentioned in the Bill of Quantity and number of joints mentioned in Erection Welding Schedule of this tender specification are meant for giving general idea to the tender only about magnitude of the work involved. The piping components are sent in parts for convenient transportation / layout requirements. They are to be cleaned, pre-assembled in stage by stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.

3.30	The work on piping systems (air, water, oil, steam, gas etc.,) will include laying, edge preparation, fixing and welding of the elbows / fittings / valves etc., welded on the lines, fixing and adjustment of supports / hangers / shock absorbers and carrying out all other activities / works to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineer's instructions and / or as per approved drawings / documents.
3.31	Carrying out erection of piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work / specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate.
3.32	Erection of all drains / vents / relief / escape / safety valve, piping to various tanks/ sewage / drain canal / flash box / flash tank / condenser / sump / atmosphere etc. from the stubs on the piping to the equipments erected by the contractor is completely covered in the scope of work.
3.33	Contractor shall provide anti-corrosive protection (coating & wrapping or anticorrosive tape) on the external surfaces of pipes to all directly buried piping including galvanized carbon steel piping.
3.34	Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive within the quoted / accepted rate.
3.35	Pipes shall not be dropped to avoid impact or bump.
3.36	Normally weld neck valves will have prepared edges for welding. But if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like tees, weld neck flanges, reducers, elbows, flanges, inserts etc., shall be suitably edge prepared and matched with pipes for welding. No extra cost shall be paid for this.
3.37	PG Test tapping points & installation of thermowells is in the scope of contractor.
3.38	Temporary piping with supports for steam blowing including fabrication, erection, welding, cutting etc is in contractor scope.
3.39	In case of any class of work for which there is no such specifications as laid down in the contract such us blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.
3.40	In the case of structural members, pipes, plates, ducts etc, in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connect the joints within the quoted rates / prices.
3.41	All the tubes and pipes shall be cleaned and blown with compressed air and shown to the Engineer before lifting. Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. Pipes below 2" diameter, shall be sponge cleaned with air flushing. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.

3.42	All the equipments / material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joint assemblies and other components as per instruction of BHEL Engineer during erection at the quoted rate. The necessary compressor for air cleaning is to be arranged by contractor at his cost.
3.43	Erection of platform and supporting structures around the equipments / valves / filters etc., is covered in the scope of contract and shall be erected by the contractor as per accepted tonnage rate.
3.44	Additional platforms for approaching different equipments as per the site requirement, which may not be indicated in drawings, shall be assembled and erected by contractor. However, the contractor shall be paid for this work on accepted tonnage rate. The steel materials required for these works shall be supplied by BHEL free of cost and the contractor will have to install them to suit the requirement.
3.45	Assistance for calibrating / testing the power cylinders/ actuators / valves, gauges, instruments, etc. and setting to actuators shall be provided by contractor within the quoted rates.
3.46	HSFG Bolts are to be tightened by turn of nut method / Torque Wrench, as per the instruction of BHEL Engineer. The bolted joints shall be jointly checked by BHEL / Customer and contractors personnel for the required tightness and retightened wherever necessary. The tightened bolts shall be identified by color paints. Facility for random checking with calibrated Torque Wrench shall also be provided by contractor.
3.47	Before erecting the valves and other mountings, check for the tag for correct rating with valve schedule. Ensure correct flow direction. Ensure easy accessibility for operation and maintenance of valves.
3.48	All the drain lines should have sufficient slope towards drain. Slope of 1:500 shall be maintained towards drain point unless otherwise specified. Expansion loops shall be provided in all the vents and drains as per the drawings.
3.49	Wherever pipes / bends / equipments are supplied in pre-fabricated / assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor‘s scope.
3.50	All the valve packing with asbestos base to be lubricated once in 6 months till handing over. Necessary gland packing will be supplied by BHEL.
3.51	All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints.
3.52	Wherever drawings indicate site routing and site fabrication, such pipes (in general equal to and less than Nb50) will be issued in running meters as straight length. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. In some cases attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor.
3.53	Certain extra lengths of portions / parts of various site fabricated components / parts / bellows / piping etc. are provided as erection allowance and they shall have to be cut to suit site conditions and layout. Certain small length of portions / components / bellows / piping casing etc., may have to be added to suit conditions and layouts. Preparing edges afresh and adopting specified heat treatment procedure, are in the scope of work. No extra payment will be admitted for such works
3.54	For any mismatch while matching the joints in tubes, the cutting, adjusting, re

	welding, addition of spool pieces shall be done by the contractor to match site conditions without any extra payment.
3.55	Fittings like bends, tees, elbow / bends, reducers, flanges etc., will be supplied as loose items and may be without any edge prepared. Contractor has to prepare edge within the quoted rates.
3.56	For pipes nominal size 2‖ and below routing shall not be shown in piping layouts or in isometrics and the same to be routed / connected as shown in schematics. For the above sizes if the routing is shown in layouts it is only for guidance and the same shall be routed and supported as per site requirement / convenience as per site engineer‘s advice.
3.57	Piping below size 2”, valves, flanges, fittings etc. shall be supplied as commercially available. Hence fit-ups, edge preparation including welding of stubs, shall be included in the contractor‘s scope.
3.58	Contractor should fabricate bends of </=2” diameter size at site from running meters of piping for the above and cut, edge prepare and lay the piping as per BHEL Engineer‘s instructions.
3.59	Minor adjustment like removal of ovalities in pipes and opening or closing of the fabricated bends by process of heat correction or any other method approved by BHEL Engineer to suit the layout, with specified heat treatment procedure shall be carried out by the contractor within the quoted rate.
3.60	Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., by grinding / gouging and not by hammering. Any burrs left on the equipments / piping, after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.
3.61	In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.
3.62	The surface of the pipes to be joined shall be suitably prepared as per instructions of BHEL Engineers. Edge preparation shall be done by chamfering machine, whenever required and all welding surfaces must be cleaned thoroughly. All works due to the mistake of the contractor shall be repaired / redone at contractor‘s cost. Instrumentation drains, stubs which are sent in loose from manufacturing units are to be welded at site as per BHEL Engineer‘s instructions.
3.63	Flame cutting of piping and other equipment shall be strictly done as per BHEL Engineer‘s instructions and in his presence only.
3.64	All the weld joints on equipments and piping shall be ground or filed after completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,
3.65	Wherever elbows of 45 deg or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used as per the instructions of BHEL engineer. No extra cost shall be paid.
3.66	Flow nozzles, orifice, spray nozzles etc., shall be mounted / erected after chemical cleaning / flushing / or steam blowing at site.
3.67	Erection of Flow nozzles, flow switches, steam traps, filters, flow meters, other metering elements, spray nozzles, steam traps, flow orifices, flow indicators, control valves, aux. control valves, CRH NRV, HPBP Valve and suction strainers of BFP, CEP &

	Booster pumps etc forming part of the system (under this scope of work) irrespective of the suppliers is also to be carried out by the agency without any extra cost after chemical and / or steam blowing / oil flushing at site. This will include collecting from BHEL / Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.
3.68	Certain instruments like pressure switches, gauges, air sets, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismount such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.
3.69	The contractor has to fabricate stainless steel orifice plate within the quoted rate. No extra payment will be made for fabrication of above orifice plates. The required stainless steel plate will be supplied by BHEL.
3.70	Welding of all thermo wells, draft, pressure and temperature instrumentation points and all other instrumentation points on piping and auxiliaries and welding of thermocouple pads are in the scope of work.
3.71	Contractor shall also weld small length of piping with root valve to the pressure, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping as per the instructions of BHEL Engineer.
3.72	The contractor shall also weld all thermo wells, small length of pipes to all pressure, flow and level tapping points, isolating valves and root valves on all equipment under scope of erection of this contract. All embedded temperature measuring elements provided in the bearings will have to be terminated at the junction box by the contractor. Thermo wells tapping point connections incorporated shall be plugged during the pressure testing and steam blow out of piping systems. Upon completion of blow out operation all thermo wells and flow elements with branch pipes be installed and welded.
3.73	For hangers and supports the instruction given in the drawings and documents must be followed for handling, erection and setting of cold / hot values and locking etc.
3.74	All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing and complete installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. (Any machining or threading, if involved will only be done by BHEL.
3.75	The hangers and supports for pipelines and pressure parts may be supplied in dismantled / knocked down condition. It is the responsibility of the contractor to assemble them as per approved drawings and install them in position as per site engineer instructions.
3.76	Wherever hangers and support materials of piping are not received from manufacturing unit in time to suit the erection schedule, contractor shall erect the piping system on temporary supports to ensure the progress of work within quoted rate. The required structural steel materials will be issued on free of charges by BHEL, either from scrap / spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports.
3.77	Contractor has to fabricate and erect temporary spool pieces wherever required due to non receipt of valves in time and after receipt of valves the spool pieces are to be

	replaced with regular valves at free of cost. For spool pieces materials will be supplied free of cost by BHEL.
3.78	Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc. shall be carried out at site by contractor within the quoted rate.
3.79	All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.
3.80	Welding, non-destructive testing and heat-treatment as prescribed in BHEL Welding / Heat treatment manual/ Welding Module is to be carried out by the contractor. The contractor shall conduct non-destructive tests like radiography, ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test etc. on weld joints, castings, valve bodies and other equipments etc. as per BHEL Engineer's instructions within the quoted rate.
3.81	Contractor should obtain the formal clearance from Inspectorate of Boilers to carry out erection & Welding of piping under IBR purview. Arrangement for the visit of Boiler inspector for field inspection hydraulic test etc. is in the scope of contractor, and necessary drawing / details only will be given by BHEL. Inspection fee, if any shall be paid by BHEL or NTPC
3.82	Contractor shall arrange all equipments, alignment bolts, tools, Consumables like welding electrodes in their scope (all types except those specified in SCC), and argon gas cylinders etc., for welding of pipes at his cost. Consumables like jute, cotton waste, hacksaw blades, petrol, Kerosene oil etc. are in contractor's scope. Only filler wires as stipulated by manufacturing units and identified in relevant shipping list will be supplied to the contractor free of cost. Any excess requirement shall be arranged by the contractor / BHEL at contractor's cost. Argon / Nitrogen gas for stainless steel tubes purging during welding to be arranged by contractor within the quoted rates.
3.83	The Matching Pieces / Nozzles / Reducers (including the reducers to be connected with HP Heaters) supplied for connecting BFP discharge piping with the Heaters are forming part of the systems and are also in the scope of work including issue, transportation, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.
3.84	Cutting and removal of dummies for all the shop welded stubs (irrespective of the equipments supplier for the above) for all the terminal points and preparation of edge where the piping is to be terminated is also in the scope of the contractor without any extra payment.
3.85	The contractor shall fabricate piping, install lub oil systems, if any and carry out the acid cleaning of fabricated piping. The contractor shall also service the lub oil system, carry out the hydraulic test of oil coolers. etc.,
3.86	For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.
3.87	All dimensions / elevations refers to centerline of pipe unless otherwise specified, the pipe routing shall be carried out as per the drawing. Wherever the dimensions are not specified / shown as approximate the same may be routed as per site requirement / convenience as per site engineer's advice.
3.88	Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.
3.89	Statutory requirements, if any, shall be in the scope of contractor and necessary drawings / details only will be given by BHEL.

3.90	Contractor has to arrange required fire retardant covering material at their cost to protect the machined components, assembled parts and insulation materials drawn from BHEL before and after erection.
3.91	Any fixtures, scaffolding materials, approach ladders, concrete block supports, steel structures required for temporary supporting, pre assembly, checking, welding, lifting & handling during pre assembly and erection shall be arranged by the contractor at his cost.
3.92	Prior to erection of any components, inspection to be done for any foreign materials and damages and they are to be removed / attended as per instructions of BHEL engineer.
3.93	All the equipments / material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect.
3.94	The temporary structures / items welded to permanent members / pipes are to be cut and removed without any damage. In case of any damage, the same has to be made good by the contractor at his cost.
3.95	Before lifting the heavy components, soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch. The end caps provided at shop for various stubs are to be removed during final fit up only.
3.96	The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.
3.97	The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision / clarification of BHEL Engineer will have to be followed.
3.98	All Operating / Approach platforms, cross over, canopies, ladders etc., shall have to be fabricated from raw materials supplied by BHEL and erected by the contractor as per instruction of BHEL and shall be paid as per accepted Tonnage rate for Structural Erection work.
3.99	The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision / clarification of BHEL Engineer will have to be followed.
3.100	All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up, inspection, edge preparation if required, etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.

4.0	**WELDING HEAT TREATMENT, RADIOGRAPHY AND NON-DESTRUCTIVE TESTING**
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. Semi automatic welding (GMAW) process shall be used for non-pressure parts/ ducting/ structures etc to the maximum possible, considering its cost efficiency, better quality and time saving features.
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 AND performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.
4.4	Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welder's is 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 quality 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 weld joints for temporary piping required for alkali flushing, acid cleaning and steam blowing should be got done by HP welders only. The root run should be done by TIG welding. All arrangements required for the above shall be the responsibility of the contractor at no additional cost. Argon Purging is to be done for TIG Run of SS Pipes
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 tube and pipe 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/ BHEL's client approved electrodes and filler wires specifically approved / applicable to this project will be arranged and used by the contractor**, within the finally quoted price. BHEL reserves the right to test any 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/ other tests 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, if applicable. The contractor shall 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:
4.15.1	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.
4.15.2	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.
4.15.3	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/ Ultrasonic testing/ Hardness test etc. as required as per welding schedules/ drawings within the finally accepted price/ rates.
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	The contractor for radiography work shall use iridium-192 or any other radiographic source required. 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 in between the range of 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, UST 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 the 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	**Erection Welding Practice for Materials P91/P92**
4.37.1	**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.**
4.37.2	**Some of the salient details in regards to P91/P92 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 :**
4.37.2.1	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.
4.37.2.2	Cutting of P-91/P92 material shall be done by bandsaw / hacksaw /machining / grinding only.
4.37.2.3	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.
4.37.2.4	During edge preparation care should be taken to avoid excessive pressure to prevent heating up of the pipe edges.
4.37.2.5	All edge preparation done at site shall be checked by Liquid Penetration Test. **Weld built-up on edge preparation is prohibited.**
4.37.2.6	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.
4.37.2.7	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.
4.37.2.8	Provide Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations.
4.37.2.9	No pre-heating is required for **fixing Thermocouples** (of Ni-Cr / Ni – Al of 0.5 mm gauge size) **with resistance spot welding**.

4.37.2.10	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
4.37.2.11	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.
4.37.2.12	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.
4.37.2.13	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.
4.37.2.14	Purging is not required in case of nozzle and attachment welds, when they are not full penetration joints.
4.37.2.15	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.
4.37.2.16	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.
4.37.2.17	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.
4.37.2.18	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.

4.37.2.19	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
4.37.2.20	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.
4.37.2.21	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.
4.37.2.22	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.
4.37.2.23	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.
4.37.2.24	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.
4.37.2.25	Welders qualified as per ASME Section – IX and IBR on P-91/P-92 material shall only be engaged for the welding of P91/P92 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.
4.37.3	**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.**
4.37.4	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.

4.37.5	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.
4.37.8	All **the consumables to carry out the work for the P91/P92 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.**
4.37.9	**Consumables like Welding electrodes and filler wires for P91/P92 materials supplied by BHEL mfg units shall be issued free of cost for erection.**
4.37.10	**For carrying out the installation , the following items are being provided by BHEL free of cost:**
4.37.10.1	Induction Heating Machine with Outgoing Cables
4.37.10.2	Suitable Power BackUp (DG Set)
4.37.10.3	Spot welding Machine for Fixing of Thermocouples
4.37.10.4	Calibrated Thermocouples
4.37.10.5	Calibrated temperature Recorder
4.37.10.6	Contact Type calibrated temperature Gauge.
4.37.10.7	Electrodes and fillers for the P91/T91 welding as supplied by BHEL Manufacturing Units
4.37.11	**The contractor shall be issued the above in line with the SCC Clause 4.0**
4.37.12	**The following will have to be provided by the Contractor:**
4.37.12.1	Qualified operator for Induction Machine and DG Set
4.37.12.2	All cables for connecting Induction Machine and DG Set to Main Supply along with Changeover System.

4.37.12.3	Welder Qualified as per ASME IX and IBR for P91/P92 Materials. Site Welder Qualification tests will be conducted also.
4.37.12.4	Exclusive Trained Welding Engineer for Supervising P91/P92 Welding and Heat Treatment
4.37.12.5	Qualified NDE Engineer (Level -II) and welding Supervisor (Level-I)
4.37.12.6	UT Testing and Hardness testing
4.37.12.7	Required GTAW and SMAW machines
4.37.12.8	Welding Machine for Demagnetizing along with cable and Residual Field Indicator
4.37.12.9	Providing Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations .
4.37.12.10	Providing of Argon purging for the welding operation (incuding supply of consumables eg Water Soluble Paper / Aluminiun Dam arrangement.)
4.37.12.11	Providing of Heating by Gas Burner as Standby Arrangement.
4.37.12.12	Providing of Baking ovens and portable ovens
4.37.12.13	Providing Band Saw/ hacksaw/ Grinder for Cutting with tools.
4.37.12.14	Providing machining for Edge preparation
4.37.12.15	Providing of LPI and MPI Facility as specified in the Welding process, including supply of all consumables.
4.37.12.16	Providing and applying insulation band as specified in the welding procedure.
4.37.13	**The above comprise of the major requirements for the process. The Contractor has to provide all services and consumables for completion of the work.**
4.37.14	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 P91/P92 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.
4.37.15	The contractor shall arrange welding Machine for Demagnetizing material along with cable and Residual Field Indicator

5.0	**APPLICATION OF REFRACTORY & 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 without any extra cost to BHEL.
5.2	Contractor has to supply and apply heat resistant primer on welded portions before application of insulation.
5.3	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.
5.4	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.
5.5	The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing
5.6	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.
5.7	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 be made 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.
5.8	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 they will also supply anti-corrosive black bituminous paint and bituminous sealing compound required for above works at his cost. However, if any material is received from the unit, the same shall be issued free of cost to the contractor**
5.9	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 contractor's responsibility. Any cutting/ bending/ welding of fabricated skin casing sheets if required will also be covered within the scope of this contract.
5.10	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.
5.11	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:
5.11.1	Wool / LRB mattresses and cladding sheets…… 2%
5.12	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.
5.13	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.
5.14	If during erection and commissioning any of the parts are to be 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.
5.15	Removable type of insulation shall be provided for valves, fittings, expansion joints etc as per the drawings or as directed by BHEL Engineer.
5.16	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.
5.17	Insulation of expansion joints, dampers, etc shall be carried out after NDT/ gas tightness test is completed.
5.18	Special type of Insulation wool used in pent house shall not be cut indiscriminately.
5.19	Contractor shall mix and apply the refractory/ insulation as per the instructions of BHEL Engineer. Castable refractory/ insulation after application shall be cured as per the instructions of BHEL Engineer. The contractor shall provide the required quantity of wire nails, planks for formwork and other materials for centering and grouting work.
5.20	Application of castable and pourable refractory between tubes, around burners, on ceiling and as directed by Engineer and as per detailed drawings and specifications.
5.21	Dressing of insulation brick to suit site conditions, curing refractory concrete applied/ sheet cladding over insulation forms a part of this work.
5.22	Contractor shall observe all precautions for laying/ curing of castable refractory. Any defective works found shall be re-laid by contractor at his cost.
5.23	Making structural supporting work for pourable insulation, laying pourable

	insulation, adhering to all specifications and instructions during application forms a part of this work.
5.24	Day to day cleaning of insulation debris and scraps to be ensured by the contractor. Excessive wastage will attract cost recovery.

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. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL and NTPC. The same will be inspected and approved by the engineer before painting.
6.2	Mostly the equipment/ items/ components will be supplied with one coat of primer paint and one coat of finish paint. However during storage and handling, the same may get peeled off/ deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint/ approved final colour. Besides above two coats of approved primer paint is to be applied on all the bare/ unpainted surfaces. The gas cut stubs would require being ground and rounded.
6.3	After applying the primer paints, wherever required, all structure/ equipment/ items, shall be finishpainted with paintsas specified by BHEL engineer. The number of coats/ paint thickness shall be as indicted in the drawing/ documents. However at least two coats of finish painting is to be applied. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish/ paint thickness is achieved. Certain equipment/ Items are required to be painted with approved quality heat resistant paint/ primer. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer.
6.4	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.
6.6	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 lumpsum price/ rates.
6.7	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.
6.8	The painters have to under go test and only qualified painters will be allowed to work.
6.9	**The contractor shall ensure availability of :**
6.9.1	Ford Cup-4 to measure consistency of paint,
6.9.2	Automatic magnetic gauge to measure the dry film thickness and
6.9.3	SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.
6.10	**WRAPPING & COATING**
6.10.1	**Contractor has to supply wrapping and coating material for complete ACW piping below ground of this tender scope. The application of wrapping and coating on ACW piplines below ground is also under**

	this scope. The length for wrapping and coating of ACW pipe Dia 800 NB (approx.) is 110 Meters approximately. **Further contractor has to follow drgs./ documents/ applicable specifications, standards and codes**
6.12	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.
6.13	Painting should be done strictly as per attached painting schedule / Instruction of BHEL Engineer.

7.0	**TESTING PRE-COMMISSIONING, COMMISSIONING AND POST-COMMISSIONING.**
7.1	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.
7.2	**Void**
7.3	It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement.
7.4	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.
7.5	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.
7.6	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 outlet lines, 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 .
7.7	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.
7.8	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.
7.9	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 and removed and weld burrs ground finished and cavities/ scars of cutting weld filled ~, d ground as per BHEL Engineer's instruction at no extra cost. NDT & SR if required may have to be carried out.
7.10	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.
7.11	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.
7.12	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.

7.13	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.
7.14	During Hydraulic Test, the pipes being tested shall be isolated from the equipments to which they are connected.
7.15	In certain places blanking has to be resorted prior to Hydraulic test and spool pieces have 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.
7.16	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.
7.17	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.
7.18	It shall be the responsibility of the contractor to provide workmen of various categories in sufficient numbers along with Engineers/ Supervisors including necessary consumables, T&P, IMTEs etc. during pre-commissioning, commissioning and post commissioning period to assist in commissioning of equipment and attending any problem in equipment erected by the contractor till handing over. The rates Quoted shall include all these contingencies also. Association of BHEL's/ Client's staff during above period will not absolve contractor from above responsibilities.
7.19	It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL commissioning Engineers and hence overtime payment by the contractor to his employees will be involved. The contractor's finally accepted rate shall be inclusive of all these factors also.
7.20	During commissioning, opening and closing of valves, changing of gaskets, attending to leakages, minor adjustments of erected piping may arise. The finally accepted rates shall include all such works.
7.21	In case, any rework is required because of contractor's faulty erection which is noticed during commissioning, the same has to be rectified by the contractor at his cost. If any equipment/ part is required to be inspected during commissioning, the contractor will dismantle/ open up the equipment/ part and reassemble/ redo the work without any extra claim.
7.22	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 including repair, rectification and replacement work are necessary, the contractor shall carry out the same as per Engineer's instructions. The parts to be replaced shall be provided by BHEL.
7.23	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.
7.24	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 un-serviced.
7.25	Cleaning & servicing of all the filters/ strainers, toppings of oils coming in the system shall be done by the contractor till the completion of trial operation and handing over of the unit within the quoted price

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

PAINTING SCHEME FOR PIPING

PROJECT NAME : - GADARWARA STPP STAGE - I (2 X 800 MW) SG PACKAGE
BHEL CUSTOMER Nos : 7216, 7217,7218(AUX BOILER).

QPNO: 7216:QPC:11
REV.NO: 03
Date : 01-04-2014

Sl. NO	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat			Finish coat			Total DFT Microns (Min.)	REMARKS
			Primer	No of coats & DFT	Paint	No of coats & DFT	Shade	Paint	No of coats & DFT	Shade		
1	2	3	4	5	6	7		9	10	11	12	13
1	Insulated Piping, components (MS / HRH / CRH / Aux Steam lines,...)	SSPC-SP3/ Power Tool Cleaning	Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	2 (30 microns per coat.)	-----	-----	-----	-----	-----	Red Oxide	60	Refer Note 4
2	Uninsulated Piping, components (Condensate lines ....,CW, Make up water storage tanks,Pipe Clamps.....) & Fuel Oil line (LDO)	SSPC-SP3/ Power Tool Cleaning	Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	1 (30 microns per coat.)	-----	-----	----- &	Synthetic enamel paint long oil alkyd to IS 2932	(20 M	Smoke Grey Shade No NTPC 5	70	Refer Note 1
3	Impure condensate, Primary & Secondary SCAPH Tanks.	SSPC-SP3/ Power Tool Cleaning	Heat resistant Aluminum Paints to IS 13183 Gr.II	2 (20 microns per coat.)	-----	-----	-----	-----		inum	40	
4	Structues	Abrasive Blast cleaning to SA2 ½ (Near white metal) Min 35 Micron	Inorganic Ethyl Zinc Silicate Primer.	1 (75 Microns per coat)	Epoxy Based Ti O2 Pigmented Intermediate Coat.	1 (75 Micron Min Per coat)	-----	$ Epoxy finish Coat $ Aliphatic Acrylic PU Paint	2 $ 35 M Coat 1 $ (30 Microns per coat)	ke Grey Shade No 692 of IS 5	185 shop + 65 site	Refer Note 2
5	Hangers & Supports-(CLH,VLH)	Blast cleaning to Sa2½ with surface profile 35-50 microns	Epoxy Zinc rich primer to IS 14589 Gr.II,% VS = 35 Min	1 (40 microns per coat)	-----	-----	-----	Aliphatic Acrylic Polyurethane paint ,%VS = 40 min	1 (30 microns per coat)	Phirozi Blue Shade No.178 of IS 5	70	
6	Valves (Bought out) & Gr-91 Clamps	SSPC-SP3/ Power Tool Cleaning	Heat resistant Aluminum Paints to IS 13183 Gr.I	2 (20 microns per coat.)	-----	-----	-----	-----	-----	Aluminum	40	
7	Stainless steel/Galvanized items	No paint										
8	Internal surface coating for ECW Tank	Blast cleaning to Sa2½ with surface profile 35-50 microns	Epoxy Zinc rich primer to IS 14589 Gr.II,% VS = 35 Min	2 (35 microns per coat)	-----	-----	-----	Epoxy based Polyamide cured finish paint	2 (65 microns per coat)	Smoke Grey Shade No 692 of IS 5	200	

$:- Out of Out of 2 coats of Epoxy based finish paint, one coat of Epoxy finish paint shall be given at shop / subcontracting works and second coat of Epoxy finish and one coat of aliphatic Polyurethane paint shall be applied at site after erection by brush and / or spray.

Note:-1) Smoke grey shade for Carbon Steel ; White shade for Alloy Steel Clamps.
2) The final colour shade to be applied at site after erection shall be as per NTPC colour coding schem
3) For bought out - and sub - vendors items falling under the scope of BHEL, the same scheme as for main equipment as covered in this shall be followed.
4) Piping above 60 Deg C are insulated at site. If not insulated, the same shall be painted with 2 coats of 20 microns each of Heat resistant AL. paint to IS 13183 Gr.II (total DFT 40 mic.)

PREPARED BY :	APPROVED BY:	For NTPC use	
VIVEKANANDA YELLU, Sr.Engr/QA	M.S.MURALIDHARAN, Mgr/QA	NTPC Doc No: 9572-102-PC-QVM-Q-130	Page 1/1

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

PAINTING SCHEME FOR PIPING

PROJECT NAME : - GADARWARA STPP STAGE - I (2 X 800 MW) TG PACKAGE
BHEL CUSTOMER Nos : 7219, 7220.

QPNo: 7219:QPC:11
REV.NO: 02
Date : 03.01.2014

Sl. NO	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat			Finish coat				REMARKS
			Primer	No of coats & DFT	Paint	No of coats & DFT	Shade	Paint	No of coats & DFT	Shade	Total DFT Microns (Min.)	
1	2	3	4	5	6	7		9	10	11	12	13
1	Insulated Piping, components (extraction steam , BFD , Aux Steam lines, Heater vents...).	SSPC-SP3/ Power Tool Cleaning	Heat resistant Aluminum Paints to IS 13183 Gr.I	1 (min.DFT = 20 microns per coat)	-----	-----	-----	Heat resistant Aluminum Paints to IS 13183 Gr.I	1 (min.DFT = 20 microns per coat)	Aluminum	40	Refer Note 1
2	Uninsulated Piping, components (Condensate lines,Safety valve extraction ....,Tanks & Vessels....)	SSPC-SP3/ Power Tool Cleaning	Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	2 (min.DFT = 25 microns per coat.)	-----	-----	-----	Synthetic enamel paint (long Oil alkyd) to IS 2932	3 @@ (min.DFT = 35 microns per coat)	Smoke Grey Shade No 692 of IS 5 **	120 shop + 35 site	
3	Structures	Abrasive Blast cleaning to SA2 ½ (Near white metal) Min 35-50 Micron	Inorganic Ethyl Zinc Silicate Primer.	1 (min.DFT = 75 Micron per coat)	Epoxy Based Ti O2 Pigmented Intermediate Coat.	1 (DFT=75 Micron Min Per coat)	-----	$ Epoxy finish Coat $ Aliphatic Acrylic PU Paint (CDE 134, %V = 40.0 Min)	2 $ (min.DFT = 35 Microns per Coat) + 1 $ (min.DFT = 30 Microns per coat)	Smoke Grey Shade No 692 of IS 5 **	185 shop + 65 site	
4	Hangers & Supports-(CLH,VLH)	Blast cleaning to Sa2½ with surface profile 35-50 microns	Epoxy Zinc Phosphate primer to IS 14589 Gr.II	1 (min.DFT = 40 microns per coat)	-----	-----	-----	Aliphatic Acrylic Polyurethane paint ,%VS = 40 min, CDE 134	1 (min.DFT = 30 microns per coat)	Phirozi Blue Shade No.176 of IS 5	70	
5	Valves (Bought out) - For all temperature range.	SSPC-SP3/ Power Tool Cleaning	Heat resistant Aluminum Paints to IS 13183 Gr.I	1 (min.DFT = 20 microns per coat)	-----	-----	-----	Heat resistant Aluminum Paints to IS 13183 Gr.I	1 (min.DFT = 20 microns per coat)	Aluminum	40	
6	Pipe Clamps											
6a.	Pipe Clamps - For Gr -91 material (For all temperature range)	SSPC-SP3/ Power Tool Cleaning	Heat resistant Aluminum Paints to IS 13183 Gr.I	1 (20 microns per coat)	-----	-----	-----	Heat resistant Aluminum Paints to IS 13183 Gr.I	1 (20 microns per coat)	Aluminum	40	
6b.	Pipe Clamps - Other than Gr -91 material (For all temperature range)	SSPC-SP3/ Power Tool Cleaning	Red oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744	1 (min.DFT = 30 microns per coat)	-----	-----	-----	Synthetic enamel [illegible]	[illegible]	Refer Note 2	70	
7	Stainless steel / Galvanized items	No paint										

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$:- Out of 2 coats of Epoxy based finish paint, one coat of Epoxy finish paint shall be given at shop / subcontracting works and second coat of Epoxy finish and one coat of Aliphatic AcrylicPolyurethane paint shall be applied at site after erection by brush and / or spray.

@@ :- Out of 3 coats of synthetic enamel, two coats shall be applied at shop, and one coat shall be applied at site.

** :- The final colour shade to be applied at site after erection shall be as per NTPC colour coding scheme (Note for NTPC use)

Note: 1) Painting for Un-accessible pipes coming under insulated category shall be as per Sl. No. 1 above.
2) Smoke grey shade for Carbon Steel; White Shade for Alloy Steel Clamps.

PREPARED BY : SURAJ KUMAR, Engr/QA	APPROVED BY: VIVEKANANDA YELLU, Sr.Eng/QA	For NTPC use NTPC Doc.ref: 9572-110-PC-QVM-Q-010	Page 1/1

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

PAINTING SCHEME FOR LP PIPING

(CW / ACW / ECW / Plant water, Air Piping, etc…,)

PROJECT NAME : - GADARWARA STPP STAGE - I (2 X 800 MW) TG PACKAGE
BHEL CUSTOMER Nos : 7219, 7220.

QPNo: 7219:QPC:12
REV.NO: 00
Dt : 12.11.2013

Sl. NO	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat			Finish coat			Total DFT Microns (Min.)	REMARKS
			Primer	No of coats	Paint	No of coats	Shade	Paint	No of coats	Shade		
1	2	3	4	5	6	7	8	9	10	11	12	13
1	(a) Internal Surface - CW Pipe (for pipe dia - 1000 mm and above)	Blast Cleaning SSPC SP-10 SA 2½ *(Refer Note 1)*	Epoxy based Zinc rich Primer *(Refer Note 2)*	1 (50 Microns Min. per coat)	-----	-----	-----	Coal tar epoxy *(Refer Note 2)*	2 (75 Microns Min. per coat)	-----	200 Microns *(Refer Note 3)*	
	(b) Holiday test (Refer Note 3)	Holiday testing by low voltage (75 Volts Min.) wet sponge Holiday detector or by High voltage (Votage per micron of DFT is as recommended by Paint Manufacturer subjected to minimum of 5V / Micron). Holiday test Equipment to be calibrated before testing.										
2	External Surface of CW --Buried Piping / Encased in concrete (For pipe dia-1000 mm and above) (Temporary Protection for transportation from works to site). **Further protection to be done by BHEL Erection Group as per Contract requirement.	SSPC-SP3 / Power Tool Cleaning	Red Oxide Zinc Phosphate (Alkyd base to IS 12744)	1 (30 Microns per coat)	-----	-----	-----	-----	-----	-----	30 Microns	
3	External Surface (over ground piping) of CW,ACW,(For all diameters)	SSPC-SP3 / Power Tool Cleaning	Red Oxide - Zinc Phosphate (Alkyd base to IS: 12744)	2 (25 Microns per coat)	-----	-----	-----	Synthetic enamel Long oil Alkyd to IS: 2932	3 ** (35 microns per coat) (2 at shop + 1 at site)	Smoke Grey (Shade No. 692 of IS: 5)	120 at shop + 35 at site	** 1 coat of DFT-35 microns finish coat at site
4	External Surface of ECW, Plant water (For all diameters)	SSPC-SP3 / Power Tool Cleaning	Red Oxide - Zinc Phosphate (Alkyd base to IS: 12744)	2 (25 Microns per coat)	-----	-----		Synthetic enamel Long oil Alkyd to IS: 2932	3 ** (35 microns per coat) (2 at shop + 1 at site)	Smoke Grey (Shade No. 692 of IS: 5)	120 at shop + 35 at site	** 1 coat of DFT-35 microns finish coat at site
5	Galvanised and Stainless steel Piping	No										

Certification signature by S K SAMANTA <sksamanta@ntpceoc.com> Validity Unknown
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Notes:
1. Blast cleaning to near white metal to obtain roughness as per epoxy paint data sheet.
2. Application of Epoxy based Zinc rich Primer, Coal Tar Epoxy shall be done as per manufacturer's data sheet / recommendation, meeting the thickness requirements as per this document.
3. Witness by BHEL / BHEL nominated inspection agency.

PREPARED BY :	APPROVED BY:	For NTPC use :	
SURAJ KUMAR Engr / QA.	VIVEKANANDA YELLU Sr.Engr / QA.	**NTPC DOC. NO: 9572-110-PC-QVM-Q-011**	Page 1/1