TENDER SPECIFICATION

S N	Tender Specification Number	Unit Number & Project
1	BHE/PW/PUR/ DHJOI-PIPG / PKG I / 1077	PIPING FOR UB1, HRSG 2 & 4 + STG1, GT/GTG 2 & 4 (PKG- I)
2	BHE/PW/PUR/ DHJOI-PIPG / PKG II /1078	PIPING FOR UB2, HRSG 1 & 3 + STG2, GT/GTG 1 & 3 (PKG-II)

FOR

RECEIPT/COLLECTION/LOADING/UNLOADING/TRANSPORTATION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, SUPPLY OF PAINTS/PRIMER AND APPLICATION OF PAINTS FOR FINAL PAINTING, APPLICATION OF THERMAL INSULATION & SHEETING/CLADDING WORK AND HANDING OVER OF COMPLETE POWER CYCLE PIPING / EXTERNAL PIPING /FIELD PIPING TOGETHER WITH VALVES, HANGERS AND SUPPORTS, FITTINGS BOTH IBR PIPING (CARBON STEEL AND ALLOY STEEL) AND NON-IBR PIPING (CARBON & SS STEEL), COMPLETE WITH ASSOCIATED PIPES, FITTINGS AND ASSOCIATED, ACCESSORIES SPECIALITIES AND OTHER ACCESSORIES & EQUIPMENTS INCLUDING BOUGHT OUT ITEMS ETC FOR OPAL (ONGC PETRO ADDITIONS LIMITED) STEAM AND POWER GENERATION SYSTEM PACKAGE FOR DAHEJ PETROCHEMICAL COMPLEX, PACKAGE – I FOR PIPING FOR UB1, HRSG 2&4, STG1 AND GT/GTG 2&4 AND PACKAGE – II FOR UB 2, HRSG 1&3, STG2 AND GT/GTG 1&3.

AT

2X220 TPH UB + 2X30MW STG + 4XFr6 B GT + 4X110 TPH HRSG
AT ONGC PETRO ADDITIONS LIMITED, SEZ, DAHEJ GUJARAT

TECHNICAL BID - VOLUME- I A– REV-01

(REVISION-01 DT:21/12/2012)

TENDER SPECIFICATIONS CONSISTS OF:

- **Notice Inviting Tender**
- **Volume 1 A - Technical Conditions of Contract,**
- **Volume 1 B - Special conditions of Contract,**
- **Volume 1 C - General conditions of Contract**
- **Volume 1 D - Forms & Procedures**
- **Volume 1 E – Painting Specification**

Bharat Heavy Electricals Limited
(*A Government of India Undertaking*)
Power Sector - Western Region
345-Kingsway, Nagpur-440001

CONTENTS			
Volume No	Description	Hosted in website bhel.com as files titled	No. of pages
NIL	Tender Specification Issue Details	(Part of **Vol-IA-1077-78 Rev-01**)	1
NIL	Notice Inviting Tender	(Part of **Vol-IA-1077-78 Rev-01**)	13
I-A	Technical Conditions of Contract	Vol-IA-1077-78 **Rev-01**	60
I-B	Special Conditions of Contract	Vol-IBCD-1077-78	47
I-C	General Conditions of Contract	(Part of **Vol-IBCD-1077-78**)	29
I-D	Forms & Procedures	(Part of **Vol-IBCD-1077-78**)	54
I-E	Painting Specifications	Part of **Vol-IBCD-1077-78**)	54
II	Price Bid Specification	Vol-II-1077-78 **Rev-01**	9

NOTE : VOLUME – I-A, B-C-D & E ARE A PART OF TECHINCAL BID.

TENDER SPECIFICATION

S N	Tender Specification Number	Unit Number & Project
1	BHE/PW/PUR/ DHJOI-PIPG / PKG I / 1077	PIPING FOR UB1, HRSG 2 & 4 + STG1, GT/GTG 2 & 4 (PKG- I)
2	BHE/PW/PUR/ DHJOI-PIPG / PKG II /1078	PIPING FOR UB2, HRSG 1 & 3 + STG2, GT/GTG 1 & 3 (PKG-II)

RECEIPT/COLLECTION/LOADING/UNLOADING/TRANSPORTATION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, SUPPLY OF PAINTS/PRIMER AND APPLICATION OF PAINTS FOR FINAL PAINTING, APPLICATION OF THERMAL INSULATION & SHEETING/CLADDING WORK AND HANDING OVER OF COMPLETE POWER CYCLE PIPING / EXTERNAL PIPING /FIELD PIPING TOGETHER WITH VALVES, HANGERS AND SUPPORTS, FITTINGS BOTH IBR PIPING (CARBON STEEL AND ALLOY STEEL) AND NON-IBR PIPING (CARBON & SS STEEL), COMPLETE WITH ASSOCIATED PIPES, FITTINGS AND ASSOCIATED, ACCESSORIES SPECIALITIES AND OTHER ACCESSORIES & EQUIPMENTS INCLUDING BOUGHT OUT ITEMS ETC FOR OPAL (ONGC PETRO ADDITIONS LIMITED) STEAM AND POWER GENERATION SYSTEM PACKAGE FOR DAHEJ PETROCHEMICAL COMPLEX, PACKAGE – I FOR PIPING FOR UB1, HRSG 2&4, STG1 AND GT/GTG 2&4 AND PACKAGE – II FOR UB 2, HRSG 1&3, STG2 AND GT/GTG 1&3.

AT

2X30MW STG + 2X220 TPH UB + 4XFr6 B GT + 4X110 TPH HRSG AT ONGC PETRO ADDITIONS LIMITED, SEZ, DAHEJ GUJARAT

(REVISION-01 DT:21/12/2012)

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender
LAST DATE FOR TENDER SUBMISSION . Refer Notice Inviting Tender

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

M/s. ……

……

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

DY. GENERAL MANAGER (Purchase)
Place: NagpurDate :

1077 & 1078 Rev01

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: NO: **BHE/PW/PUR/DHJOI-PIPG/1077-7078**

Dt:13/12/2012

NOTICE INVITING TENDER (NIT)

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

==========

To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHE/PW/PUR/ DHJOI-PIPG / PKG I / 1077 & BHE/PW/PUR/ DHJOI-PIPG / PKG II /1078**	
ii	**Broad Scope of job**	**Receipt/collection/loading/unloading/transportation of materials from BHEL/client's stores/storage yard to site of work, erection, testing, commissioning, supply of paints/primer and application of paints for final PAINTING, APPLICATION OF THERMAL INSULATION & SHEETING/CLADDING WORK AND HANDING OVER OF COMPLETE POWER CYCLE PIPING / EXTERNAL PIPING /FIELD PIPING TOGETHER WITH VALVES, HANGERS AND SUPPORTS, FITTINGS BOTH IBR PIPING (CARBON STEEL AND ALLOY STEEL) AND Non-IBR piping (Carbon & SS steel), complete with associated pipes, fittings and associated, accessories specialities and other accessories & equipments including bought out items etc for OPaL (ONGC Petro additions Limited) Steam and Power Generation system package for Dahej petrochemical complex, package – I for Piping for UB1, HRSG 2&4, STG1 and GT/GTG 2&4 and package – II for UB 2, HRSG 1&3, STG2 and GT/GTG 1&3.**	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA REV-01	*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- I E	*Technical Specifications*	*Applicable*
e	Volume-II REV-01	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :*** ***Start : 13/12 / 2012*** ***Closes: 26 /12/2012 , Time :17.00 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date :27 /12/ 2012 , Time :15.00Hrs*** ***Place : BHEL OFFICE AT NAGPUR***	*Applicable*
vi	**OPENING OF TENDER**	***1 hours after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	*Rs 2,00,000/- (Rupees Two Lakhs Only)*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Date: (Atleast 2 days before the due date of offer submission)* *Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	*Not applicable.*	*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	*Applicable.* *Shri D. P. Bagchi, IAS (Retd.)* *Y-165, Regency Park - II,* *DLF City, Phase IV,* *Gurgaon - 122 009*	*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 Nagpur issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at NAgpur, Sundays and second/ last Saturdays

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

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

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)

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- I E : Technical Specifications	
xiii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiv.	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:

1. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The 'Load' is the sum of the unit wise identified packages (refer Table-1) for contracts with BHEL Regions. The cut off month for

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

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

i). Total number of Packages

Total number of Packages in hand = P
Where

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

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

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

2. **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:
This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

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

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

c) Sum '$\mathbf{S_1}$ ' 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 $\mathbf{S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}N}}$). Similarly $\mathbf{S_2}$ for package P_2 for period T_2, $\mathbf{S_3}$ 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'= $\mathbf{S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N}$.)

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

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

= ----------

Aggregate of months for each of the similar package for which performance should have been evaluated in all the Regions

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

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

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

Sl no	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions →	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)	$S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, … $S_{1\text{-}T1}$	$S_{2\text{-}1}$, $S_{2\text{-}2}$, $S_{2\text{-}3}$, $S_{2\text{-}4}$, … $S_{2\text{-}T2}$	$S_{3\text{-}1}$, $S_{3\text{-}2}$, $S_{3\text{-}3}$, $S_{3\text{-}4}$, … $S_{3\text{-}T3}$	$S_{4\text{-}1}$, $S_{4\text{-}2}$, $S_{4\text{-}3}$, $S_{4\text{-}4}$, … $S_{4\text{-}T4}$	$S_{5\text{-}1}$, $S_{5\text{-}2}$, $S_{5\text{-}3}$, $S_{5\text{-}4}$, … $S_{5\text{-}T5}$	.. … … … …	$S_{N\text{-}1}$, $S_{N\text{-}2}$, $S_{N\text{-}3}$, $S_{N\text{-}4}$, … $S_{N\text{-}TN}$	---------
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) Weightage "B" assigned to bidders based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions, for the respective Package:

a) If $\mathbf{R_{BHEL}}$ is ≥ 80%, "B" will be equal to '6'
b) If $\mathbf{R_{BHEL}}$ is ≥ 75% < 80%, "B" will be equal to '5'
c) If $\mathbf{R_{BHEL}}$ is ≥ 70% < 75%, "B" will be equal to '4'
d) If $\mathbf{R_{BHEL}}$ is ≥ 65% < 70%, "B" will be equal to '3'

e) If R_{BHEL} is ≥ 60% < 65%, "B" will be equal to '2'
f) If R_{BHEL} is < 60%, "B" will be equal to '0'

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

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

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

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

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

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

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

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

i. upto Boiler Steam Blowing in case of Steam Generator and Auxilliaries

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

iii. upto execution of at least 75% of anticipated contract value (unit wise), in case of Enabling works or Civil & Structures.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

26.0 Order of Precedence

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

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

f. General Conditions of Contract (GCC) —Volume-1C
g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

AGM (Purchase)

Enclosure

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

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	**RECEIPT/COLLECTION/LOADING/UNLOADING/TRANSPORTATION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, SUPPLY OF PAINTS/PRIMER AND APPLICATION OF PAINTS FOR FINAL PAINTING, APPLICATION OF THERMAL INSULATION & SHEETING/CLADDING WORK AND HANDING OVER OF COMPLETE POWER CYCLE PIPING / EXTERNAL PIPING /FIELD PIPING TOGETHER WITH VALVES, HANGERS AND SUPPORTS, FITTINGS BOTH IBR PIPING (CARBON STEEL AND ALLOY STEEL) AND NON-IBR PIPING (CARBON & SS STEEL), COMPLETE WITH ASSOCIATED PIPES, FITTINGS AND ASSOCIATED, ACCESSORIES SPECIALITIES AND OTHER ACCESSORIES & EQUIPMENTS INCLUDING BOUGHT OUT ITEMS ETC FOR OPAL (ONGC PETRO ADDITIONS LIMITED) STEAM AND POWER GENERATION SYSTEM PACKAGE FOR DAHEJ PETROCHEMICAL COMPLEX, PACKAGE – I FOR PIPING FOR UB1, HRSG 2&4, STG1 AND GT/GTG 2&4 AND PACKAGE – II FOR UB 2, HRSG 1&3, STG2 AND GT/GTG 1&3.**
TENDER NO	**BHE/PW/PUR/ DHJOI-PIPG / PKG I / 1077** **BHE/PW/PUR/ DHJOI-PIPG / PKG II /1078**

SL NO	**PRE QUALIFICATION CRITERIA**	**Bidders claim in respect of fulfilling the PQR Criteria**	
		Name and Description of qualifying criteria (Bidder Should Fill Up the Details in this column for PQR)	Page no of supporting document of bidders offer
A	Submission of Integrity Pact duly signed (if applicable)	**APPLICABLE**	
D	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	**APPLICABLE**	
B	**Technical** **B.1** Erection Testing & Commissioning (E T & C) of Atleast One Boiler (Consisting of Pressure Parts, Structures/ESP and IBR/Power Cycle Piping, of the same Unit as a Stand alone bidder) of rating 300 TPH or above. **OR** **B.2** E T & C of ESP and Power Cycle Piping of One Unit of Rating 190 MW or above **OR** **B.3** E T and C of ESP **or** Power Cycle Piping of a Unit of rating 190 MW or above subject to: Entering into a Technical Tie Up with another agency who has experience of Boiler & Power Cycle Piping OR Boiler & ESP respectively, of a	APPLICABLE	

	unit of rating 190 MW or above **OR** **B.4** E T & C of Atleast One STG of 400 MW or higher, under direct order of BHEL subject to:- **a)** Experience of E T & C of Boiler (Consisting of Pressure Parts, Structures/ESP and IBR/Power Cycle Piping, of the same Unit as a Stand alone bidder) of at least 200 TPH. **OR** **b)** Entering into a Technical Tie Up with an agency who has experience of E T & C of Boiler Structures and Pressure Parts or IBR/Power Cycle Piping of 190 MW or above with his own T&Ps and consumables. **OR** **B.5)** Executed E T & C of **600 MT** or above of Carbon steel Piping (Consisting of IBR& Non IBR Piping) and **265 MT** or above Alloy steel piping (Consisting of IBR& Non IBR Piping) in a maximum of two work orders in any industry or Refinery or Power Plant Project.		
C.1	**Financial TURNOVER** Bidders must have achieved an average annual financial turnover (Audited) of **Rs 293.00 Lakhs** or more over last three Financial Years (FY) i.e. 2009-2010, 2010-2011 and 2011-12.		
C.2	NETWORTH (In case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C1' above should be positive.		
C.3	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'C1 above based on latest Audited Accounts.		
E	Approval of Customer Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	APPLICABLE	

F	Consortium criteria (applicable)	APPLICABLE only for B.3 and B.4.b	

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

1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures
2. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e total divided by three.
3. C-2:-NETWORTH : Shall be calculated based on the latest Audited Accounts as furnished for C-1 above. Net worth = Paid up share capital + Reserves. (Net worth is required to be evaluated in case of companies)
4. C-3:- PROFIT : shall be NET profit (PAT + Non cash expenditure viz depreciation) earned during any one of the three financial years as in C-1 above
5. ~~'Additional' Criteria in respect of 'Technical' criteria of PQR (as in 'B' above) for Civil, Electrical, CI, unless otherwise specified :~~
   1. ~~Bidder should have executed similar work of any one of the following:~~
      a. ~~One (1) work of value not less than Rs XXX~~
      ~~OR~~
      b. ~~Two (2) works of not less than Rs YYY~~
      ~~OR~~
      c. ~~Three (3) works of not less than Rs ZZZ~~
      ~~(Value XXX, YYY, ZZZ shall be as indicated by BHEL~~
   2. ~~'Similar' work for criteria 5 above means~~
      a. ~~Civil or Structures or Civil & Structures or Chimney respectively as applicable to the tendered scope in respect of 'CIVIL' Works~~
      b. ~~Electrical works in respect of 'ELECTRICAL'~~
      c. ~~CI works in respect of 'CI' Works~~
      d. ~~Material Handling and/or Management works in respect of 'MM' works~~
6. Time period for achievement of the 'Technical' criteria of PQR (as in 'B' above) will be the last 7 years ending on the 'latest date' of Bid submission
7. **'EXECUTED' means the Vendor should have achieved the criteria specified in the Technical criteria of PQR (as in 'B' above) even if the Contract has not been completed or closed**
8. **Unless otherwise specified, for the purpose of 'Technical' criteria of PQR (as in 'B' above), the word 'EXECUTED' means:**
   1. **"BOILER LIGHT UP" in respect of Boiler & Aux and ESP**
   2. **"SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG**
   3. "STEAM BLOWING COMPLETION" in respect of at least Main Steam Line of Power Cycle Piping
   4. "HYDRAULIC TEST" of the system in respect of Structures, Pressure parts/IBR Piping
   5. "CHARGING" in respect of power Transformers, Bus ducts, HT/LT switchgears
   6. "Completion of RCC Shell and liner (steel or brick as per tendered scope) up to the HEIGHT specified using slip form" in case of RCC Chimney.
   7. Achievement of physical Quantities as per respective PQRs in respect of Civil & Structures and Piling Works
   8. 'Readiness for coal Filling" in respect of Bunker Structure Work.
9. Boiler means HRSG or WHRB or any other types of Steam Generator
10. Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass lines

For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size.

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT IN THE RESPECTIVE ANNEXURES IN THEIR OFFER along with copies of Work Orders, Work Completion certificates, Audited profit and Loss Account for the last three years and other related documents as per PQR & tender specification..

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer			
2	Details about type of the Firm/Company			
3	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Fax No:		
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER		
			APPLICABILITY	BIDDER REPLY
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 submitted		Applicable	YES/NO
8	Copy of PAN Card submitted		Applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed		Applicable/Not Applicable	YES/NO
10	Integrity Pact		**Applicable**	YES/NO
11	Declaration by Authorised Signatory submitted		Applicable	YES/NO
12	No Deviation Certificate submitted		Applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions submitted		Applicable	YES/NO
14	Declaration for relation in BHEL submitted		Applicable	YES/NO
15	Non Disclosure Certificate submitted		Applicable	YES/NO
16	Bank Account Details for E-Payment submitted		Applicable	YES/NO
17	Capacity Evaluation of Bidder for current Tender		Applicable	------

18	**Tie Ups / ~~Consortium Agreement~~ against this tender**	**Applicable**	-------
19	Power of Attorney for Submission of Tender/Signing Contract Agreement submitted	Applicable	YES/NO
20	Analysis of Unit rates submitted	Applicable	YES/NO

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE - 3

INTEGRITY PACT

Between

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

And

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

Preamble

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

_____

_____

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

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

Section 1 - Commitments of the Principal

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

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

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all

Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

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

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

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

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

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

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

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

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

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

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

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

Section 4 – Compensation for Damages

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

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

Section 5 – Previous Transgression

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

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

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

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

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

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

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

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

Section – 8 Independent External Monitor(s)

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

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

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

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

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

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

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

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC/PC Act, and the CMD, BHEL has not, within reasonable time, taken

visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

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

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

Section 9 – Pact Duration

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

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

Section 10 – Other Provisions

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

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

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

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

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

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

ANNEXURE 4: IMPORTANT INFORMATION

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

2. **This is a combined tender for Piping works for UB1, HRSG 2 & 4 + STG1, GT/GTG 2 & 4 (PACKAGE- I) & Piping work for UB2, HRSG 1 & 3 + STG2, GT/GTG 1 & 3 (PKG-II) of Opal Dahej Project**

   i Tender specification (Volume I) is common for both Packages **(Package I & Package-II)**.
   ii **Package I & Package-II** shall be awarded to separate agencies.
   iii **Bidder has to submit price for One Package of Piping Works as indicated in the Price Bid.**
   iv L-1 Bidder shall be considered for award of Package-I
   v For award of Package-II, next bidder in the order of their price competitiveness (i.e L-2, then L-3 and hence forth) shall be given an option to match their price/rate, with the Awarded/Finalised price/rate of Package-II. In case none of the bidders agree to match the Awarded Lump sum price of Package-I, then BHEL may consider awarding the Package-II to L-1 bidder or opt any other suitable method to finalize Package-II
   vi **Each package (I & II) shall have two different option of Price Bid (as given in the rate schedule document).**
   vii **Bidders are to offer their most competitive rates under two options i.e. Option 1 and Option 2.**
   viii **Option 2 categorically specifies use of Orbital welding machine for 50% of total tonnage of pipes under each package.**
   ix **Evaluations of offers shall be only on the basis of price offered for option 1. Lowest bidder of option 1 will be awarded the work.**
   x **The lowest bidder of option 1 will be offered the lowest quoted price of each items amongst the all bidders of option 2 and if bidder agrees, then BHEL as per the discretion may opt for award of work on the basis of option 2.**

1077 &
1078
Rev-01

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

1.0 Project Information

1.1 INTROUCTION

ONGC Petro Additions Limited (OPaL) is setting up a Petrochemical Complex at Dahej in the state of Gujarat, India. The complex consist of dual feed Ethylene Cracker of 1100 KTPA capacity.

The scope of the present project is to set up a steam and power generation system to primarily meet the process steam requirement and incidentally generate power to partly meet the power requirement for the Petrochemical Complex. The project shall consist of 2X220 TPH Utility Boilers, 2X30 MW STG, 4XFr6B GTG and 4X110 TPH HRSG with associated auxiliary systems and accessories.

BHEL has been awarded the EPC package comprising of system design, detailed engineering, manufacturing, procurement, civil works, supply, fabrication, inspection, transportation, storage, installation, insurance, testing, mechanical completion, pre-commissioning, commissioning and performance guarantee test runs of the complete system. The project is to be completed within 30 months from zero date i.e. 15/04/2011.

Site information

a)	Location	: Dahej SEZ near Village Ambhetha at Dahej, District-Bharuch, Gujarat
b)	Longitude	: 21°40'47"N to 21°41'48"N
c)	Latitude	: 72°35'24"E to 72°36'44"E
d)	Nearest Railway Station	: Bharuch – 45 km
e)	Nearest Town	: Bharuch - 45 Km, Vadodara - 140 Km
f)	Nearest Port	: Dahej - 10 Km
g)	Nearest Air Port	: Vadodara - 140 km
h)	Access Road	: Bharuch-Dahej State Highway - SH6 - 1.2 Km
i)	Height above mean sea level	: Mean Sea Level (MSL) = 5.1M w.r.t. Chart datum Finished Grade Level (FGL)=6.6M/ 7.1M/ 7.6M above MSL

1.2 CLIMATIC CONDITIONS

1. **Seismic data**
   a. Zone : III

2. **Air Temperature**

	a. Air Temperature Max/Min : 40° C / 13° C b. Design dry bulb Temp Max/Min : 42° C / 29° C **3. Relative Humidity** : 90%@ 42 °C **4. Rainfall** Annual Rainfall : 1000 mm **5. Wind velocity/ direction** a. March- October : 44 km/h/ South west b. November- February : 15KM/Hr/ North west/North/ North East **6. Climatic Conditions** : Tropical

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

2.0 SCOPE OF WORK:

Broad Scope

1. Handling and Collection of material at stores/storage yard of BHEL/Client
2. Transportation of materials up to site of work via pre-assembly area if needed
3. Pre-assembly, if any and pre-erection checks
4. Erection, alignment, bolting, fastening, grouting, anchoring
5. Preheating, Welding, Post Heating and Post Weld Heat Treatment
6. Non Destructive Examination
7. Hydro Testing, Blowing, Flushing, Chemical Cleaning and Steam Blowing
8. Wrapping & Coating and coal tar tape coating of buried / underground piping.
9. Pre-commissioning checks/tests and Commissioning
10. Handing Over of the System

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

2.1

Receipt/collection/loading/unloading/transportation of materials from BHEL/client's stores/storage yard to site of work, erection, testing, commissioning, supply of paints/primer and application of paints for final **PAINTING, APPLICATION OF THERMAL INSULATION & SHEETING/CLADDING WORK AND HANDING OVER OF COMPLETE POWER CYCLE PIPING / EXTERNAL PIPING /FIELD PIPING TOGETHER WITH VALVES, HANGERS AND SUPPORTS, FITTINGS BOTH IBR PIPING (CARBON STEEL AND ALLOY STEEL) AND Non-IBR piping (Carbon & SS steel)**, complete with associated pipes, fittings and associated, accessories specialities and other accessories & equipments including bought out items etc for OPaL (ONGC Petro additions Limited) Steam and Power Generation system package for Dahej petrochemical complex, package – I for Piping for UB1, HRSG 2&4, STG1 and GT/GTG 2&4 and package – II for UB 2, HRSG 1&3, STG2 and GT/GTG 1&3.

2.1.1

Following named systems are broadly in the scope for Piping (for each Block) in the present contract:

- Erection, welding, testing and commissioning with radiography, NDE & heat treatment, application of thermal Insulation & sheeting/cladding etc. of following piping's with associated valves, hangers & supports and fittings etc.

1. Utility Boiler piping: following piping system in scope of work-
    - AUX STEAM TO SCAPH

- AUX STEAM TO UNLISTED USERS - SG SCOPE
- CBD TANK VENT TO SYSTEM
- CBD TANK VENT/SV EXHAUST TO ATMOSPHERE
- IBD TANK VENT TO ATMOSPHERE
- CBD AND EMERGENCY DRUM DRAIN
- BOILER INTEGRAL PIPING DRAINS (PC Chennai supply)
- LP PIPING DRAINS - SG SCOPE
- SCAPH DRAINS
- SG AUX COOLING WATER UNIT SYSTEM
- BOILER WATER WASH TO & FROM UNIT
- HIGH PRESSURE DOSING PIPING
- SERVICE AIR FOR INDIVIDUAL UNITS
- INSTRUMENT AIR FOR INDIVIDUAL UNIT
- SUB DELIVERY VALVES FOR LIGHT UP
- H&S FOR HYDRO TEST
- H&S FOR LIGHT UP - NON STEAM LINES
- CONTINUOUS BLOW DOWN EXPANDER-D1500 MM ETC.

2. BOP IBR Piping (Caron and Alloy steel piping) for UB, STG, HRSG's and GT/GTG's: Following piping system in scope of work with Valves, Flanges, Fittings and Steam Traps-

    - VHP STEAM SYSTEM
    - HP STEAM SYSTEM
    - MP STEAM SYSTEM
    - LP STEAM SYSTEM
    - EXTRACTION STEAM SYSTEM
    - BFP DISCHARGE - UB SYSTEM
    - BFP DISCHARGE - HRSG SYSTEM
    - SPRAY WATER SYSTEM
    - MISC.EXHAUSTS & VENTS
    - HP & LP PIPING DRAINS

Note- All Pipes, Flanges & Fittings are supplied by Piping Centre, Chennai. Valves are supplied by BHEL-Tiruchy or Other manufacturers or BHEL Vendors.

3. BOP Non-IBR Piping (Caron and Stainless steel piping) for UB, STG, HRSG's and GT/GTG's- Following piping system in scope of work:

- CONDENSATE & FEED WATER SUCTION PIPING
- PLANT AIR & INSTRUMENT AIR
- HSD & NAPTHA PIPING
- DM WATER PIPING
- NATURAL GAS PIPING

The work is mainly categorized as follows:

- Chemical cleaning/ flushing including EDTA cleaning, flushing with air / water / oil etc., Hydro testing, steam blowing including lube oil flushing etc. of piping's and other associated systems covered under the scope.
- supply of Paints/Primer and application of paints for final painting including surface preparation, cleaning, marking of identification marks, colour bands, direction of rotation / flow marks, legends etc. as per OPaL/EIL/ site requirement.
- Agencies for Package I and II of piping work will work simultaneously. The all common header of piping which requires interconnection / termination of piping for respective system/machines is specifically included in the scope of Package-I contractor. Contractor shall carry out the common header of piping work on top most priority as per instruction of BHEL Construction Manager to enable the contractor to hookup/terminate the piping of the respective systems/equipments and to achieve the overall charging of system/commissioning of equipments.
- Vendors to specifically note that piping's terminated to common header/common system shall be erected with fitting, valves/drains simultaneously in order to charge the common header. In case of any difficulty in arranging/fixing of theses valves contractor has to make the piping line dummy and same shall be done by respective vendors as a part of scope of work.
- Welding of pipe line joints connected to flange mounted on the respective equipments included in the contractor scope.

Bidders should note the following points:

- **The scope of works for each package as mentioned above are indicative and for idea purpose of the bidders only. However, during the actual execution if any additional works are required to be done for successful completion of the systems are deemed to be in the scope of contract and shall be completed by contractor. Payment for such additional works shall be made as per the accepted unit rate of contract under relevant items of Rate schedule.**
- **Each package (I & II) shall have two different option of Price Bid (as given in the rate schedule document)**

- **Time is the essence of this contract. Bidders are to ensure deployment of adequate resources i.e. Manpower and T&Ps. Bidder shall deploy any additional T&P if required to meet the contractual schedule without any extra time & cost implication.**

- **Bidders to provide proper arrangement for monsoon combat including suitable coverage for pipe rack for uninterrupted construction activities during monsoon period.**

- **Bidders are to offer their most competitive rates under two options i.e. Option 1 and Option 2.**

- **Option 2 categorically specifies use of Orbital welding machine for 50% of total tonnage of pipes under each package.**

- **Evaluations of offers shall be only on the basis of price offer for option 1. Lowest bidder of option 1 will be awarded the work.**

  N.B:The lowest bidder of option 1 will be offered the lowest quoted price of each items amongst the all bidders of option 2 and if bidder agrees, then BHEL as per the discretion may opt for award of work on the basis of option 2.

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE:**			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)		Yes	Contractor has to make his own arrangements for space, shelter and transportation of labours as per their requirement.
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	**Electricity for construction purposes 3 Phase** 415/440 V **(To be specified whether chargeable or free)**			

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
a	Single point source	Yes		**Shall be provided by BHEL on chargeable basis. Pl. refer clause no. 2.3.1 in this regard.**
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc of the bidder**.			Contractor has to make his own arrangement.
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		Yes	Contractor has to make his own arrangement.
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	**WATER SUPPLY**			
3.3.1	**For construction purposes: (to be specified whether chargeable or free)**			

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
a	Making the water available at single point		**yes**	Contractor has to make his own arrangement.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			
a	Making the water available at single point			Contractor has to make his own arrangement.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**Water supply for Living Purpose**			Contractor has to make his own arrangement.
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Téléphone, fax, internet, intranet, e-mail etc		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		**YES**	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl.No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	

Sl.No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9.1	Engineering works for construction:			
a	Providing the erection/constructions drawings for all the equipments covered under this scope	Yes		
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		**Yes**	Changes are to be marked in drawing & handover to BHEL on completion of work.
d	Shipping lists etc for reference and planning the activities	Yes		
e	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on Sl No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on Sl No. g		Yes	In consultation with BHEL

Sl.No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	NOT APPLICABLE
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	NOT APPLICABLE
L	Arranging the materials required for preassembly		Yes	NOT APPLICABLE

2.4 Construction Power & Water:

2.4.1 CONSTRUCTION POWER: Shall be provided on chargeable basis.

Tariff & other details shall be as follows:

1. BHEL is lining up construction power from M/s Torrent and it is expected to be made available by end of Jan'12 at 415 V at a single point.

   Construction power will be provided on chargeable basis. The charges will comprise of per unit charges as charged by M/s Torrent plus 56% additional charges towards fixed cost. Hence the monthly charges to be paid by bidder will be as below:

   Monthly Charge = 1.56 X (per unit rate charged by M/s Torrent) X (Units consumed for that month)

Per unit rate charged by M/s Torrent may vary in future and same shall be applicable to contractor. The rate charged by M/s Torrent as on September '2011 is Rs 6.30 per unit as energy charges.

There will be number of contractors using construction power at LT side. In case there is a difference in energy consumption in HT & LT side, i.e the sum of LT side energy meter readings with individual agency are less than the total energy consumption recorded in HT side energy meter of respective month, the differential consumption shall be proportionately distributed among all users in line with their energy consumption

2. Construction power (three phase, 415 V/ 440 V) will be provided at one point near the site at a distance of approx. 500M. **The electricity shall be provided on chargeable basis including all taxes, duties, levies etc as applicable**. Further distribution shall be arranged by the contractor at his own cost and services. Contractor shall be responsible for fulfilment of all requirements including statutory requirements in this regard. Contractor shall deploy and install required energy meter, cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act. Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc towards the clearance of such installations, prior to use. Sufficient power factor compensation equipments like capacitor shall be provided by contractor for reactive loads like welding machines etc. In case of any fine/penalty on account of low power factor, same shall be shared by contractor proportionately according to power consumption.

3. Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes & vehicles, civil work, fabrication/construction/assembly/ erection etc and safety of personnel. It may become necessary to relocate some of the installations to facilitate work by other agencies or by him.

4. It shall be the responsibility of the Contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.

5. While reasonable efforts will be made to ensure continuous electric power supply, interruptions cannot be ruled out and no claim from the Contractor shall be entertained on this account such as idle labour, extension of time etc. The Contractor shall adjust his working shift accordingly and deploy additional manpower, if necessary, so as to achieve the target.

6. Contractor shall be well equipped with back-up power supply arrangement like DG set and diesel operated welding machine etc to tackle situations arising due to failure of supplied power, so as to ensure continuity and completion of critical processes that are underway at the time of power failure or important activities planned in immediate future.

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

8. **Contractor to note that till construction power is made available by BHEL, contractor shall make his own arrangement like DG set etc. The contractor shall also take the approval/ permission of Gujarat State statutory authorities for his DG set installation.**

9. Contractor is requested to maintain the power factor above 0.95. On account of lapses by contractor on such account, the penalty as charged by M/s Torrent Power on account of drop in power factor below 0.9 shall be charged proportionately by sub-contractors working in the respective calendar month.

10. Contractor is advised to maintain the calibrated energy measuring instruments and use their system as efficiently as possible to maintain the HT side input energy meter reading and LT side outgoing energy meter reading to sub-contractors as equal.

    In case there is any difference between the sum of the LT side meter readings of all sub-contractors and the HT side meter reading of M/s Torrent, same shall be distributed proportionately among all sub-contractors working during the respective calendar month.

1) Any taxes, duties, levies, cess etc as being charged/ levied by M/s Torrent/ state statutory authority shall be passed on to the sub-contractors proportionately in the respective calendar month bill.

2.4.2 Construction and Potable water shall be arranged by Contractor within the quoted rate. No additional payment shall be made on account of this.

Since the project site is under the SEZ's Area (Special Economic Zone), benefit of Exemption in Excise Duty, Service Tax, VAT etc may be availed by the contactor. For this necessary document as available shall be provided by BHEL to Contractor for obtaining Exception Certificate from the concerned Authority.

A: TOOLS AND PLANTS TO BE DEPLOYED BY CONTRACTOR FOR EACH PACKAGE

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
1	TYRE MOUNTED CRANE FOR HANDLING, LIFTING OF EQUIPMENTS	40 MT	1	TO BE DEPLOYED FROM THE START OF ERECTION
	MOBILE CRANE	18 MT	1	TO BE DEPLOYED FROM THE START OF ERECTION
2	PICK & CARRY CRANE	12 MT	1	TO BE DEPLOYED FROM THE START OF ERECTION
3	TRAILER WITH PRIME MOVER	15/20 MT	As Required	1 NO. FROM START AND 1 MORE FROM START+2 MONTHS BOTH TILL TRIAL RUN
4	AIR COMPRESSOR (ELECTRIC/DIESEL OPERATED)	140 CFM, 7 KG/CM2	As Required	
5	TIG WELDING SET	AS REQUIRED	(15) NOS. AND FURTHER AS PER REQUIREMENT	
6	PLASMA CUTTING M/C	FOR CUTTING UP TO 10 MM THICK STAINLESS STEEL	AS REQUIRED	
7	3-PHASE DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWL OF CONSTRUCTION POWER & FITTED WITH ENERGY METER	600 Amp / unit	AS PER REQUIREMET	
8	POWER CABLE FOR DRAWL OF CONSTRUCTION POWER	AS REQUIRED	AS REQUIRED	
9	PRE HEATING / STRESS RELIEVING SET (HEATING CONTROL PANEL, CABLES, HEATING ELEMENTS, THERMOMETERS ETC.)	AS REQUIRED	AS REQUIRED	
10	RADIOGRAPHY ARRANGEMENT WITH RADIOACTIVE ISOTOPE SOURCE	IRIDIUM-192	AS PER REQUIREMENT	
11	RADIOGRAPHY ARRANGEMENT WITH RADIOACTIVE ISOTOPE SOURCE	COBALT-60	1 SET	
12	CHEMICAL CIRCULATION PUMPS TO HANDLE ACID SOLUTION, OPR TEMP 80 DEG CEL, WITH DRIVE MOTORS, STARTER PANEL, CABLE, SWITCH FUSE UNIT ETC.	SUGGESTED RATING: 150 M3, 120-150 M WC, WITH 90KW, 3000 RPM, 150 Amps MOTOR. HOWEVER, CONTRACTOR SHALL DEPLOY THE RQUIRED CAPACITY	AS REQUIRED	

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
		PUMP WITH ACCESSORIES AFTER OBTAINING WRITTEN APPROVAL OF BHEL.		
13	WELDING GENERATOR (ELECTRICAL)	300 AMPERE RATING	AS REQUIRED	
14	WELDING GENERATOR (DIESEL OPERATED)	300 AMPERE RATING	AS REQUIRED	
15	RADIOGRAPHY FILM VIEWER	AS REQUIRED	AS REQUIRED	
16	ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER	AS PER SITE REQUIREMENT	AS PER SITE REQUIREMENT	
17	ELECTRIC WINCH	3/2 TON CAPACITY	AS REQUIRED	
18	ELECTRO-HYDRAULIC PIPE BENDING MACHINE	FOR UP TO 100 mm Nb PIPES	AS PER SITE REQUIREMENT	
19	PIPE BENDING MACHINE-HAND OPERATED	UP TO 2" NB PIPES	AS REQUIRED	
20	HAND WINCH	1 TON	AS REQUIRED	
21	BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR WELDING ELECTRODES	AS PER REQUIREMENT	AS REQUIRED	
22	PORTABLE OVEN FOR COATED WELDING ELECTRODES	AS PER REQUIREMENT	AS REQUIRED	
23	ELECTRIC MOTOR DRIVEN HYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC.	400 Kg/Cm2 250 Kg/Cm2	1 NO. 1 NO.	FURTHER AS REQUIRED
24	SCAFFOLDING MATERIALS (SCAFFOLDING PIPES WITH CLAMPS ETC.)	ADEQUATE TO SUIT THE REQUIREMENT	800 SETS AND FURTHER AS PER REQUIREMENT	
25	ALU. SHEET CLAD PROFILE MAKING MACHINE	AS PER REQUIREMENT	AS REQUIRED	
26	HAND TOOLS, CUTTING TOOLS GRINDING MACHINES ETC	AS PER REQUIREMENT	AS REQUIRED	

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
27	CHAIN PULLEY BLOCKS	Assorted capacities	AS REQUIRED	
28	FIRE EXTINGUISHER	AS PER REQUIREMENT	AS REQUIRED	
29	HYDRAULIC J ACKS	100 MT	AS REQUIRED	
30	TORQUE WRENCH 0 TO 200 N-M CAP	AS PER REQUIREMENT	AS REQUIRED	
31	SLINGS OF VAROIUS CAPACITY AND QUANTITIES FOR HANDLING OF EQUIPMENTS	AS PER REQUIREMENT	AS REQUIRED	
32	CENTRIFUGAL PUMP WITH MOTOR, STARTER PANEL, CABLES BETWEEN STARTER PANEL AND MOTORS, INLET AND OUTLET VALVES FOR THE PUMPS FOR FILLING AND HYDRAULIC TESTING OF SYSTEMS	150-200TPH	AS REQUIRED	
33	ANY OTHER MAJOR T&P REQUIRED FOR SATISFACTORY COMPLETION OF THE WORKS	AS PER REQUIREMENT	AS REQUIRED	
34	ORBITAL/AUTOMATIC WELDING MACHINE	AS PER REQUIREMENT	Quantity of orbital welding shall be approx. 50% of total tonnage of the pipes.	Applicable for Option 2 of Price Bid

Note:

1

BHEL shall not provide any Chemical Cleaning /Flushing pumps / equipment's as required for Chemical cleaning/flushing of piping and related equipment's / systems. These Chemical pumps of suitable capacity along with motor starters, cables etc. shall have to be provided by the contractor as part of scope of work. Contractor shall arrange / provide all Chemical cleaning arrangements as per requirement and instructions of BHEL engineer without any delay/time lapse.

2

Contractor has to arrange slings of all sizes for completing the works covered under these specifications including the special slings for Generator Stator Lifting/Handling.

B: MEASURING AND MONITORING DEVISES (MMD) TO BE DEPLOYED BY CONTRACTOR

To be finalized at site as per requirement.

NOTE:

1) ALL THE TOOLS AND PLANTS REQUIRED FOR THIS SCOPE OF WORK, EXCEPT THE TOOLS & PLANTS PROVIDED BY BHEL ARE TO BE ARRANGED BY CONTRACTOR WITHIN THE QUOTED RATES. THE LIST IS SUGGESTIVE IN NATURE. ANY ADDITIONAL T&P REQUIRED TO BE ARRANGED BY THE CONTRACTOR.

2) UT AND RT EQUIPMENTS ARE TO BE ARRANGED BY BIDDER AS PER REQUIREMENT.

3) IF ABOVE MENTIONED T & P ARE NOT DEPLOYED IN SPECIFIED TIME BHEL WILL CHARGE TO CONTRACTOR CURRENT MARKET RATE + 30 % OVERHEADS FOR NON AVAILABILITY T&P OR LEVY A DAY WISE PENALTY FOR NON DEPLOYMENT OR DELAYED DEPLOYMENT.

4) IF THE WORKS GET DELAYED DUE TO NON-AVAILABILITY OF T&P, BHEL RESERVES THE RIGHT TO GET THE WORK DONE AT THE RISK AND COST OF CONTRACTOR WITHIN PREJUDICE TO RIGHTS OF BHEL AS IN GCC.

5) THE MANUFACTURING YEAR OF ALL MAJOR T&PS DEPLOYED BY THE CONTRACTOR (FOR HANDLING OF MATERIALS, PICK & CARRY CRANE) SHOULD NOT BE MORE THAN 10 YEARS AS ON THE DATE OF DEPLOYMENT. IF AT ANY MOMENT OF TIME DURING THE EXECUTION OF WORK, ANY CRANE IS FOUND TO BE NOT IN A GOOD WORKING CONDITION AND NON-PERFORMING AT DESIRED MINIMUM CAPACITY, AS CERTIFIED BY BHEL ENGINEER, THE CONTRACTOR SHALL DEPLOY ANOTHER CRANE IN GOOD WORKING CONDITION WITH MINIMUM DESIRED CAPACITY. IF CONTRACTOR FAILS TO DEPLOY THE SAME WITH IN 10 DAYS, BHEL WILL RECOVER NON-REFUNDABLE PENALTY PER DAY OF DELAY IN THE FOLLOWING MANNER -

   1. IN RESPECT OF 18 MT CRANE: @ RS. 1,000 / -

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

SN	DESCRIPTION	QUANTITY	REMARKS
1	Cranes	-	All cranes (except Contractor scope) required for the mentioned work will be arranged by BHEL as per requirement.

Note:

1) CRANES DEPLOYED BY BHEL SHALL BE OWNED OR HIRED BY BHEL.

2) OPERATOR AND O&M FOR BHEL OWNED CRANE WILL BE ARRANGED BY BHEL (FREE OF CHARGES).

3) OPERATORS AND O&M FOR HIRED CRANE WILL BE PROVIDED BY THE HIRING AGENCY (FREE OF CHARGES).

4) CONTRACTOR SHALL PROVIDE THE FUEL FOR BHEL PROVIDED CRANES (HIRED/OWNED) FOR THEIR USE.

5) CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENTS LIKE LAYING OF SPECIAL SLEEPER BEDS AND STEEL PLATES (ALL ARRANGED BY CONTRACTOR), ASSEMBLY AND DISMANTLING OF HEAVY LIFT ATTACHMENT, BOOM, JIB ETC FOR MOVEMENT AND OPERATION OF THE CRANE.

6) CRANES PROVIDED BY BHEL WILL BE ON SHARING BASIS WITH OTHER AGENCIES / CONTRACTORS OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR. CRANES WILL BE DEPLOYED AT APPROPRIATE TIME AS DECIDED BY BHEL FOR SUITABLE DURATION AND INTENDED PURPOSE.

7) ABOVE T&PS WILL BE PROVIDED ON SHARING BASIS ONLY. CONTRACTOR HAS TO PLAN HIS ACTIVITIES WELL IN ADVANCE AND INFORM BHEL ENGINEER IN CHARGE/ CONSTRUCTION MANAGER THE DATE OF ACTUAL USE.

8) CONTRACTOR SHALL PROVIDE ALL NECESSARY TOOLS & TACKLES, CRANE, TRAILERS ETC FOR TRANSPORTATION OF PORTAL GANTRY CRANE/STRAND JACK COMPONENTS/PARTS FROM BHEL STORES/ STORAGE YARD, ASSEMBLY/ERECTION AT SITE, TESTING, COMMISSIONING, DISMANTLING AFTER COMPLETION OF WORKS AND RETURNING TO BHEL STORES/STORAGE YARD AS PER INSTRUCTION OF BHEL ENGINEER.

6.1 TIME SCHEDULE & MOBILIZATION

6.1.1 INITIAL MOBILIZATION

After receipt of fax **Letter of Intent (LOI),** Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall mobilize necessary resources within 2 weeks of issue of fax letter of intent or as per the directive of Project Manager / Construction Manager. Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

6.1.2 MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

The activities for Erection, Testing etc. shall be started as per directions of Construction Manager of BHEL. Contractor shall mobilize further resources (in addition to those required for activities under clause no. 6.1.1) as per requirement to commence the work of erection, testing etc. of boiler and auxiliaries and progressively augment the resources to match schedule of the project.

6.1.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Erection/placement on its designated foundation / location, of the first major permanent system piping erection start covered in the scope of these specifications shall be recognized as **"Start of Contract Period".** Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period.

The Contractor has to subsequently augment his resources in such a manner and shall complete the respective system piping works in all respect (i.e. laying, welding, NDE, Hangers & Supports, Insulation & cladding works) well in advance (at least 2 months in advance) so that following major milestones of respective for milestone of respective unit/machines/equipments are achieved on specified schedules:

According to the contract between BHEL and Owner the schedule of important milestones is as follows: **The contractor has to subsequently augment his resources in such a manner and shall complete the respective piping work of each related milestone well in advance (at least 1 month) to achieve the following tentative schedule:**

6.1.4 <u>(A) Schedule for Package-I (Piping for UB1, HRSG 2 & 4 + STG1, GT/GTG 2&4):</u> The contractor has to complete related piping works of system/equipments much earlier to achieve to achieve the following schedule: **Assuming Date of start of Piping Package – I: 15-Jan-13.**

Major Milestone for UB 1, HRSG 2 & 4 + STG1, GT/GTG 2&4 of OPaL Dahej Project

SL No.	Major Milestones	Tentative completion Schedule
	Assuming DOS of Piping Package I : 15-Jan-13	
	Related Milestones of Units for completion of Piping:	
	UB 1 + STG 1	
1	Erection Start	Work in progress at site
2	Drum Lifting	10.09.2012
3	Hydro Test	11.04.2013
4	Boiler Light Up (BLU)	14.07.2013
5	Safety Valve Floating	14.08.2013
6	UB Commissioning	14.08.2013
6	Condenser Erection Start	15.02.2013
7	Box up of Turbine	05.06.2013
8	Oil Flushing	15.07.2013
9	STG Barring Gear Operation	10.08.2013
10	STG Rolling & Synchronization	15.10.2013
	HRSG 2 + GT/GTG 2	
1	HRSG Erection Start	15.01.2013
2	HRSG Drum Lifting	15.05.2013
3	Hydraulic Test	25.07.2013
4	Gas In	30.09.2013
5	Safety Valve Floating	20.10.2013
6	Commissioning	20.01.2014
7	GT Erection start	27.12.2012
8	Oil Flushing	15.06.2013
9	Cranking	10.08.2013
10	FSNL	31.08.2013
11	GT Synchronization & Open cycle Commissioning	15.09.2013
	HRSG 4 + GT/GTG 4	
1	HRSG Erection Start	27.11.2012
2	HRSG Drum Lifting	15.04.2013
3	Hydraulic Test	25.06.2013
4	Gas In	30.08.2013
5	Safety Valve Floating	20.09.2013
6	Commissioning	20.10.2013
7	GT Erection start	09.11.2012
8	Oil Flushing	15.05.2013
9	Cranking	10.07.2013
10	FSNL	15.07.2013

11	GT Synchronization & Open cycle Commissioning	15.07.2013

6.1.3 (B) Schedule for Package - II (Piping for UB2, HRSG 1 & 3 + STG2, GT/GTG 1&3): The contractor has to complete related piping works of system/equipments much earlier to achieve to achieve the following schedule:

Major Milestone for UB 2, HRSG 1 & 3 + STG2, GT/GTG 1&3 of OPaL Dahej Project

SL No.	Milestones	Tentative completion Schedule
	Assuming DOS of Piping Package II : 15-Jan-13	
	Related Milestones of Units for completion of Piping:	
	HRSG 1 + GT/GTG 1	
1	HRSG Erection Start	15.12.2012
2	HRSG Drum Lifting	15.03.2013
3	Hydraulic Test	25.05.2013
4	Gas In	30.06.2013
5	Safety Valve Floating	20.08.2013
6	Commissioning	20.09.2013
7	GT Erection start	08.11.2012
8	Oil Flushing	15.04.2013
9	Cranking	10.06.2013
10	FSNL	15.06.2013
11	GT Synchronization & Open cycle Commissioning	15.06.2013
	HRSG 3 + GT/GTG 3	
1	HRSG Erection Start	15.04.2013
2	HRSG Drum Lifting	08.08.2013
3	Hydraulic Test	25.10.2013
4	Gas In	26.12.2013
5	Safety Valve Floating	15.01.2014
6	Commissioning	20.02.2014
7	GT Erection start	27.03.2013
8	Oil Flushing	15.09.2013
9	Cranking	10.11.2013
10	FSNL	30.11.2013
11	GT Synchronization & Open cycle Commissioning	15.12.2013
	UB 2 + STG 2	
1	Erection Start	04.12.2012
2	Drum Lifting	07.03.2013
3	Hydro Test	10.07.2013
4	Boiler Light Up (BLU)	10.10.2013
5	Safety Valve Floating	15.11.2013

6	UB Commissioning	15.02.2014
7	Condenser Erection Start	16.05.2013
8	Box up of Turbine	05.09.2013
9	Oil Flushing	15.10.2013
10	STG Barring Gear Operation	10.11.2013
11	STG Rolling & Synchronization	15.12.2013

In order to meet above schedule, and any other intermediate Schedule/targets as set by BHEL/Customer, to meet customer and project schedule requirements, Contractor shall make the note of above and will mobilize his manpower and resources. It will require working in 2 to 3 shifts to meet the above schedule / Intermediate targets as set by BHEL Engineer/Customer at site and contractor shall augment the manpower/resources accordingly whiten the quoted price without any compensation.

6.1.4 CONTRACT PERIOD

The contract period for completion of entire work under scope shall be **09 (Nine) months for Package-I (Piping for UB 1, HRSG 2 & 4 + STG1, GT/GTG 2&4) and 09 (Nine) months for Package-II (Piping for UB 2, HRSG 1 & 3 + STG1, GT/GTG 1&3) from the "start of contract period" as specified earlier.**

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

Note:

- **Agency should note that the Piping Erection, welding, testing and commissioning with radiography, NDE & Heat treatment, application of thermal Insulation & sheeting/cladding etc. for both the stream viz Piping of UB, STG, HRSGs and GT/GTG shall have to go parallely to match with the commissioning schedule of the plant. For this it will necessary to deploy "Dedicated Resources" like Manpower, Machineries and Materials Area wise to execute the woks simultaneously.**

- **Bidders are requested to submit Resource deployment plan Area wise with detail program in line with above schedule in the form of Bar Chart / MS project planer along with their offer.**

6.1.5

IN ORDER TO MEET ABOVE SCHEDULE AND OTHER INTERMEDIATE TARGETS/ACTIVITIES AS SET **BY BHEL ENGINEER IN CHARGE** AT SITE & TO MEET CUSTOMER REQUIREMENTS/PROJECT SCHEDULE, CONTRACTOR SHALL ARRANGE ALL NECESSARY RESOURCES AND WORK FORCE IN CONSULTATION WITH BHEL ENGINEER AT SITE TO UNDERTAKE WORKS CONCURRENTLY IN ALL POSSIBLE FRONTS AS MADE AVAILABLE TO CONTRACTOR.

CONTRACTOR SHALL NOTE THAT INDIVIDUAL MILESTONES AS ABOVE SHALL BE ACHIEVED AS PER SCHEDULE FURNISHED ABOVE. **THE DATE OF START OF FIRST MAJOR PERMANENT EQUIPMENT / COMPONENT / COLUMN COVERED IN THE SCOPE SHALL BE RECKONED AS THE START OF CONTRACT PERIOD FOR THIS PURPOSE.**

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

A) TERMS OF PAYMENT FOR PIPING AND INSULATION

SL NO	Contract (Main Package) Identitification ---->	~~Boiler~~				~~Rotating Machine~~	~~Steel Stack~~	PIPING			~~De-aerator~~	INSULATION
	Rate schedule Identification ------->	~~Structure~~	~~Pressure Parts~~	~~Non Pressure Parts~~	~~Air Pre Heaters~~	~~1) RM 2) Handling Eqpts~~	~~HRSG Chimney/Steel stack~~	1)P-91 2) AS 3) CS (HP) 4) CS (LP) 5) SS	Hangers & Supports	Temporary Piping 1) Steam Blowing 2) Chemical Cleaning	~~De-aerator, feed storage Tank and associate approach platform with ladders~~	1) Castable & Pourable 2) Iron Components 3) Wool mattresses 4) Aluminium sheeting
I	**PRO RATA PAYMENTS (85%)**											
1.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION SHALL BE CLUBBED WITH PLACEMENT IN POSITION)	~~20~~	~~20~~	~~25~~		~~15~~	~~15~~	20	15			--
1.2	PLACEMENT IN POSITION	~~15~~	~~10~~	~~10~~		~~20~~	~~20~~	20	25		~~25~~	50
1.3	ALIGNMENT	~~15~~	~~15~~	~~10~~		~~20~~	~~15~~	10	15		~~20~~	15
1.4	WELDING/BOLTING/FIXING	~~15~~	~~20~~	~~15~~		~~20~~	~~20~~	15	30		~~30~~	20
1.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be paid along with welding)	~~5~~	~~10~~	~~--~~		~~--~~	~~--~~	5				--
1.6	On Drum Lifting	~~0~~										
1.7	COMPLETION OF ATTACHMENT WELDING, FIN WELDING, SUPPORTS		~~5~~									

1.8	COMPLETION OF ROOF SKIN CASING		~~5~~									
1.9	INSTALLATION OF TEMPORARY PIPING									60		
1.10	DISMANTLING OF TEMPORARY PIPING, EDGE PREPARATION AND RETURN TO BHEL STORES, AREA CLEANING									25		
1.11	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG		~~--~~	~~25~~		~~--~~	~~15~~	10				--
1.12	COMPLETION OF FURNACE ALIGNMENT AND FIRE BALL CHECKING	~~5~~										
1.13	COMPLETION OF BACK PASS ALIGNMENT	~~5~~										
1.14	COMPLETION OF VIBRATION SNUBBERS, MECHANICAL SPACERS, CASSETTE BAFFLES, STEAM COOLED SPACERS	~~5~~										
1.15	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC		~~--~~	~~0~~		~~--~~	~~0~~	--				--
1.16	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC		~~--~~	~~--~~		~~--~~	~~--~~	--				--
1.17	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES		~~--~~	~~--~~		~~--~~	~~--~~	--				--
1.18	EQUIPMENT TRIAL OPERATION					~~10~~						
1.19	HYDRAULIC TEST OR PNEUMATIC TEST							3				

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

1.21.8	Erection, Testing & commissioning of De-aerator, feed storage tank and associated approach platform with ladders etc.										~~10~~	
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	~~85~~	~~85~~	~~85~~	~~85~~	~~85~~	~~85~~	85	85	85	~~85~~	85
II	**STAGE/MILESTONE PAYMENTS (15%)**											
2.1	AIR & GAS TIGHTNESS TEST		~~--~~	~~5~~		~~--~~	~~5~~	--				--
2.2	GAS DISTRIBUTION TEST		~~--~~	~~--~~		~~--~~		--				--
2.3	CHARGING OF ESP FIELDS		~~--~~	~~--~~		~~--~~		--				--
2.4	COMPLETION OF AIR & GAS TIGHTNESS TEST FOR FURNACE		~~2~~									
2.5	BOILER HYDRAULIC TEST (DRAINABLE)	~~0~~	~~2~~									
2.6	BOILER HYDRAULIC TEST (NON DRAINABLE)		~~1~~									
2.7	Reheater Coils Hydraulic Test		~~2~~									
2.8	Clean Air Flow test					~~1~~						
2.9	Boiler Light Up/Gas In	~~0~~	~~1~~		~~2~~	~~1~~		1	1			1
2.10	ABO		~~1~~	~~1~~	~~2~~	~~1~~	~~1~~	1	1			1

2.11	Steam Blowing	~~0~~		~~2~~	~~1~~	~~1~~	~~2~~	1	1			1
2.12.	SVF		~~2~~		~~2~~			1	1			1
2.13	Oil Flushing (TG/GT)											
2.14	Barring Gear (TG)/ Cranking (GT)											
2.15	Rolling/FSNL and Synchronisation	~~0~~							1			
2.16	Fuel Firing			~~2~~	~~2~~	~~2~~	~~2~~		1			1
2.17	Full Load					~~1~~		1	1			1
2.18	Trial Operation of Unit					~~2~~		2	2			2
2.19	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	~~3~~										
2.20	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing							2				
2.21	Painting	~~6~~	~~0~~	~~1~~	~~1~~	~~2~~	~~1~~	2	1			0
2.22	Area cleaning, temporary structures cutting/removal and return of scrap	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	1	2			3
2.23	Punch List points/pending points liquidation	~~2~~	~~1~~	~~1~~	~~2~~	~~1~~	~~1~~	1	1			1
2.24	Submission of 'As Built Drawings'											

2.25	Material Reconciliation	~~2~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	1	1	15		2
2.26	Completion of Contractual Obligation	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	1	1			1
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	~~**15**~~	~~**15**~~	~~**15**~~	~~**15**~~	~~**15**~~	~~**15**~~	**15**	**15**	**15**		**15**
	TOTAL I + II	~~**100**~~	~~**100**~~	~~**100**~~	~~**100**~~	~~**100**~~	~~**100**~~	**100**	**100**	**100**		**100**
	*INCLUDING NDE AND SR/HT WHERE EVER APPLICABLE (IF APPLICABLE, WEIGHTAGE OF 10%)											

12.2 **GENERAL**

12.2.1
Weight of packers and shims which become permanent part of equipment, both figuring in shipping list and those fabricated at site will be paid for on shipping list based actual weight.

12.2.2
Certain optimized assemblies / or modules may be made, assembling products from two or more different product group main assembly and dispatched. Payment for erection of these optimized assemblies / or modules will be regulated as per the weight of individual product group main assemblies contributing to the total weight of the module or optimized assembly at the quoted rate for the respective product group main assemblies, in the rate schedule.

12.2.3
For the purpose of release of progressive payments, month-wise break up for each of the above services will be jointly worked out by BHEL and the contractor at site at the time of start of work. This will be dynamically and regularly reviewed every month or mutually agreed periodicity and shall be re-set based on expected requirement or various services keeping in view relevant aspects. On all the issues as above, BHEL engineer's decision shall be final & binding.

12.3 MEASUREMENT OF THE WORK COMPLETED

A) Where payment is to be made on the basis of weight, the weight per unit given in the BHEL document only shall be taken in to consideration. In case such an information is not available in BHEL documents, then the latest relevant Indian standards in this regard may be applied.

B) Spares, surplus quantity, erection contingency materials will not be paid for unless the same has been consumed in place of regular item of measurable work as per the rate schedule.

C) Where the payment is made on the basis of item rate, actual executed quantity measured jointly shall only be paid for.

D) It is clarified that as far as weight constituted by welding consumables and other consumables supplied by BHEL as well as by the contractor, shall be ignored for the purpose payment.

E) BHEL engineer's decision regarding stage of payment corresponding to progress of work, calculation of weight etc. will be final and binding on the contractor.

F) Wastage allowance provided elsewhere on application of refractory & insulation will be applied on the net issued quantity. The net issued quantity is gross issue less the quantity returned. The wastage allowance will be applied at the final reconciliation stage. The payable amount will then be restricted to the net quantity after wastage allowance.

No separate payment shall be made for grouting of equipments, structures etc specified elsewhere in these specifications.

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

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

8.1.1

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

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

8.1.2 Service Tax & Cess on Service Tax

Contractor's price/rates shall be exclusive of Service Tax and Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate (presently 12.36 %) on the admitted bill value.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,

1. **The name, address and the registration number of the contractor,**
2. **The name and address of the party receiving taxable service,**
3. **Description, classification and value of taxable service provided and,**
4. **The service tax payable thereon.**

All the Four conditions shall be fulfilled in the invoice before release of service tax payment.

Wherever, more than one route/option are available for discharge of service tax liability under a particular service, (e.g. "works contract Service"), contractor shall obtain prior written consent from BHEL site before billing the amount towards Service Tax.

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT)/CST on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be inclusive of the same and in no case input or output VAT/CST will be reimbursed extra.

In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. Contractor will submit all the details of

VAT/CST paid for the contract in the prescribed format of the respective state VAT laws. Also, the contractor will issue the tax Invoices to BHEL as per the Tax laws of respective state on monthly basis. Contractor shall also be required to furnish to BHEL necessary proof of VAT remittance on monthly basis.

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

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

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

8.2 New Taxes/Levies

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

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

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

8.3 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998.

In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-

i. It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a licence to the Competent Authority under the BOCW Act and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of licence / permission to BHEL within a period of one month from the date of award of contract.

ii. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on the extant of work involving building or construction workers engaged by the contractor within a period of one month from the receipt of payment.

iii. It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building workers) engaged by the sub-contractor during the preceding month.

iv. It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

SPECIFIC INCLUSIONS

9.1
All terminal connections for equipment & piping covered in this specification.

9.2
Impulse/ pneumatic piping between customer's battery limit and equipments.

9.3
Servicing and assembly of control valves/regulating valves, fixing of filter elements/strainers & steam blowing & blanking devices in MS strainer, HRH strainer & and blanking ESV & IV system, for hydro test, steam blowing etc. is the part of scope of work.

9.4
It may be specifically noted that it should not be construed or claimed by the contractor that with the technical specification and "exclusions and/or inclusions" detailed in this tender specification, BHEL has covered the entire scope of work and/or the details thereof to be executed by the contractor.

9.5
Complete control fluid system included in this specification. Associated assistance for commissioning like lube oil flushing, filling and topping up of lube oil etc. shall be part of the work.

9.10
CONSUMABLES
The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those which are specifically indicated as BHEL scope.
TG special consumables like hylomar / golden hermetite / stag-b / molykote/ anabond compounds / rubber fixing compounds etc. will have to be arranged by the contractor.

9.11
All consumables to be used for the work shall have prior approval of BHEL engineer with regard to brand and quality specifications. Test reports / certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

9.12
PRIMERS & PAINTS
Supply of Paints/Primer/Thinner and application of paints for final painting and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower, and supervision is in contractor's scope.

9.13
WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES

All welding consumables including filler wires are in the contractor's scope.

9.14

All the required welding electrodes as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. on receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL regarding type of electrodes, batch number, date of expiry etc. Batch test certificates shall be made available for verification & record before the actual use of the welding consumables.

BHEL reserves the right to reject the use of any electrodes, if found non-acceptable because of bad quality, deterioration in quality due to improper storage, shelf life expiry, unapproved type / brand etc.

9.15

The contractor shall provide all consumables required for carrying out the work covered under this scope of work including TIG wires for welding of piping joints.

9.16

All the required gases like argon, oxygen, and acetylene etc. including required high purity nitrogen gas (for purging of generator stator water system) shall be arranged by the contractor at his cost.

10.0 EXCLUSIONS

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

- Application of Thermal Insulation and cladding of Equipment's of Utility Boiler, HRSG, STG, and GT/GTG are excluded from the scope of work.
- Cooling Water Piping
- Sub-delivery items and electrical components such as push-buttons, junction boxes etc.
- E&C work of cable trays, cables and earthing etc.
- Control panels, EPMS, MCC etc.
- Electrical & C&I items of handling system.
- All electrical and control & instrumentation items except those specified elsewhere in these specifications.
- Civil works except to the extent specifically indicated elsewhere in this tender.
- Instrument impulse piping beyond nut & tail
- Pneumatic copper tubing and fittings thereof.
- Testing and commissioning of heating elements, thermostats, HV rectifier transformers.
- Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.

ESTIMATED WEIGHT OF VARIOUS PIPING SYSTEM IN SCOPE OF WORK FOR PIPING PACKAGE FOR EACH BLOCK

LIST OF APPLICABLE PGMA'S

1) UB PIPING SUPPLY FROM PC CHENNAI:

SL NO	PG	MA	DESCRIPTION	WT/BOILER (Kgs)	IBR	ACTIVITY
A	**Piping (PC Chennai Supply) UB**					
1	80	300	MS FROM SUPERHEATER TO BOILER STOP VALVE	4000	I	HT
2	80	342	AUX STEAM TO SCAPH	1500	I	LU
3	80	351	AUX STEAM TO UNLISTED USERS - SG SCOPE	10000	I	SN
4	80	364	CBD TANK VENT TO SYSTEM	200	I	SN
5	80	365	CBD TANK VENT/SV EXHAUST TO ATMOSPHERE	50	N	SN
6	80	366	IBD TANK VENT TO ATMOSPHERE	2000	N	LU
7	80	418	ERECTION MATERIALS FOR INSTRUMENTS	150	N	LU
8	80	450	CBD AND EMERGENCY DRUM DRAIN	200	I	LU
9	80	451	BOILER INTEGRAL PIPING DRAINS	650	I	LU
10	80	453	LP PIPING DRAINS - SG SCOPE	1500	I	LU
11	80	454	SCAPH DRAINS	250	N	LU
12	80	460	SG AUX COOLING WATER UNIT SYSTEM	5000	N	LU
13	80	471	BOILER WATER WASH TO & FROM UNIT	2500	N	LU
14	80	600	HIGH PRESSURE DOSING PIPING	350	N	LU
15	80	612	SERVICE AIR FOR INDIVIDUAL UNITS	1800	N	LU
16	80	616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	2200	N	LU
17	80	901	SUB DELIVERY VALVES FOR LIGHT UP	1800	N	LU
18	80	920	H&S FOR HYDRO TEST	1500	N	HT
19	80	922	H&S FOR LIGHT UP - NON STEAM LINES	4000	N	LU
20	80	992	IMPORTED ELECTRODES	10	N	HT
21	81	003	CONTINUOUS BLOW DOWN EXPANDER-D1500 MM	2200	I	LU
22	81	008	INTERMITTENT BLOW DOWN EXPANDER-D2000 MM	5000	N	LU
23	81	128	HIGH PRESSURE DOSING SYSTEM	850	N	LU
24	81	415	TEST THERMOWELLS	50	N	LU
25	81	421	SENSING ELEMENTS FOR STEAM LINES	800	I	LU
	Sub-Total Piping (A) (IBR CS piping+ NON- IBR CS piping)			**48560**		

B	**Insulation**					
1	81	318	FIX COM FOR MISCELLANEOUS PPG INSULATION	800	N	LU
2	81	325	MINERAL WOOL MATTRESS	5000	N	LU
3	81	341	SEALING COMPOUND FOR INSL	80	N	LU
4	81	350	ALUMINIUM CLADDING FOR INSULATION	4000	N	LU
	Sub-Total Insulation (B)			**9880.00**		
	TOTAL (A+B)			**58440.00**		
	TOTAL (A+B) in MT			**58.44**		

2) IBR PIPING (PC CHENNAI SUPPLY)

S.N.	PG	MA	PGMA Description	Est Wt in Kg WT/BOILER	Wt in MT
1	80	130	VHP STEAM SYSTEM	225000	225.00
2	80	131	HP STEAM SYSTEM	35000	35.00
3	80	132	MP STEAM SYSTEM	12500	12.50
4	80	133	LP STEAM SYSTEM	55000	55.00
5	80	134	EXTRACTION STEAM SYSTEM	15000	15.00
6	80	135	BFP DISCHARGE - UB SYSTEM	42500	42.50
7	80	136	BFP DISCHARGE - HRSG SYSTEM	60000	60.00
8	80	137	SPRAY WATER SYSTEM	1250	1.25
9	80	149	MISC.EXHAUSTS & VENTS	1250	1.25
10	80	452	HP PIPING DRAINS - SG SCOPE	2500	2.50
11	80	453	LP PIPING DRAINS - SG SCOPE	1250	1.25
12	80	992	IMPORTED ELECTRODES	250	0.25
13	xx		VALVES, FLANGES, WITH FITTINGS AND STEAM TRAPS	34000	34.00
			Total WT	**485500.00**	**485.50**

FOR ABOVE MENTION IBR PIPING- LINE SIZE, LENGTH PIPE OD/TH DETAILS OF CARBON STEEL AND ALLOY STEEL:
FOR S. NO. 2 - IBR PIPING LINE WEIGHT AND DIMENSION DETAILS:

S.NO.	LINE SIZE	LENGTH in m	Sch/Thk	PIPE ODxTHK IN mm	WEIGHT (kg)
A . IBR PIPING - CARBON STEEL					
A1. PIPES					
1	1"	900	XS	33.4x4.5	1458
2	1.5"	240	XS	48.3x5.08	649

3	2"	100	XS	60.3x5.54	374
4	6"	250	XS	168.3x14.27	6775
5	8"	190	XS	219.1x12.7	6141
6	10"	60	STD	273x9.30	1809.5
7	12"	175	STD	323.8x9.53	6464.5
8	14"	300	STD	355.6x9.53	12199.5
9	3"	765	STD	88.9x5.49	4318.5
10	4"	190	STD	114.3x6.02	1526.5
11	3/4"	300	S160	26.7X5.56	435
12	6"	275	STD	168.3x7.11	3886
13	8"	400	STD	219.1x8.18	8509
14	12"	50	25	323.9x25	2725
15	14"	40	S60	355.6x12.7	2148
16	1.5"	100	S160	48.3X5.08	271
17	2"	75	S160	60.3X11.07	504
18	4"	135	S160	114.3X13.49	2261
19	6"	470	21.95	168.3x21.95	18615
20	10"	390	9.27	273X9.27	11755
21	14"	250	36	355.6X36	35465
22	3/4"	100	S160	26.7X5.6	144
23	16"	25	XS	406.4x12.7	1537
24	20"	105	XS	508x12.7	8137
26	16"	55	STD	406.4x9.53	2566
27	18"	50	STD	457.2x12.7	3480
29	24"	115	STD	610x14.27	12053
30	28"	80	STD	711.2x9.53	6595
33	16"	20	17	406.4x17	1632
34	10"	30	12.7	273X12.7	1223
35	12"	50	10.31	323.9X10.31	1993
36	20"	35	25	508X25	5211
37	20"	15	9.53	508X9.53	878
SUB TOTAL A1- CS PIPING					**173739**
A2. WEIGHT OF VALVES, FLANGES WITH FITTINGS					**45000**
TOTAL CARBON STEEL PIPING (A1+A2)					**218738.5**
B . IBR PIPING - ALLOY STEEL					
B1. PIPES					
1	1"	150	XXS	33.4X9.09	408
2	3/4"	160	XXS	26.7X7.82	291
3	1.5"	120	XXS	48.3X10.15	573
4	12"	650	35.08	323.9X35.08	81201

5	8"	140	32	219.1X32	10335
6	4"	55	22	114.3X22	1650
7	6"	55	27.5	168.3X27.5	2625
8	24"	35	73.7	610X73.7	14875
9	3"	30	20	88.9X20	435
10	2"	50	12.5	60.3X12.5	368
11	12"	25	14.27	323.8X14.27	1361
12	16"	375	55	406.4X55	89362
13	12"	30	9.53	323.9X9.53	1108
14	4"	20	6.02	114.3X6.02	160
15	8"	25	36	219.1X36	2032
SUB TOTAL B2- AS PIPING					**206784**
B2. WEIGHT OF VALVES, FLANGES, WITH FITTINGS AND STEAM TRAPS					**60000**
TOTAL ALLOY STEEL PIPING (B1+B2)					**266784**
TOTAL IBR PIPING (Kg)					**485522.5**
TOTAL IBR PIPING (MT)					**485.5225**

Note:

1. All Pipes, Flanges & Fittings are supplied by Piping Centre, Chennai Valves are supplied by BHEL-Tiruchy or Other manufacturers.

2. IBR pipes are supplied in single commercial lengths with edge prepared and fully formed like bends, curvature, coupler for pipes, branches etc.

NON-IBR PIPING LINE WT AND DIMENSION DETAILS (EMRP Supply)

S.NO.	LINE SIZE	LENGTH in m	Sch/Thk	PIPE ODxTHK IN mm	WEIGHT (kg)	SYSTEM
A . NON-IBR PIPING - CARBON STEEL						
A1 PIPES						
A1.1 CARBON STEEL PIPES (SEAMLESS)						
1	1/2"	204	SCH 160	21.3X4.8	199	CONDENSATE & FEED WATER SUCTION PIPING
2	3/4"	414	SCH 160	26.7X5.6	598	CONDENSATE & FEED WATER SUCTION PIPING
3	1"	3438	SCH XS	33.4X4.5	5552.5	CONDENSATE & FEED WATER SUCTION PIPING
4	11/2"	402	SCH XS	48.3X5.1	1085.5	CONDENSATE & FEED WATER SUCTION PIPING

5	2"	8130	SCH XS	60.3X5.5	30365.5	CONDENSATE & FEED WATER SUCTION PIPING
6	3"	11358	STD	88.9X5.5	64172.5	CONDENSATE & FEED WATER SUCTION PIPING
7	4"	7332	STD	114.3X6.0	59022.5	CONDENSATE & FEED WATER SUCTION PIPING
8	6"	3096	STD	168.3X7.1	43653.5	CONDENSATE & FEED WATER SUCTION PIPING
9	8"	1836	STD	219.1X8.2	39015	CONDENSATE & FEED WATER SUCTION PIPING
10	10"	714	STD	273.0X9.3	21491.5	CONDENSATE & FEED WATER SUCTION PIPING
11	12"	960	STD	323.8X9.5	35424	CONDENSATE & FEED WATER SUCTION PIPING
12	14"	288	STD	355.6X9.5	11693	CONDENSATE & FEED WATER SUCTION PIPING
A1.2 CARBON STEEL PIPES (WELDED)						
1	16"	394	STD	406.4X9.5	18380	CONDENSATE & FEED WATER SUCTION PIPING
2	18"	546	STD	457.2X9.5	28665	CONDENSATE & FEED WATER SUCTION PIPING
3	24"	102	STD	609.6X9.5	7191	CONDENSATE & FEED WATER SUCTION PIPING
A1.3 GALVANIZEED IRON PIPES (IS 1239 GALV)						
1	1"	4056	HEAVY	33.4X4.05	6023	PLANT AIR & INSTRUMENT AIR
2	11/2"	36	HEAVY	48.3X4.05	79.5	PLANT AIR & INSTRUMENT AIR
3	4"	480	HEAVY	114.3X5.40	3456	PLANT AIR & INSTRUMENT AIR
Sub Total (A-1.1+1.2+1.3)					376067.00	
A2. FABRICATED MITRE BENDS AND REDUCERS TO BE MADE AT SITE BY ERECTION AGENCY WEIGHT OF VALVES, FLANGES WITH FITTINGS					150000	PLANT AIR & INSTRUMENT AIR
TOTAL CARBON STEEL PIPING (A)					**526067.00**	
B. NON-IBR PIPING - STAINLESS STEEL						
B1 PIPES						
B1.1 STAINLESS STEEL PIPES (SEAMLESS)						
1	1"	984	SCH 40S	33.4X3.38	1230	HSD&NAPTHA
2	2"	492	SCH 40S	60.3X3.9	1328.5	DM WATER
3	3"	630	SCH 10S	88.9X3.05	2032	HSD&NAPTHA

4	6"	456	SCH 10S	168.3X3.40	3155.5	NATURAL GAS
5	8"	480	SCH 10S	219.1X3.76	4790.5	CONDENSATE & FEED WATER SUCTION PIPING
B1.2 STAINLESS STEEL PIPES (WELDED)						
1	16"	114	SCH 10S	406.4X4.78	2695.5	DM WATER
Sub Total (B1.1+B1.2)					15232	
B2. WEIGHT OF VALVES, FLANGES WITH FITTINGS					3750	
TOTAL STAINLESS STEEL PIPING (B1+B2) (B)					**18982**	
C.1	Pipe Hanger Assemblies				1,250	
C.2	Structural Steel for Pipe Supports				10,417	
Sub Total (C=C.1+C.2)					**11,667**	
TOTAL NON-IBR PIPING (KG) (A+B+C)					**556715.50**	
TOTAL NON-IBR PIPING (MT)					**556.7155**	
D	**Thermal Insulation Material for B.O.P. Piping**					
D.1	Mineralwool Mattress				112,000	
D.2	Cladding Material - Aluminium sheet				20,000	
D.3	Ancilliary Material				15,000	
	Total D				**147,000**	

NOTE:

1 **All Pipes are supplied in Single commercial lengths, with edge preparation by EMRP.**

2 **Cutting into required spool lengths, edge preparation of spools, welding of Stubs & support attachements are to be done at Site by Erection Agency**

3 **Cathodic protection as per EIL's specification is required for all underground piping; PE&SD will supply the material required, Erection Agency to provide lugs on pipe**

4 Besides product groups indicated herein, there is likelihood of addition of new product groups by BHEL' s unit for release of some items, integral to this work. Tenderers' quoted unit rates shall be applicable for such product groups also.

5 The weights given against PGMA's listed above are tentative. It may change after detailed engineering is done. Rate quoted by the Contractor shall not change due to variation in weight.

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

7 BHEL's decision with regard to classification of a particular product group for applicable rate category shall be final & binding on the Contractor.

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

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

10 THE LIST IS **FOR ONE PACKAGE** & TENTATIVE AND HAS BEEN GIVEN TO ENABLE THE CONTRACTOR TO STUDY THE NATURE OF WORK TO BE DONE IN THIS CONTRACT. THERE MAY BE VARIATION IN SIZE, WEIGHT ETC. AND NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED ON ACCOUNT OF THIS BY BHEL.

11 SOME OF THE PACKAGES MAY BE SENT IN PARTS TO SUIT THE SITE CONDITION / TRANSPORTATION, THE SAME IS TO BE ASSEMBLED AT SITE WITHOUT ANY EXTRA COST, LIKEWISE THE PACKAGE MAY BE ASSEMBLED TOGETHER AND SEND AS A SINGLE ASSY. CONTRACTOR MAY HAVE TO DISMANTLE AND ERECT OR, ERECT AS SINGLE ASSEMBLY AS PER THE INSTRUCTION OF BHEL ENGINEERS WITHOUT ANY EXTRA COST.

SUMMARY OF TENTATIVE WEIGHT OF SYSTEMS/EQUIPMENTS INVOLVED:

A) Summary of Tentative Weight of Piping (PC piping, BOP IBR piping/ BOP Non IBR piping) Involved in Erection, Testing & Commissioning Scope for Piping Package - I:

S.N.	Package/Equipments	Weight (Kg)	Approx. WT.(MT)
A	**UB Piping (PC Chennai supply)**		
i	**IBR CS Piping**	21,050.00	21.05
Ii	**Non-IBR CS Piping**	27,510.00	27.51
iii	**Insulation**	9,880.00	9.88
	Sub Total A	**58,440.00**	**58.44**
B	**IBR Piping (PC Chennai supply)**		
i	Carbon Steel Piping with fittings	218,738.50	218.74
ii	Alloy Steel Piping with fittings	266,784.00	266.78
	Sub Total B	**485,522.50**	**485.52**
C	**Non-IBR Piping (EMRP Mumbai supply)**		
i	Carbon Steel Piping with fittings	526,067.00	526.07
ii	SS Steel Piping with fittings	18,982.00	18.98
iii	Pipe Hanger Assemblies	1,250.00	1.25
iv	Structural Steel for Pipe Supports	10,417.00	10.42
	Sub Total C	**556,716.00**	**556.72**

	Total IBR and Non-IBR Piping (B+C)	1,042,238.50	1,042.24
D	**Thermal Insulation Material for B.O.P. Piping**		
i	Mineralwool Mattress	112,000.00	112.00
ii	Cladding Material - Aluminium sheet	20,000.00	20.00
iii	Ancilliary Material	15,000.00	15.00
	Sub Total D	**147,000.00**	**147.00**
	Grand Total (A+B+C+D) with margin	**1,247,678.50**	**1,247.68**

NOTE:

a. THE WEIGHT INDICATED ABOVE FOR PACKAGE - I ONLY.

b. THE WEIGHT INDICATED ABOVE IS APPROXIMATE AND THERE MAY BE A VARIATION IN WEIGHT OF EQUIPMENT / PACKAGE. NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED BY BHEL ON ACCOUNT OF VARIATION IN WEIGHT QUANTITIES.

B) Summary of Tentative Weight of Piping (PC piping, BOP IBR piping/ BOP Non IBR piping) Involved in Erection, Testing & Commissioning Scope for Piping Package - II:

S.N.	Package/Equipments	Weight (Kg)	Approx. WT.(MT)
A	**UB Piping (PC Chennai supply)**		
i	**IBR CS Piping**	21,050.00	21.05
Ii	**Non-IBR CS Piping**	27,510.00	27.51
iii	**Insulation**	9,880.00	9.88
	Sub Total A	**58,440.00**	**58.44**
B	**IBR Piping (PC Chennai supply)**		
i	Carbon Steel Piping with fittings	218,738.50	218.74
ii	Alloy Steel Piping with fittings	266,784.00	266.78
	Sub Total B	**485,522.50**	**485.52**
C	**Non-IBR Piping (EMRP Mumbai supply)**		
i	Carbon Steel Piping with fittings	526,067.00	526.07
ii	SS Steel Piping with fittings	18,982.00	18.98
iii	Pipe Hanger Assemblies	1,250.00	1.25
iv	Structural Steel for Pipe Supports	10,417.00	10.42
	Sub Total C	**556,716.00**	**556.72**
	Total IBR and Non-IBR Piping (B+C)	1,042,238.50	1,042.24
D	**Thermal Insulation Material for B.O.P. Piping**		

i	Mineralwool Mattress	112,000.00	112.00
ii	Cladding Material - Aluminium sheet	20,000.00	20.00
iii	Ancilliary Material	15,000.00	15.00
	Sub Total D	**147,000.00**	**147.00**
	Grand Total (A+B+C+D) with margin	**1,247,678.50**	**1,247.68**

NOTE:

a. THE WEIGHT INDICATED ABOVE FOR BLOCK I ONLY.

b. THE WEIGHT INDICATED ABOVE IS APPROXIMATE AND THERE MAY BE A VARIATION IN WEIGHT OF EQUIPMENT / PACKAGE. NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED BY BHEL ON ACCOUNT OF VARIATION IN WEIGHT QUANTITIES.

- Agencies for Package I and II of piping work will work simultaneously. The all common header of piping which requires interconnection / termination of piping for respective system/machines is specifically included in the scope of Package-I contractor. Contractor shall carry out the common header of piping work on top most priority as per instruction of BHEL Construction Manager to enable the contractor to hookup/terminate the piping of the respective systems/equipments and to achieve the overall charging of system/commissioning of equipments.

- Vendors to specifically note that piping's terminated to common header/common system shall be erected with fitting, valves/drains simultaneously in order to charge the common header. In case of any difficulty in arranging/fixing of theses valves contractor has to make the piping line dummy and same shall be done by respective vendors as a part of scope of work.

- Welding of pipe line joints connected to flange mounted on the respective equipments included in the contractor scope.

PAINTING SCHEME: Applicable for each Block

PAINTING SCHEME AS PER OPaL/EIL SPECIFICATION FOR SHOP & FIELD PAINTING **SECTION C: 4.9, SPECIFICATION No. 6987-0642-PT-F09 Rev 0**

OPaL/EIL Specification for Shop & Field Painting **SECTION C: 4.9, SPECIFICATION No. 6987-0642-PT-F09 Rev 0** with regard to surface preparation and final painting with colour codes / scheme for surface preparation and finish paints coating including primer coating for shop and field painting is attached separately along with this tender specification for ready reference. Contractor shall carry out surface preparation and final painting works as per customer specification and instruction of BHEL engineer at site.

All the primer, thinner & paints for final painting and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower, supervision is in contractor's scope.

GENERAL REQUIREMENTS – COMMON TO ALL WORK

1.1
The intent of specification is to provide services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the Contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

1.2
The terminal points decided by BHEL shall be final and binding on the Contractor for deciding the scope of work and effecting payment for the work done.

1.3
The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Contractor and his personnel shall cooperate with personnel of BHEL, BHEL'S Customer, Customer's consultants and other Contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.

1.4
The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The Contractor should ensure proper planning and successful & timely completion of the work to meet the overall project schedule. The Contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequate trained, qualified and experienced supervisory staff and skilled personnel.

1.5
All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the Bidder.

1.6
The Bidder shall at his cost perform any services, tests etc., although not specified but nevertheless required for the completion of work.

1.7
Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.

1.8
All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory/ local authorities are to be arranged by the Contractor at his cost in time to ensure smooth progress of work.

1.9
The work to be carried out under the scope of these specifications covers the complete work of collection from stores/storage yard, handling, transporting, unloading at erection site, pre-assembly, erection, alignment, hot alignment, bolting, fastening, welding, radiography, leveling, cold pulling, adjusting, Non-destructive testing, Post weld heat treatment, hydraulic test, chemical cleaning, passivation, steam blowing, oil flushing, water flushing, air flushing, pre-commissioning tests, trial running of auxiliaries covered under these specifications, commissioning and all other activities till handing over of the unit. The work shall conform to dimensions and tolerances specified in the various drawings, documents etc. That will be provided during the course of installation. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost failing which the work will be got done by BHEL at the cost and risk of the contractor. Contractor may please note that the loading of materials at storage yard/Stores in contractor's Trailer / Carriers while collecting materials will be done by material handling agency deployed by BHEL.

1.10
The Piping shall be erected as per relevant provisions of latest Indian Boiler Regulations (IBR) and amendments/addendums thereof, if any.

1.11
The terminal points as decided by BHEL shall be final and binding on the Contractor.

1.12
The indicative schedule of weight of major equipment's/Piping given in relevant appendices is meant for providing a general idea to the Contractor about the magnitude of the work involved.

1.13
The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to Contractor's fault, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.

1.14
The Contractor shall perform any services, tests etc, which may not be specified but nevertheless, required for the completion of work within quoted rates.

1.15
All necessary certificates and licenses required for carrying out this work are to be arranged by the Contractor expeditiously.

1.16
The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.

1.17
BHEL reserves right to recover from the Contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to Contractor's lapse during any stage of work. Any loss to BHEL due to Contractor's lapse shall have to be made good by the Contractor.

1.18
All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables etc, except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by Contractor unless otherwise specified in the relevant clauses. The Contractor's quoted rates should be inclusive of all such contingencies.

1.19
During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc may become necessary on account of feedback / revision of drawing etc. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc shall be maintained by the Contractor for such reworks. Claim of Contractor if any, for such works will be governed by relevant clauses of 'General Conditions of Contract'.

1.20
All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of structures, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the Contractor as part of the work within the quoted rates.

1.21
The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel for such usage. Only the steel for making temporary structure (cat head) for drum lifting will be provided by BHEL in random sizes materials available at site.

1.22
The Contractor shall take delivery of the components, equipments, chemicals, and lubricants etc from the BHEL stores/ storage area after getting the approval of BHEL Engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipments after usage shall be submitted to the BHEL and reconciled periodically.

1.23
Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to

congestion at site of work. Materials shall be stacked neatly, preserved and stored in the Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as incidental to work.

1.24
Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc.

1.25
The details of equipments to be erected under this contract are generally as per the schedule given in relevant appendices. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

1.26
Hangers & suspensions, supports etc for tubes, piping, & ducts etc will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required.

1.27
Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.

1.28
Contractor shall lay/install the field-routed/small-bore pipelines to suit site condition/ requirement. Before laying/installing such pipelines, the contractor shall prepare necessary sketch for routing these pipe lines and get the same approved by BHEL. Contractor must take care of the location/layout of other systems and equipment before preparing such sketch to avoid interference. There is a possibility of minor change in routing such pipelines even after completion of erection; contractor shall carry out the same without any extra cost to BHEL.

1.29
Welding of necessary instrumentation tapping points, thermowell, thermocouple pad, metal temp pad and clamps, root valve including reducer (to suit Control & Instrumentation Impulse Piping requirements), condensing vessel, flow metering & measurement devices, and control valves to be provided on boiler & its auxiliaries and piping are covered within the scope of this specification. The installation of all the above items will be Contractor's responsibility even if:

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

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

1.30
Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc are received in assembled condition as integral part of equipments. Contractor shall dismount such instruments for calibration and hand over the same to BHEL. C & I erection agency will do storage / re-erection calibration etc.

1.31
Fixing and seal welding of thermowells & plugs before Hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermowells after hydro test/steam blowing of lines as part of work.

1.32
Actuators/drives of valves, dampers, gates, powered vanes etc may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.

1.33
All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. BHEL will provide the motorized insulation testers.

1.34
In installation of various equipments it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials. Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipments to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements will be provided by BHEL on free -returnable basis which shall be returned to BHEL after the use.

1.35
The work shall be carried out strictly in accordance to the “Field Quality Plan” approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.

1.36
All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per the general engineering practice and as per BHEL engineers instructions at site, cutting, weld desposing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scraping, lapping, fitting up etc as may be applicable in such erection works and which are treated incidental to the erection work and necessary to complete the work satisfactorily shall be carried out by the Contractor as part of the work.

1.37
Interconnection/ hookup, if any, with the existing system shall form part of work. Such interconnections, hookups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

1.38
Contractor shall regulate flow of material to and from site in such a manner and sequence that material accumulation at site does not lead to congestion at site. In case it is necessary to shift and restack the materials kept at work areas / site to enable other agencies to carry out their work or further any other reason, it shall be done by the Contractor most expeditiously. No claim for extra payment for such work will be entertained.

1.39
It may so happen that certain components like manhole doors, hanger etc may be supplied in loose items. They need to be assembled as per relevant drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.

1.40
The Contractor shall have total responsibility for all equipment and materials in his custody at Contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

1.41
BHEL is operating web based computerized site operation management system (SOMS) that includes, inter-alia, issue of materials, daily progress reporting, Contractor's running monthly billing and material reconciliation through a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work.

1.42
In the event the computerized SOMS is inoperative for any reasons, the Contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the SOMS as and when the SOMS is reactivated/ normalized.

1.43
All lubricants and chemicals required for testing, preservation, chemical cleaning / acid cleaning, oil flushing, and the lubricants for trial runs of the equipments and trial operation of the unit will be supplied by BHEL free of charges.

1. 2) COLLECTION AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES

1.2.1
Contractor shall take delivery of the components, equipments, lubricants, chemicals, special consumables, steel etc. from the storage yard/stores/sheds of BHEL/ client. The Contractor should

note that the transport of equipments to erection site, assembly yards etc should be done by the prescribed route, without disturbing the other works and contractors and in the most professional manner. Special equipments such as laboratory equipments, measuring and controls equipments, special electrodes, valves, shims, packing materials for joints and seals, lubricants, actuators etc, shall be stored, when taken over by the Contractor, in appropriate manner as per BHEL's instructions.

1.2.2
The contractor shall return all parts, materials, consumables etc. remaining extra over the normal requirement with proper identification tags to BHEL stores. In case of any misuse or use over actual requirement, BHEL reserves the right to recover the cost of parts/materials used in excess or misused, with departmental charges.

1.2.3
Transportation of lube oil, Chemicals, Gas cylinders etc from stores, is included in the scope of this contract. The contractor shall have to return all the empty and excess drums to the customer/BHEL stores. Similarly, transport of chemicals for various pre-commissioning activities/ processes mentioned in clauses herein from BHEL/customer's stores and charging of chemicals into the system for carrying out various pre-commissioning activities and processes mentioned herein and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of contractor. After completion of oil flushing operation, the used oil shall be filled in empty drums and which in turn shall be returned to BHEL/customer's stores.

1.3 TEST TAPPING POINTS

1.31
Installation and welding of Tapping Points for taking performance test measurements shall be carried out by the contractor as part of this work for the equipments covered under this tender specification under the guidance of BHEL engineer. The scope will be limited to all the tapping points for which materials are available and their locations identified within the regular contract period and extensions thereof.

1.3.2
All packing and forwarding material shall be returned as soon as the material is unpacked. The location for storage of such materials shall be as indicated by BHEL Engineer.

1.3.3
All Measuring and Monitoring Devices (MMD) used for the work in scope of these tender specifications shall be calibrated by the accredited agencies that are approved by BHEL or calibration tractability is established upto National Physical Laboratory.

1.3.3
Contractor shall furnish the consumption details of chemicals, lubricants, TIG welding filler wire, welding electrodes and other consumables on monthly basis.

1.4 GENERAL

1.4.1
During the course of erection, platforms and floor grills are to be cut at certain places to route steam, oil, water and air piping, cable trays, etc or for accommodating erection, rigging etc, the cutting of platforms and grills should be minimum and as approved by BHEL engineer. After completion of work, the platform/grills cut shall be made good neatly as instructed by BHEL engineer.

1.4.2
Erection and welding of stainless steel fittings including supply of necessary stainless steel welding electrodes is within the scope of the work/specification.

1.4.3
No temporary supports should be welded on to the piping.

1.4.4
Contractor shall carry out preservation painting on all items taken from stores. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. This facility shall be provided by the contractor till the commissioning and handing over of the equipment to the customer. Preservative and touch up painting on equipments covered under this specification stored at stores/storage yard shall also be carried out by the contractor.

1.4.5
Adjustment of spring hangers for piping shall be done by the contractor during initial erection. After initial commissioning trials, it is possible that the spring hangers have to be adjusted repeatedly till the correct spring compression is achieved. Contractor shall do the same to the satisfaction of BHEL engineer. The marking of cold and hot positions on the hangers shall be done by the contractor.

1.4.6
The contractor shall return to BHEL the excess materials left over after completion of work, materials issued for temporary pipelines for HT, chemical cleaning, flushing, blowing etc. and materials issued on returnable basis in neatly dressed condition. Necessary grinding, edge cutting (square facing), edge preparation (vee), painting etc. to the condition similar to the one at the time of issue shall be in scope of work.

1.4.7
Wherever the equipments are erected by the contractor and connected piping is done by other agency, contractor shall weld / tighten the incoming pipes to either the equipment or the counter flange provided on the equipment.

2 PREPARATION OF FOUNDATION

2.1
Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by the customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations up-to 25mm for achieving proper levels will be within the scope of work/specification.

2.2
All minor foundations and anchor points required for installing erection equipments like winches, anchors etc. are to be cast by the contractor.

2.3
The complete work of secondary grouting of equipments is included in the scope of work/specification. Contractor shall arrange all manpower, T&P, form work and shuttering materials, all grouting materials such as ordinary portland cement, sand, stone chips etc & quick-setting-non-shrink-free-flow special grout mix of required specification (like conbextra-gp-2 or equivalent).

2.3.1
The quick-setting-non-shrink-free-flow special grout mix shall be purchased only from the following BHEL approved vendors:

1. M/S FOSROC CHEMICALS (INDIA) PVT LTD;
2. M/S SIKA INDIA PVT LTD;
3. M/S PAGEL CONCRETE TECHNOLOGIES PVT LTD;
4. M/S PIDILITE INDUSTRIES LTD.

In order to ensure the quality, the major grouting of equipments using any of above grout mixes shall essential be done as per the recommendations of supplier with regard to grout preparation and use of machinery etc under the supervision of the respective supplier. BHEL has arrangement with above suppliers for supervision services and the supervision charges for the same will be borne by BHEL. However, the contractor shall ensure readiness of equipment for grouting in all respect before such a service is requisitioned and the duration is not prolonged unduly. Any overstay required due to contractor shall be charged to the contractor with BHEL's departmental charges. Contract shall consult BHEL engineer before deciding upon the vendor for the above.

2.3.2
Cleaning of the foundation surfaces, pocket holes, anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods will be within the scope of this work.

2.4

BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional packer plates and shims if required will have to be prepared by the contractor out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

2.5
The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipments under scope wherever required. The support and sole plates matching and concrete surface bedding is also covered in the scope of work. The fine dressing of concrete shall be with Prussian blue-match checks.

2.6
Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

A) DETAILS OF SCOPE OF WORK OF ERECTION, TESTING, COMMISSIONING, SUPPLY OF PAINTS/PRIMER AND APPLICATION OF PAINTS FOR FINAL PAINTING APPLICATION OF THERMAL INSULATION & SHEETING/CLADDING WORK AND HANDING OVER OF COMPLETE POWER CYCLE PIPING TOGETHER WITH VALVES, HANGERS AND SUPPORTS, FITTINGS, IBR PIPING (CARBON STEEL AND ALLOY STEEL) WITH VALVES & FITTINGS, NON-IBR PIPING (CARBON & SS STEEL), COMPLETE WITH ASSOCIATED PIPES, FITTINGS AND ASSOCIATED, ACCESSORIES SPECIALITIES AND OTHER ACCESSORIES & EQUIPMENTS INCLUDING BOUGHT OUT ITEMS ETC FOR OPAL (ONGC PETRO ADDITIONS LIMITED) STEAM AND POWER GENERATION SYSTEM PACKAGE FOR DAHEJ PETROCHEMICAL COMPLEX, PACKAGE – I FOR PIPING FOR UB1, HRSG 2&4, STG1 AND GT/GTG 2&4 AND PACKAGE – II FOR UB 2, HRSG 1&3, STG2 AND GT/GTG 1&3.

1.
The work on piping systems will include cutting to required length, edge preparation, laying, fixing & welding of the pipes / elbows / fittings/ valves etc. in the pipeline, fixing & adjustment of supports / anchors / shock absorbers and carrying out all other activities / work to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineers instructions and / or as per approved drawings / documents.

2.
Laying of pipelines as per the specifications, between equipments constituting Terminal point, whether the terminal equipments fall within the scope of the work / specification or not, is within the scope of the work / specification. The contractor shall complete terminal joints at both ends for all the piping schemes covered in the specification.

3.
Aligning, Matching and welding of piping to the terminal points (such as stubs, on terminal equipments, stubs on headers, battery limits etc), even if these terminal equipment/point do not form part of this scope of work / specification, and stress relieving and NDE of joints so made is also within the scope of work / specification. Also, where the piping connection to the terminal points involves flanged joints, mounting and welding of flanges on piping as well as terminal equipment matching of flanges as specified elsewhere herein, fixing of gaskets, bolting and tightening as per BHEL Engineer's instruction is also in this scope of work / specifications. Required fasteners and gaskets will be supplied by BHEL free of cost.

4. Following items of work included in the scope of piping erection:

a. Installation & Removal of Isolating Devices/ NRVs and removal & re-fixing of internals required for Hydraulic Testing, Pre-commissioning and commissioning activities. Required gaskets will be supplied by BHEL free of cost.

b. Matching of flanges for achieving parallelism and alignment resorting to heat correction or other suitable methods as per instructions of BHEL Engineers.

c. To locate the cause of vibrations in pumps or other auxiliaries and to carry out necessary corrections in piping and its supports. This may involve cutting, fresh edge preparation, welding, radiography, stress relieving, etc., of suction, discharge, re-circulating and other connected piping and its supports at number of places.

d. Increase or decrease in length of piping including change in layout to suit site conditions.

e. Fabrication and erection of racks and steel supports for all the piping including of system piping. Steel for this purpose will be supplied by BHEL in random sizes.

f. Erection, welding, NDE and stress relieving of certain equipments, e.g. flow nozzles, Control Valves etc, after completion of certain activities e.g. chemical cleaning, steam blowing etc is part of work. This may involve removal of portions from the already erected pipelines in order to introduce these equipments and resultant edge preparation etc shall be incidental to work. No separate/ additional payment is envisaged for cutting, welding and edge preparation in this regard. The removed pieces of pipes shall be returned to BHEL stores with proper cleaning, dressing and identification marking.

g. Matching of all fittings like tees, bends, flanges, reducers, valves, socket fittings, etc with pipes for welding. This may involve weld build up, edge preparation, etc.

h. Cleaning of all pipes by wire brush and flushing by compressed air.

i. Welding of root valves with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping.

j. Welding of weld blanks with due NDE & PWHT, if required, on a temporary basis.

k. Opening of valve actuators, dismantling of actuators from the valves, refitting and rendering assistance connected with the electrical and mechanical problems.

l. Fixing and welding including due NDE & PWHT etc of Carrier plates on to the pipes.

m. Cutting into required spool lengths, edge preparation of spools, welding of Stubs & support attachments are to be done at Site by Erection Agency.

n. Mitre Bends, Reducers in Piping are to be fabricated at Site by Erection Agency using the pipe supplied by BHEL Manufacturing Units.

o. Cathodic protection as per EIL's specification is required for all underground piping; PE&SD will supply the material required, Erection Agency to provide lugs on pipe.

5
On all steam piping, water (DM / Raw / Condensate) Piping, Oil Lines / Piping, condensate & feed water suction piping, HSD & NAPTHA piping, natural gas piping, Instrument air piping. Service Air Piping, etc, where butt welding is involved, root TIG Welding and subsequent Arc Welding shall be adopted as instructed by BHEL Engineer. The decision of BHEL Engineer regarding welding procedure for welding of above lines will be binding on the contractor.

6
Pipes / Tubes / Structural Materials, which are issued in running meters, may not be sent in standard lengths. These have to be cut to suit site conditions.

7
Certain pipe lines of Oil, Air, Natural Gas, HSD & NAPTHA piping, Steam and Water will be field routed as per schemes approved at site or as per the instructions of BHEL Engineer, and will be supplied in random lengths / Running lengths. The contractor shall lay the piping according to instructions at sites, after carrying out the necessary fabrication, edge preparation, routing etc, in best professional manner and as per instructions. The supports for field-routed piping shall be fabricated and erected as per the requirement of the work. The steel required for the supports will be provided by BHEL free of cost at their stores.

8
'L'/'C' Bridges may be used for alignment of higher size pipelines with prior approval of BHEL. Contractor shall remove the bridges, stoppers, etc. after completion of welding by gas cutting, followed by grinding the spot smooth and free of any surface defects. Such stoppers shall not be removed by hammering. Any scar or cavity shall be made good by welding and grinding as per the instructions of BHEL Engineer.

9
All weld joints on piping shall be ground or filed on completion of welding and before radiography as per instructions BHEL engineer so as to achieve smooth surface free of notches, ripples, undulations, etc. and to limit the reinforcement as per the codes.

10

Contractor shall erect the piping by doing pre-assemble on ground if possible at the first instance. The pipe laying shall be carried out from the available terminal point / points or any other area between the terminal points. The erection can be carried out on temporary supports to obtain proper alignment and welding. After fixing the permanent supports, all the temporary supports shall be removed. The alignment, distances and loading of the supports shall be checked and the required spring compression achieved in the case of spring hangers.

11
Contractor shall carryout edge preparations for welds joints in accordance with BHEL Drawings / BHEL Standards / BHEL Engineer's instruction.

12
The location of drain headers, valves, stations, steam traps of piping as indicated in the BHEL drawings are suggestive only. The final location and routings shall be decided to suit the site conditions. While routing such lines and fixing the stations, it has to be erected so as to provide easy accessibility and free path for the purpose of easy operation and maintenance. These locations shall be acceptable to the client. Sometimes, the locations of stations and routing of lines may have to be changed as per the site conditions. All such works shall be carried out expeditiously as per the instructions of BHEL Engineer. The decision of BHEL Engineer is final and binding on the contractor.

13
The rate quoted in rate schedule is also inclusive of pre-heating, welding, post heating, Post Weld Heat Treatment/ stress relieving and NDE of piping.

14
Hanger rods shown in the piping arrangement drawing may have to cut and welded to suit site condition. The contractor shall do cutting and welding of these hanger rods. The NDE & stress relieving required on welded hanger rods shall be carried out. The hanger for piping will be tested for even distribution of load with the help of torque wrench.

15
The piping is provided with hand holes. The hand holes will be opened up for inspection and seal welded prior to operation.

16
Structural materials required for the supporting / operating platforms required for the valves/equipments at various levels for the safe operation will be issued in random sizes to the contractor free of cost. However, the contractor's quoted rate shall include fabrication and erection of all such of platforms at site and no extra payments shall be allowed for this and only tonnage rate applicable will be payable.

17

Erection of piping systems shall be coordinated by the contractor as required, with the erection of the Utility Boiler, Steam Turbine, generator, condenser, HRSG Boiler, boiler feed pumps, Gas Turbine, Gas turbine generator and other major equipments, approval must be obtained from the concerned BHEL engineer and other agencies concerned prior to making piping interface connections to the aforementioned equipments. Sequence of work shall be carefully planned to minimize interference with other groups working in the same area. Actual sequence to be followed shall be subject to the approval of engineer and engineers may, at time, direct the contractor to reschedule his work as per status of the site work.

18
While erecting the field run pipes, the contractor shall check the accessibility of valves, instruments tapping points and maintain minimum head room requirement and other necessary clearance from the adjoining work areas to avoid interferences.

19
All pipelines shall be given proper slope towards the drain points during erection.

20
All pipe lines shall be provided with suitable vent and the drain points with valve (s) on the highest and lower points of the pipe run although may not be specifically mentioned in the drawing as per the instructions of BHEL Engineer.

21
For instrument connections, pipe stubs including the instrument tubing up to the root valve(s) shall be installed by the contractor. Root valves shall be located in the convenient location / place as required by the customer to facilitate easy operation as per the decision / instruction of BHEL Engineer.

22
The contractor shall be responsible for correct orientation of all valves so that flow direction, seats, stem and hand wheel are in desired locations. Information regarding orientation of valves, not fully located on drawings, may be obtained from the BHEL Engineers.

23
The piping systems, which come under the purview of IBR, should meet the requirement of IBR. The contractor shall be well versed with all the latest amendments of Indian Boiler Regulations.

24
All piping shall be grouped wherever practicable and shall be routed to present a neat appearance.

25
For field run piping, contractor shall fabricate and erect all hangers and supports as required with due regard to general arrangement layout of other pipes, hangers, cable trays, ducting, structural members, etc.

26
For maintaining the slopes as given in the drawings for larger thickness and larger dia pipelines, edge preparation for welding may have to be altered suitably to achieve the slope.

27
It may become necessary to make & install temporary spool pieces for certain process requirements. Contractor's scope shall include preparation, erection, fit-up, welding, NDE etc and dismantling of such spool pieces at appropriate stage without any additional payment.

28
In pipelines like CRH lines, extraction lines, etc., the NRVs will be erected by other erection agency. Alignment of these valves to match the pipe ends (Both sides), welding, heat treatment and NDE etc., shall be carried out by the contractor within their quoted rates. Similarly, above specification will be applicable to strainers coming in various lines.

29
All temporary lines required for Chemical Cleaning, Hydraulic testing, Steam blowing, etc., shall be supplied in 'As is Where is' condition. The contractor shall arrange to carry out the required fabrication, dressing, grinding, cleaning, cutting, edge preparation etc., while carrying out erection. The contractor shall provide dummy flanges for Hydro tests of piping. No extra claim on this account will be entertained. For human protection, temporary insulation over piping to be applied at no extra cost.

30
Before laying the piping on supports, the coordinates and elevations of all supports shall be checked by the contractor for correctness. Discrepancies from the execution drawings, if any, shall be promptly brought to the notice of BHEL engineer in writing and correction shall be carried out as per his instructions.

31
Normally, hangers setting in cold condition are done by simulation adding additional temporary weight, which will be roughly equal to the weight of the insulation. Attachment of temporary weights and floating of the joints in the simulation test to be treated as part of job. Hanger settings have to be repeated for achieving free-floating joints. Hanger adjustments to be repeated for steam blowing by resetting hot and cold values if required. This may have to be repeated several times after steam blowing and synchronization. The weights will be supplied by BHEL. Contractor has to transport from BHEL stores and

return the same after completion of work. No extra claim on this account will be entertained.

32
All the instrumentation Tap-off points like thermowells, Root Valves, Impulse lines, nipples etc., shall also be erected and welded by the contractor irrespective of whether such materials are supplied by BHEL or any other agency.

33
The weld Grooves of MS Line, HRH Line, CRH Line, BFD Lines and other pipes will be as per BHEL standard specifications. Further, the edge preparation shall be done as per instruction of BHEL site Engineer and same shall be binding on the contractor.

34
All equipments / works shall be preserved and protected properly during and after erection. Instructions / directions given by BHEL in this connection will have to be observed by the contractor.

35
Tubes or pipes wherever deemed convenient, will be sent in random lengths. These shall be cut and edge prepared to suit the site conditions and the layouts. Fittings like bends tees, elbows, reducers, flanges etc will be supplied as loose items. However, bends of tube size up to NB. 65 mm will have to be formed at site as incidental to work.

36
Connection (either flanged, bolted or welded) of piping to the terminal points/equipments etc is in the scope of work even though such terminal point/equipment may not form part of this work. All NDE including radiography of joints so made, post-weld-heat-treatment if any, are also within the scope of work/specification. The terminal points work is inclusive of cutting of existing lines, if required, edge preparation, welding/blanking and hook up work.

37
It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipments. Necessary protocols have to be prepared for such fit-up along with BHEL/customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, is also within the scope of work/ specification.

38
Mechanical freeness of valves has to be ensured prior to erection.

39
The above provisions shall be applicable, mutatis - mutandis, to other piping systems e.g. Boiler front Naphtha piping, Fuel Gas piping from boiler front and up-to burner wind box including control valves, trip valves and conventional valves (as shown in the scheme of fuel gas system), HP auxiliary steam piping from boiler front row column to drive turbine of

(i) FD fan (II) GR fan and (iii) Fuel oil pump, Fuel oil piping, Lub oil piping of rotating M/c etc.

40
Bidder shall follow BHEL approved procedure for welding, pre-heating. Detailed procedure will be issued to the contractor. The main steam pipeline between strainer and turbine does not undergo steam blowing, therefore this pipeline must be thoroughly cleaned of dust, scale, burr, any foreign materials and deposits by manual and mechanical cleaning method. Contractor shall take at most care in the cleaning activity so as to ensure that no undesirable particle enters inside the turbine. Contractor shall obtain specific written clearance from BHEL before and after the cleaning activity.

Contractor shall take atmost care and work in co-ordination with BHEL's turbine erection agency to ensure that no undesirable stress/force/load gets transferred to turbine or any other rotating machine that is connected to the pipelines in scope of this contract.

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

a. Installation & removal of isolating devices/ NRVS and removal & re-fixing of internals required for hydraulic testing, pre-commissioning and commissioning activities. Required gaskets will be supplied by BHEL free of cost.

b. Matching of flanges for achieving parallelism and alignment resorting to heat correction or other suitable methods as per instructions of BHEL Engineers.

c. To locate the cause of vibrations in pumps or other auxiliaries and to carry out necessary corrections in piping and its supports. This may involve cutting, fresh edge preparation, welding, radiography, stress relieving, etc., of suction, discharge, re-circulating and other connected piping and its supports at a number of places.

d. Fabrication and erection of racks and steel supports for all the piping including critical piping. Steel for this purpose will be supplied by BHEL.

e. Erection, welding, NDE and stress relieving of certain equipments, e.g. flow nozzles, control valves etc, after completion of certain activities e.g. chemical cleaning, steam blowing etc is part of work. This may involve removal of portions from the already erected pipelines in order to introduce these equipments and resultant edge preparation etc shall be incidental to work. No separate/ additional payment is envisaged for cutting, welding and edge preparation in this regard. The removed pieces of pipes shall be returned to BHEL stores with proper cleaning, dressing and identification marking.

f. Welding of root valves including reducer (to suit Control & Instrumentation Impulse Piping requirements) with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping.

g. Opening of valve actuators, dismantling of actuators from the valves, refitting and rendering assistance connected with the electrical and mechanical problems.

h. Fixing and welding including due NDE & PWHT etc of carrier plates on to the pipes.

41
As far as possible pre-assy of piping on ground is to be done. The erection of various piping may have to be started from any random reference instead of the terminal points in order to meet certain completion commitments.

42
The location of drain headers, valves, stations, steam traps of piping as indicated in the BHEL drawings are suggestive only. The final location and routings shall be decided to suit the site conditions. While routing such lines and fixing the stations, it has to be erected so as to provide easy accessibility and free path for the purpose of easy operation and maintenance. These locations shall be acceptable to the client. Sometimes, the locations of stations and routing of lines may have to be changed as per the site conditions. All such works shall be carried out expeditiously as per the instructions of BHEL Engineer. The decision of BHEL Engineer is final and binding on the Contractor.

43
The rate quoted in rate schedule is also inclusive of pre-heating, welding, post heating, post weld heat treatment/ stress relieving and NDE of piping.

44
Erection of piping systems shall involve co-ordination with the erection of the turbine, turbo-generator, condenser, boiler, boiler feed pumps and other major equipments. Wherever required, approval of concerned BHEL Engineer/other erection agency must be obtained prior to making piping interface connections to such equipments. Sequence of work shall be carefully planned to minimize interference with other groups working in the same area. Actual sequence to be followed shall be subject to the approval of BHEL Engineer and BHEL Engineer may direct the Contractor to reschedule his work to suit the status of the site work.

45
While erecting the field run pipes, the Contractor shall check the accessibility of valves, instruments tapping points and maintain minimum head room requirement and other necessary clearance from the adjoining work areas to avoid interferences.

Steam Turbines and all Steam line drain headers will be operate from common steam header; Contractor under this Tender specification shall carried out the main steam piping works as per instruction of BHEL Site in charge.

46
All pipelines shall be given proper slope towards the drain points during erection. For maintaining the slopes as given in the drawings for larger thickness and larger dia pipelines, edge preparation for welding may have to be altered suitably to achieve the slope.

47
All pipelines shall be provided, as per the instructions of BHEL Engineer, with suitable Vent and the drain points with valve (s) on the highest and lower points of the pipe run although may not be specifically mentioned in the drawing.

48
It may become necessary to make & install temporary spool pieces for certain process requirements. Contractor's scope shall include preparation, erection, fit-up, welding, NDE etc and dismantling of such spool pieces at appropriate stage without any additional payment.

49
Normally, setting of hangers in cold condition is done by simulation adding additional temporary weight, which will be roughly equal to the weight of the insulation. Attachment of temporary weights and floating of the joints in the simulation test is to be treated as part of contractual work. Hanger settings may have to be repeated till free-floating joints are achieving. Hanger adjustments to be repeated for steam blowing by resetting hot and cold values if required. This may have to be repeated several times after steam blowing and synchronization. The weights will be supplied by BHEL. Contractor has to transport from BHEL stores and return the same after completion of work. No extra claim on this account will be entertained.

50
The scope of work in piping system (air, Gas, Water, Oil, Steam, Governing oil/Control oil, HSD & NAPHTHA, Natural Gas etc.) will include cutting to required length, edge preparation, laying, fixing and welding of the elbows/fittings/valves etc., fixing supports/hangers/shock absorbers/ guides and restraints etc. and carrying out all other activities/works to complete the erection and also carrying out all pre-commissioning/ commissioning operations mentioned in these specifications as per engineer's instructions and/or as per approved drawings.

All Pipes are supplied in Single commercial lengths, with edge preparation by EMRP.

Cutting into required spool lengths, edge preparation of spools, welding of Stubs & support attachments are to be done at Site by Agency. Mitre Bends, Reducers in Piping are to be fabricated at Site by Erection Agency using the pipe supplied by EMRP.

Weld joints and NDT requirement for all Integral piping, Central Lube Oil piping, Service Water Piping, TG Auxiliaries Cooling water piping (DMCW system, which includes some lines Hotwell make (50NB), Solution preparation NaoH dosing (25 NB), Return line form NaoH dosing system (25 NB), Emergency make from CEP discharge (50 NB) and from DMCW tank to DM cooling water piping (100NB) are of stainless steel), Main circulating water piping & ACW Piping including buried piping / underground piping and other related pipings as applicable under tender specification shall be as per drawings/schemes and suiting to site requirement. The necessary drawings/documents for these weld joints will be provided at site during execution of work.

Contractor to note that TG Auxiliaries Cooling water (called DMCW system piping) will also be extended to some of the Auxiliaries/equipments of HRSG area and other relevant equipments. Contractor shall carry out erection, testing, NDE requirements and commissioning of entire system TG Auxiliaries piping of per drawing requirement and instruction of BHEL Engineer at site.

51
Carrying out of piping as per the specifications between equipments constituting terminal points, whether the terminal equipments fall within the scope of the work/specification or not, is within the scope of the work/ specification. The contractor shall complete terminal joints at either ends, with due NDE & PWHT if applicable, for all the piping schemes covered in the scope of work.

52
Fit up and welding/bolting/fastening of piping to the terminal points (such as stubs, valves, flanges on terminal points/equipments, stubs on headers, battery limits etc) forming part of the scope of work/specification and stress relieving and radiography of joints so made are also within the scope of work. Permanent fasteners and gaskets will be supplied by BHEL.

53
Interconnection/Hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work has to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

54
All drains / vents / relief / escapes / safety valve piping to various tanks/ sewage / drain canal / flash box / condenser / sump / atmosphere etc. from the stubs on the piping and equipments erected by contractor is completely covered in the scope of this tender specification.

56

The following items of work shall be incidental and forming part of piping fabrication and erection:

(1) To locate cause of vibrations in equipments/auxiliaries/pipelines and carrying out necessary corrections in case the same is attributed to the contractor.
(2) Fabrication and erection & welding of racks, steel supports, guides, restraints for all the piping. Steel for this purpose will be supplied by BHEL free of charge in random and running lengths.
(3) Pre-assembly of spring suspension/hangers and shock absorber as per requirement.
(4) Erection of steam traps, filters, flow nozzles/ flow indicators/ flow orifices other measuring elements in the piping. These may have been supplied either by BHEL or their customer. This may involve cutting of pipe lines, fresh edge preparation and welding with stress relieving wherever applicable.
(5) Fabrication / making of bends for pipes and tubes of diameter up to 65mm.
(6) Matching of all fittings like tees, bends, flanges, reducers valves, socket fittings, etc with pipes for welding.
(7) Servicing of valves, Power Cylinders and actuators etc.
(8) Cleaning of all pipes by wire brushing / blowing by compressed air.
(9) Welding of root valves with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles/orifices/metering/ measuring elements fixed on piping.
(10) Welding of blanks with stress relieving if required on a temporary basis.

57

Pipelines will be field routed as per schemes/ suggestive layout or as per the instructions of BHEL engineer. Pipes & tubes will be supplied in random lengths and running lengths. The contractor shall have to lay the piping after carrying out the necessary fabrication, edge preparation, routing etc to suit site requirement in best professional manner.

58

As far as possible pre-assembly shall be done. The pipe laying shall be carried out from the available terminal point/points or any other area between the terminal points. The erection can be carried out on temporary supports to obtain proper alignment and welding. After fixing the permanent supports, all the temporary supports shall be removed. The alignment, distances and loading of the supports shall be checked and the required settings to be ensured as per requirement.

59

The detail of Condensate & Feed water piping, Plant air & Instrument air piping, HSD & NAPHTHA piping, Natural gas piping, DM water piping, to be erected under this contract is generally as per the indicative weight given in relevant APPEXDIX. These details are approximate and meant only to give a general idea to the bidder about the magnitude of the work involved, actual quantum and type of equipments will be based on the erection documents, which will be furnished in the course of erection.

The pipe surfaces shall be cleaned by shot blast / sand blasting before application of anti-corrosive taping. Contractor shall also carry out the Bond / Adhesion test and Holiday test on anti-corrosive applied portion of piping as part of scope of work to prove the satisfactory completion of anti-corrosive taping.

Cathodic protection as per EIL's specification is required for all underground piping; PE&SD will supply the material required, Erection Agency to provide lugs on pipe as scope of work including surface preparation & supply of all required materials and any other extra payment for such work shall not be entertained.

Complete TG Auxiliaries Cooling Water piping as per respective drawings and up-to battery limits are also included under these tender specifications.

60
The work on piping systems include laying, edge preparation, fixing & welding/ bolting of the elbows/fittings/valves of all types and sizes/ strainers (e.g. Self-cleaning strainers etc)/ Duplex filter and any other equipment shown in the drawing/documents etc coming in the pipelines, fixing & adjustment of supports/angles shock absorbers and carrying out all other activities/work to complete the erection and also carrying out all pre-commissioning/commissioning operations mentioned in the specification as per BHEL engineers instructions and / or as per approved drawings / documents.

61
Fittings like bends tees, elbows, miter bends, reducers, flanges etc, will be supplied as loose items.

62
Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh at no extra cost.

63
Minor adjustment like removal of ovality in pipes is in the scope of work.

64
All drains / vents / relief tubes / escape pipes / air relief valves/ safety valve/ piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc from the piping and equipments erected by the contractor is completely covered in the scope of work.

65
Connection (either flanged/bolted or welded) of piping to the terminal points/ equipments etc is in the scope of work even though such terminal point/ equipment may not form part of this work. All NDE including radiography of joints so made, is also within the scope of work/specification.

66
Hydraulic test of piping assembly shall be conducted after completion of certain number of weld joints as instructed by BHEL. Supply of suitable blanks/ dished ends, welding/ bolting the same, removal of blanks and fresh edge preparation/ restoration of pipeline after successful completion of hydraulic test is to be carried as part of the work. No separate payment shall be made for this work.

67
Manhole door openings have to be cut on the main piping and necessary attachments such as access pipe, flange, pad plates etc is in the scope of work. The access pipe may have to be suitably cut in length and in profile to suit the requirement. Blind/blank flanges have to be bolted later on to close the access opening. Materials, fasteners etc for these permanent installations will be provided by BHEL free of charge.

68

De-watering of pits and shuttering to avoid land-slide:

de-watering of pits excavated by the respective agency have to be done periodically to ensure safe and proper working condition. Similarly, contractor shall arrange shuttering with props of side walls to avoid land slide in the pit wherever required for work.

B) OTHER PRODUCTS AND SYSTEMS AND COMMON REQUIREMENTS

i. The all common header of piping which requires interconnection / termination of piping for respective system/machines is specifically included in the scope of Package-I contractor. Contractor shall carry out the common header of piping work on top most priority as per instruction of BHEL Construction Manager to enable the contractor to hookup/terminate the piping of the respective systems/equipments and to achieve the overall charging of system/commissioning of equipments.

ii. All welded joints should be painted with anticorrosive paint/primer immediately after completion of all work. Necessary paints and other consumables for the above work are in the scope of the contractor.

iii. Spring suspension / constant load hangers may have to be preassembled for required load and erection carried out as per instruction of BHEL. Adjustments,

removal of temporary arrests / locks, cutting of excess thread length of hanger, tie rod etc, have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents / instructions, during various stages of erection and testing and after floating of piping / ducting during cold and hot condition will have to be done. This exercise may have to be repeated till satisfactory results are achieved.

iv. Hangers and suspensions, support steels for ducts and other equipments, piping etc will be supplied in running/random lengths/ sizes, which shall be cut to suitable sizes and adjusted as required.

v. Touch up and preservative painting of all components issued to and/or erected by contractor shall form part of scope of work. The contractor shall arrange all paints, primer and consumables, T&P and facilities.

vi. Fittings like bends tees, elbows, miter bends, reducers, flanges etc., will be supplied as loose items. However, bends of tube size up to OD 65 mm will have to be formed as part of work.

vii. All drains / vents / relief/ escape / safety valve piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc. from the stubs on the piping and equipments erected by the contractor/ battery limit points as specified in drawings/ instructions of BHEL site in charge is completely covered in the scope of work. The matched flanges including at battery limit points will be provided by BHEL.

viii. Connection (flanged, bolted, welded) of piping to the terminal points/equipments etc. is in the scope of work even though such terminal point/equipment may not form part of this work. All NDE including radiography of joints so made, post-weld-heat-treatment if any is also within the scope of work/specification. Terminal points works of various piping schemes with customer lines and other contractor's lines. The terminal points work is inclusive of cutting of existing lines, edge preparation, welding/blanking and hook up work.

ix. It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipments. Necessary protocols have to be prepared for such fit-up along with BHEL /customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, are also within the scope of work / specification.

x. The non-IBR piping will be sent as plain pipes. The attachments for tapping points and / or supports will be sent as loose items. Site work will involve fabrication, drilling, fitting, pre-heating, welding, NDE & PWHT as per applicable BHEL documents. Rate quoted shall take account of all these work as no separate payment is envisaged for such work.

69 SECURITY, HOUSE KEEPING & OTHER RESPONSIBILITIES OF THE CONTRACTOR

69.1

The contractor shall have total responsibility for all equipment and materials in his custody at contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and

shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

69.2 Preservation & Protection of components

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

69.3
The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

69.4
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of contractor in compliance of this requirement, BHEL will make suitable arrangement at contractor's risk and cost.

69.5
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc., shall be returned to BHEL stores by the contractor.

69.6
The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilization of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.

4 HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS

4.1
Contractor shall carry out the following tests required to complete the erection and commissioning of the GTT and STG Sets along with related systems & equipments:

(1) Hydraulic testing of individual equipments like condenser, coolers, heaters, other auxiliaries and equipments. Required capacity Hydraulic test pump/Fill pump and other necessary arrangement shall be provided by contractor to carry out hydraulic testing, chemical cleaning of the equipments and piping as part of scope of work under this tender specification.

(2) Ultrasonic test
(3) Dye Penetrant test
(4) Magnetic Particle Test.

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

4.2
Contractor shall lay all necessary temporary piping, welding, supports, install pumps, valves, pressure gauges, electric cables and switches etc, required for the Hydro test, Air leak test, Chemical cleaning, Steam blowing etc.. After the test is over, all the temporary piping, pumps, etc will be removed. It may also specifically be noted that servicing, erection and dismantling of piping and equipments for conducting above tests will be done by the contractor. No separate payment shall be made for this purpose.

4.3
All the above tests shall be repeated till all the equipments, piping and systems satisfy the technical and statutory requirements. All related works form part of the scope.

4.4
Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration/ venting /drain points with valves as per BHEL engineer's instruction, for performing hydro test of piping is within the scope of work**.** After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL engineers' instruction.

4.5
Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

4.6
While conducting hydraulic test of steam lines, water lines, oil lines either individually or grouping a few lines or in portions. Blanks/spools may have to be put up at terminal points, strainers, walls, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored. Also

interconnecting piping between boiler and turbine, the hydraulic test may have to be done section wise and some–times piping of other agencies may have to be combined. Contractor shall carry out all such incidental work to satisfactorily conduct the hydro 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.

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.

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

5.1 WELDING

5.1.1
Installation of equipment involves good quality welding, NDE checks, post weld heat treatment etc. Contractor's personnel engaged should have adequate qualification on the above works.

5.1.2
The method of welding (viz) arc, TIG or other method will be indicated in the detailed drawing/documents. BHEL Engineer will have the option of changing the method of welding as per site requirement.

5.1.3
Welding of high pressure joints shall be done by IBR certified high pressure welders who have been permitted by CIB of state concerned for deployment at the site of work.

5.1.4
Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.

5.1.5
Before any welder is engaged on work, he shall be tested and qualified by BHEL/ customer, though they may possess the IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason. All the expenditure in testing/qualification of the Contractor's welder shall be borne by Contractor.

5.1.6
Unsatisfactory and continuous poor performance may result in discontinuation of concerned welder.

5.1.7
The welded surface shall be cleaned of slag and painted with primer paint to prevent rusting, corrosion. For this consumables like paint /primer etc will be in the Contractor's scope.

5.1.8
HP joint fit-up, should be protected, where required, by use of tapes/protective paint as may be prescribed by BHEL. The Contractor shall arrange consumables like protective paints/tapes etc.

5.1.9
The Contractor shall maintain welding records in the form as prescribed by BHEL containing all necessary details, and submit the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability of the welds shall be final.

5.1.10
In the case of P-91 pipe welding, Contractor shall deploy welders having experience in welding of P-91 material. The welders engaged by Contractor if not qualified for P-91 welding will be trained by BHEL at BHEL welding research institute (WRI) Trichy and allowed to work only after passing the

required test arranged by BHEL. All the expenditure towards such qualification including cost of training, traveling expenses, stay etc., shall be borne by the Contractor.

5.1.11
Joint fit up will be a stage of inspection. Where required, joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

5.2 SOCKET WELDING:

In execution of this work, considerable number of socket weld joints is involved. The exact quantity of such socket welds or probable variation in the quantum cannot be furnished. The tenderer shall take notice of this while quoting as no extra claim on this account will be entertained. The socket welding on HP parts/ HP piping shall be done by the IBR qualified welders. Contractor has to adhere to the procedures/specification as indicated in the drawing for socket welding.

5.2.1
Welding electrodes have to be stored in enclosures having temperature and humidity control arrangements. This enclosure shall meet BHEL specifications.

5.2.2
Welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the welding electrodes have to be carried in portable ovens.

5.3 HEAT TREATMENT:

5.3.1
For the purpose of temperature recording of stress relieving process, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations shall be as per the standards of BHEL. Thermocouples have to be attached using capacitor discharge type portable thermocouple attachment unit. Contractor shall arrange sufficient number of thermocouple attachment units.

5.3.2
Contractor should provide temperature indicator / temperature recorder for measuring temperature during pre-heating for welding or for controlling temperature of metal for hot correction etc. The temperature recorders should be preferably of solid state type.

5.3.3
Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The Contractor shall make all necessary arrangements including labourer required for the same as per directions of BHEL.

5.3.4
In certain cases only the pre-heating of weld joints may be called for.

5.3.5

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

5.3.6
Checking effectiveness of stress relieving by hardness tests (by digital hardness tester or other approved test methods as per BHEL Engineer's instruction) including necessary testing equipments is within the scope of the work / specification.

5.3.7
Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the Contractor in accordance with BHEL engineer's instructions. Where the electric resistance heating method is adopted Contractor shall make all arrangement including heating equipment with automatic recording devices, all heating elements, thermocouples and attachment units, graph sheets, thermal chalks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

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

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

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

5.3.8
All the recorded graphs for heat treatment shall be handed over to BHEL/ IBR authorities and due clearances obtained.

5.3.9
During welding & post weld heat treatment of main stream piping (P-91 material), the induction heating process shall continue un-interrupted. Therefore, contactor shall arrange back-up DG set to take care of power interruptions during the process.

5.3.10
Results of these processes shall be verified/ validated as per requirements of BHEL/client.

5.4 NON DESTRUCTIVE EXAMINATION:

5.4.1
Contractor shall provide all resources and make all arrangements for the radiographic examination of welds for this work. for reasons of safety, invariably the radiography work will be carried out after the normal working hours and close of other site activities only. in this regard, the Contractor has to adhere to the safety rules / regulations laid by barc authorities from time to time.

5.4.2
Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL Engineer. The minimum quantum of radiographic inspection shall be as per provision of IBR/BHEL's erection documents. They may, however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer/Boiler inspecting authority. Bidder shall also arrange the UT equipment with recording facility at his own cost. Usage of UT equipment shall be as per direction of BHEL engineer. Records of UT shall be produced as per site requirement.

5.4.3
All X-Ray / Gamma Ray films of weld joints shall be preserved properly and be handed over to BHEL/ IBR authorities and requisite clearances shall be obtained by the Contractor.

5.4.4
The field welded joints shall be subject to Dye-penetrant/MPT/RT/ other non-destructive examination as specified in the respective engineering documents/ as instructed by BHEL.

5.4.5
Wherever required, surface preparation, like smooth grinding of welded area, prior to Radiography shall be done. It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/ technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The Contractor shall take all this into account in his offer. The required NDT method/procedure will be decided by BHEL engineer at site.

5.4.6
Tenderer shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found by BHEL Engineers to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. the defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance / rejecting the joints will be final and binding on the Contractor.

5.4.7
100% radiograph of certain sizes in piping have to be taken as per BHEL standards/ drawings.

5.4.8
For carrying out ultrasonic testing of welding joints of large size tubes and pipes, it will be necessary to prepare surface by grinding and buffing a smooth finish and contour as necessary. The Contractor's scope of work includes such preparation as incidental to work.
5.4.9
After stress relieving 5% of UT for all critical lines and 2% of UT for other alloy steel lines to be taken to ensure soundness of joints particularly stress relieving cracks. No separate payment will be made.

5.4.10
Contractor may have to undertake radiography with cobalt-60 isotope camera in certain cases. However, for any reason if use of Cobalt-60 is not possible then these joints shall be checked by radiography after completion of welding up to suitable part of thickness with IR–192 other suitable source subsequently after completing the joint UT to be done. For this Contractor has to deploy level–II operator certified by BARC.

5.4.11
In the case of P-91 piping wherever radiography is not possible, alternatively ultrasonic test has to be carried out apart from other NDE checks.

5.4.12
For piping of thickness less than 25 mm no radiography plugs will be provided radiography shots to be taken by double wall technique or any other method to be adopted in consultation with BHEL engineer at site.

5.4.13
No separate payment for any NDE activities (including radiography) will be made.

6 ACID CLEANING/ ALKALI FLUSHING/ STEAM BLOWING/ OIL FLUSHING ETC

6.1
Contractor shall lay and erect temporary pipelines with fittings and accessories and also erect/commission the chemical cleaning/ circulating pumps after servicing as per requirements, tanks and other installations, as a system as instructed by BHEL for the purpose of chemical cleaning, steam blowing, steam washing, steam flushing, water flushing, water washing, oil flushing of piping and shall provide all other arrangements as per requirement as part of scope of work.

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

6.2
After the chemical cleaning/ flushing have been successfully completed, dismantling of all temporary installations as instructed by BHEL is within the scope of work under this specification. The dismantled materials shall be dressed and returned to BHEL as stated elsewhere in this tender spec.

6.3
Preservation of the cleaned surfaces will be the responsibility of contractor under the guidance of BHEL engineer.

6.4
Hydraulic test of temporary piping is to be carried out as per the instructions of BHEL Engineer. Carrying out repairs, if any, is in the scope of work/specification.

6.5
For chemical cleaning of the piping system, contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected is in the scope of contractor or not. Decision of BHEL Engineer in this regard will be final and binding on the contractor.

6.6
During the initial stages of work, trenches for draining water may not be available after alkali flushing or mass flushing for discharging and emptying. Necessary low point drains and temporary piping for this will have to be provided by contractor from materials provided by BHEL.

6.7
Laying effluent discharge line from mixing tank (for acid cleaning or any other chemical cleaning process) as per the instructions of BHEL engineer and dismantling, servicing for preservation and handing over the same to BHEL stores after completion of the job is within the scope of work/specification.

6.8
Radiographic examination of weld joints on temporary pipes as required by the Engineer In-charge should be carried out.

6.9
Contractor shall also carry out the repairs or attend leaks etc., in the temporary piping and equipments for the above operations / activities while carrying out the above activities / operations.

6.10
For chemical cleaning of system which consist of equipment/piping erected by the contractor and also equipment/piping erected by other contractors of BHEL/customer's contractor has to arrange for workers and supervisory staff as required supplementing/complimenting the labour and supervisory staff mobilized by other agencies for chemical cleaning of the portion of equipment erected by them in the system. Decision on the strength of gangs and supervisory staff for deployment of labour and allocation of work for them at site by BHEL engineer is final and binding on the contractor.

6.11
Contractors quoted rate shall be inclusive of fabrication, cost of consumables, erection, dismantling of temporary piping and servicing of the equipments and valves and handing over to BHEL. No separate payment on this account shall be entertained.

6.12
After acid cleaning/pickling of lubricating system (including oil piping of lube oil system, HP Oil supply system, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems, LP Bypass systems etc as per instructions of BHEL Engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machineries, cooler etc before and after oil flushing is the responsibility of the contractor.

6.13
For full welding of structures, tanks and piping etc, only welding generators shall be used. The use of welding transformers will be subject to the approval of BHEL Engineer.

6.14
Erection and commissioning of connecting piping – permanent and temporary for oil purification equipments and all operations for cleaning, oil flushing, dismantling of temporary piping during pre and post-commissioning of equipment up to full load shall be the responsibility of contractor as part of scope of work.

8 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

8.1
The contractor shall provide all (except those indicated in BHEL scope) required tools and plants, monitoring and measuring devices (MMD) and handling & transportation equipments for the scope of work covered under these specifications. Contractor has to provide suitable cranes for material handling at BHEL/client's stores/storage yard. BHEL's crane will not be available for this purpose. Please refer relevant appendix for the list of T&P being provided by BHEL free of charges on sharing basis.

8.2
All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification. Indicative list of major T&P to be arranged by contractor has been furnished in relevant appendix. Contractor shall also mobilize all other T&P necessary for timely and satisfactory completion of the work in scope.

8.3
Contractor shall provide all required suitable cranes and trailers for materials handling during collection from BHEL/ client's stores/ storage yard, transportation to site of work and at work site for all items / systems etc. BHEL/customer shall not provide any T&P other than mentioned in relevant appendix for the purpose identified.

8.4
Contractor has to provide spanners of all sizes for carrying out the complete erection / commissioning works. No spanners will be provided by BHEL to the contractor.

8.5
Contractor has to arrange slings of all sizes for completing the works covered under these specifications except the special slings for generator stator lifting/handling, which will be provided by BHEL free of charges on returnable basis.

8.6
All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification.

8.7
Timely deployment of adequate quantity of T&P is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned program and to achieve the milestones.

8.8
All jack bolts that are required during erection for carrying out roll-check etc will have to be arranged by the contractor. No jack bolts will be provided by BHEL.

8.9
Contractor shall maintain and operate his tools and plants in such a way that major breakdowns are avoided. In the event of major breakdown, contractor shall make alternative arrangements expeditiously so that the progress of work is not hampered.

8.10
In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make the alternative arrangement at the risk and cost of the contractor.

8.11
The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. Contractor shall obtain prior approval of BHEL for all the T&P before deploying in actual work. The movement of cranes and other equipment should be such that no damage / breakage occur to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility.

8.12
Normally, use of welding generators only is permitted for welding. The use of welding transformers will be subject to prior approval of BHEL.

8.13
The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of measuring & monitoring devices (MMD). Test / calibration certificates shall be furnished to BHEL. MMD shall be calibrated only at accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL. All calibration shall be traceable to national or international standards.

WELD FIT-UP AND WELD JOINT PROTECTIVE PAINT, COMPONENT PRESERVATIVE PAINTING ETC.

1) All protective paints for the protection of weld joint fit-ups, application of primers on finished weld joints are in the scope of contractor.

2) Two coats of steam washable paints shall be applied on steam side of Turbine and condenser components, as advised by BHEL. The steam washable paints, primer and thinner will be provided by contractor as part of scope of work along with other like arrangements for surface preparation and paint application like sand/shot-blasting, consumables like surface cleaning agents, paint brush, brush cleanser, labour and necessary tools and plants as required for completion of work.

3) The water boxes shall be sandblasted to remove all traces of primer applied at the works. Thereafter apply two coats of primer paint followed by two/three coats of alloyed resin machinery enamel paints as approved by BHEL. Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL approved laboratory for the primers and paints. Prior approval of BHEL for each and every batch of the primer & paints shall be mandatory. In order to achieve a desired minimum paint dry film thickness (DFT) as specified in BHEL drawing, number of coats may be applied and method of application shall be as recommended by the paint manufacturer. Required paints & primers and other consumables shall be arranged by contractor.

4) All site weld joints falling in steam side shall be painted with two coats of steam washable paint.

5) All water side surfaces of water chambers including tube plate shall be thoroughly surface prepared and painted. Required primer & paints and other consumables for condenser water box and tube plates shall be provided by Contractor.

6) After the successful completion of hydraulic testing, the interior surfaces of the water boxes, main tube plates shall be painted with suitable anticorrosive paints as per special procedures laid down by BHEL. Required necessary paints along with primers and other consumables shall be arranged by Contractor.

7) Prior to hydraulic testing of water side of condenser, interior surfaces of water boxes shall be painted.

8) After completion of tubing and tube side hydro test, all water side surfaces of water chambers including tube plate shall be painted.

9) Preservation of all components/equipments during various stages of erection, commissioning till handing over is in the contractor's scope. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor. **Contractor has to arrange all primer and paints, and other consumables like wire brush, painting brush required for this work.**

LINING AND INSULATION

LINING AND INSULATION AS PER OPaL/EIL STANDARD SPECIFICATIONS FOR INSULATION.

Application of thermal insulation, finishing & cladding etc. of piping with valves, flanges, fittings etc. of scope of supply of PC Chennai and EMRP for the following systems are included in the scope of contractor under these tender specifications:

1. Utility Boiler Piping
2. Insulation of Utility boiler IBR piping including valves and other related equipments.
3. UB, HRSG, STG and GT/GTG BOP IBR piping and tanks & vessels
4. UB, HRSG, STG and GT/GTG BOP Non-IBR piping and tanks & vessels
5. LP piping and other piping covered in the scope.
6. Other equipments including BOIs, though not listed above but required for completion
7. Application of thermal insulation with retainers, fixing components, cladding sheet etc. of UB piping, BOP IBR piping, BOP non –IBR piping etc.

15.1
The work shall conform to dimension and tolerances specified in the various drawing and documents that will be provided during the execution. if any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by engaging other agencies or departmentally and recoveries will be deducted from Contractor's bills towards expenditure incurred including 30% departmental charges.

15.2
The terminal points as decided by BHEL shall be final and binding on the Contractor.

15.3
All insulation and refractory materials including iron components and outer sheet casing materials, cladding sheets etc required will be supplied by BHEL and the same have to be erected/ applied as per the drawings and specifications of BHEL by the Contractor.

15.4
The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during all stages of work. Scaffolding materials (poles, gratings etc) shall be of light weight construction. Contractor shall arrange steel pipes & clamps with accessories like base plate attachment, fixing pins, struts etc for scaffolding required for this work. However, BHEL's decision in this regard shall be final and binding. Contractor shall arrange the scaffolding materials in sufficient quantity.

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

15.5
Contractor shall observe all precaution for laying, curing etc of pourable insulation. the Contractor at his own cost shall redo any defective works found.

15.6
Wool insulation is received at site as loose bonded mattresses in standard sizes. These are to be dressed/cut to suite the equipments. Multiple layers of wool have to be applied as directed and as per drawings and specifications for all equipments/ systems covered under the scope of work.

15.6
Cutting & dressing of insulation bricks to suit the site area of application is incidental to work.

15.7
Removable type of insulation has to be provided for valves fittings, expansion joints etc as per drawing or as directed by BHEL Engineer.

15.8
The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for alunimium sheets have to be adhered to.

15.9
Cladding/outer casing shall be fixed expeditiously, so as to avoid damage to the insulation from the weather.

15.10
The overlapping surface of outer casing/cladding sheet shall be coated with sealing compound, which will be supplied by BHEL free of cost.

15.11
To take care of bimetal corrosion due to variety of metals in contact of each other viz retainer to support, support to outer casing/cladding, cladding-to-cladding etc, suitable paints specified by BHEL, to be applied and/or neoprene rubber packing/strips or any other insert may have to be fixed as required.

15.12
The Contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL Engineer to facilitate inspection by boiler inspector or during commissioning to fix gauges, fittings, instruments etc. these gaps will have to be finished as per drawings at later date by the Contractor at his cost.

Contractor shall cut open works in needed as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over without any extra payment.

15.13
A log book shall be maintained by the Contractor for the clearance of the area for application of refractory and insulation. Where the Contractor does the work on his own accord without prior permission, the work should be re-done, at his own cost, where necessitated.

15.14
Wastage allowances for the material issued are envisaged as follows:

➢	a	Insulation bricks and motor	-	2%
➢	b	Wool mattresses	-	2%
➢	c	Cladding sheets	-	2%

The wastage allowance will be applicable on the net issued quantity i.e. total quantity issued reduced by the quantity returned to stores as unused/fresh item. Contractor shall reconcile the material issues periodically as prescribed by BHEL site
15.15
The following works are also included in the scope of this contract.

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

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

15.16
Insulation work of temporary piping for alkali boil out, steam blowing and chemical cleaning has to be carried out at site. The same have to be removed and returned to the BHEL stores after the completion of activity. Rates quoted for application of wool for boiler and auxiliaries will be applicable for this work also. No separate payment will be made for removal of temporary insulation and return of the same to BHEL stores/yard.

15.17
In certain instances, co-ordinated/phased application of castable refractory/ insulation on pressure parts etc may be necessitated in consideration of sequence of activities of other erection agencies. Contractor shall do such phased work as may be directed by BHEL.

15.18
Prior to application of refractory bituminous painting on the pressure parts and other area is under Contractor scope. The bituminous paint will be supplied by Contractor. No separate payment will be made for application of paint.

15.19
HRSG casing, inlet and outlet ducts have to be fully insulated at site with ceramic wool and SS cladding on gas flow path side.

15.20

application of wool insulation, sheet metal cladding, welding of hooks/supports to hold insulation covered under this contract, shall include, but are not limited to, the following :-

a) Where indicated, removable type of insulation to be provided for valves, expansion joints, etc. as per the drawings or as directed by BHEL engineer.

b) Wool insulations are received at site as bonded and unbounded mattresses in standard sizes. These are to be dressed / cut to suit work by the contractor.

c) Application of insulation and refractory works and sheet metal covering as given in various drawings/ specifications of BHEL, supplied to the contractor.

d) Outer sheet cladding by fabrication of aluminium sheets to the sizes and shapes specified in drawings, beading, swaging, bevelling of sheets, crowning the sheets, if necessary, fixing the same to supports, over wool insulation with screws/retainers as specified in BHEL drawings or as instructed by BHEL engineer.

e) Welding of hooks/supports on equipment including on pr. parts and piping to support wool insulation, as per the drawings or as instructed by BHEL engineers.

f) Painting the inner side of aluminium/GI/steel cladding, with anticorrosive paint as specified. The required paint and thinner is in the contractor's scope. Also, all other accessories consumables for painting, cleaning the surfaces etc shall also be arranged by the contractor.

g) The contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL engineer to facilitate inspection by boiler inspector or cut open during commissioning to fix gauges, fittings, and instruments. These gaps will have to be finished as per drawings at a later date by the contractor at no extra cost to BHEL.

h) The skin casing plate's scalloped bars and other materials that are to be matched with the erected components have to be cut and re-welded from the fabricated pieces as incidental to work.

i) wastage allowance for the materials issued shall be as under :-

- Refractory 2%
- Wool insulation 2%
- Cladding sheets 2%

j) The cladding inside the inlet duct, casings etc are of stainless steel material. Some trimming/ finishing required at site during fixing shall also be done as part of work.

15.21

Application of lining and insulation on all piping covered under this Specification is also the part of this work. Similarly, it is applicable for Lining and insulation of TG side auxiliaries such as heaters, de-aerators Etc. However, application of spray insulation on turbine is not in the scope of work.

16 PAINTING

OPaL/EIL Specification for Shop & Field Painting **SECTION C: 4.9, SPECIFICATION No. 6987-0642-PT-F09 Rev 0** with regard to surface preparation and final painting with colour codes / scheme for surface preparation and finish paints coating including primer coating for shop and field painting is attached separately along with this tender specification for ready reference. Contractor shall carry out surface preparation and final painting works as per customer specification and instruction of BHEL engineer at site.

16.1
All the primer, thinner & paints for final painting and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower, supervision is in contractor's scope.

16.2
Components of the boiler & auxiliaries will in general be supplied painted by BHEL manufacturing units as per their standard applicable painting schemes. Contractor shall carry out primer and finish painting coats and DFT requirement with colour codes & specifications as per requirement of customer.

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

16.3
Painting of welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc. has been carried out by the bidder.

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

16.4
The scope of work includes painting of colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/customer engineer at site for the equipments/ components covered in these specifications. Applicable paints and primer shall be supplied by BHEL.

16.5
All exposed metal parts of the equipment including piping, structures, hand railing, grating etc shall be thoroughly cleaned off dust, rust, scales and other foreign materials by manual or mechanized wire brushing, scrapping, sand blasting etc and the same being inspected and approved by BHEL/customer engineer before application of primer. Afterwards, the above parts shall be finish painted with specified number of coats as per specification.

16.6
In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

16.7
Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The Contractor at his own cost shall provide all the consumables and application implements.

16.8
During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, Contractor shall repair the same free of cost to BHEL.

16.9
Specified drying time shall be permitted from one to another coat.

16.10
This work requires working at higher altitudes from ground level to as high as 90 m and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of standard quality for safe and smooth execution of work.

16.11
Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by Contractor, BHEL shall have the right to recover the cost of such damages from the Contractor.

16.12
Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the Contractor without any extra charges.

16.13
In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipments inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. For the purpose of spray painting, air at one point will be made available by BHEL free. Laying of air hose pipe and any other line required shall be done by Contractor at his cost. The Contractor shall provide spray equipment set.

16.14
The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

16.15
Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

16.16 PRIMER AND PAINTS FOR FINAL PAINTING

Supply of Paints/Primer/Thinner and application of paints for final painting and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower, and supervision is in contractor's scope.

17.1
Testing, pre-commissioning, & commissioning will involve, though not limited to these, various testing e.g. hydro-static pressure, pressure decay tests, leak test, trial runs of equipments; flushing by air, water, oil, steam as applicable; checking/setting various clearances/ parameters, ensuring operation of various equipments free of undue restrictions, chemical **(EDTA)** cleaning & alkali boil out of boiler, steam blowing of the boiler and the critical piping, floating of safety valves, coal firing, trial operation and loading etc are some of these activities, flushing of the lines by air, water, oil/lube oil, gas, steam as the case may be; chemical cleaning of various systems & piping; steam blowing of the pipe lines; floating of safety valves, cranking of GT, FSNL run, Barring Gear operation, Synchronization, Trial operation, combined cycle operation and reliability run etc., are some of these activities. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

17.2
All these tests should be repeated till all the equipments satisfy the requirement / obligations of BHEL to their client and also the relevant statutory authority.

17.3
Contractor shall lay / install necessary temporary piping, pumps, valves, blanks, gauges, cables, switches etc for conduct of hydraulic / pressure test, chemical cleaning, steam / air blowing etc. this may involve cutting of some portion of existing piping / valves, placing of rubber wedges / blanks in the valves and other openings, fabrication and installation of temporary tanks for chemical mixing, temporary access platforms to mixing tanks etc. Where required, bends have to be fabricated / formed at site from random length / size of pipes / structural steel. Temporary installation itself has to be tested, tried, and subject to non-destructive examinations as per the instructions of BHEL as part of work**.**

No payment will be made for temporary installations made for hydraulic testing of various systems & piping. Similarly no payment will be made for electrical installations made for any temporary system.

17.4
All materials, equipments necessary for installation of temporary system as above will be supplied by BHEL as free returnable issue in random sizes / lengths. However, servicing, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the Contractor.

In accounting of materials following wastage allowances are provided:

1. Structural items : 5%
2. Pipes : 3%

No wastage allowance for valves & other equiptments.

17.5
Fabrication, fit-up, pre-heating, welding, post-weld heating and post-weld-heat treatment if any, of requisite blanks for conduct of hydraulic test / leakage test is part of work. Similarly, removal of blanks, restoration and normalization of the concerned system / line is to be done as part of work.

BHEL will provide the material for blanks free of charge. No separate payment is envisaged for these activities.

17.6
Overhauling, cleaning, servicing of tanks, pumps, equipments, valves, during erection and commissioning stages are in the scope of work. Gaskets, packing & spares for replacement will be provided free of charges by BHEL.

17.7
After chemical cleaning / pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems as per instructions of BHEL engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machinery before and after oil flushing is in the scope of work.

17.8
Transportation of oil drums from customer's / BHEL's stores, filling of oil for flushing, first fill of lubricants and subsequent topping up during trials, tests and commissioning is included in the scope of this contract. The Contractor shall have to return all the empty drums to the customer / BHEL stores. Similarly, for various pre-commissioning / commissioning activities / processes mentioned in various clauses, transport of chemicals from BHEL / customer's stores, charging of chemicals into the system and returning of remaining chemicals and the empty containers of the chemicals to customer / BHEL stores is the responsibility of the Contractor.

17.9
During trial runs/ tests, pre-commissioning / commissioning, replacing / changing mechanical / other seals of equipments like pumps, removal and cleaning / replacing of filters etc is within the scope of work. Replacement spares for this purpose will be provided by BHEL.

17.10
In case any defect is noticed during tests, trial runs of all equipments and their auxiliaries, such as interferences, rubbing, loose components, abnormal noise or vibration, strain on connected equipment etc the Contractor shall immediately attend to these defects and take necessary corrective measures. Readjustment and/or realignment, if necessary, shall be done as per BHEL engineer's instructions. Claim, if any, for these works shall be governed by relevant clauses of 'General Conditions of Contract provided the cause of such work is not attributable to the Contractor.

17.11

- ✓ Contractor shall cut / open / dismantle work, if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

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

17.12
During this period, though BHEL/ client's staff will also be associated in the work, the Contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc till such time the commissioned unit undergoes trial operations.

17.13
Commissioning activities will continue till the completion of trial operation. During this period Contractor shall make available the services of separate dedicated workforce comprising of suitable skilled and semi-skilled / un-skilled workmen and supervisory staff alongwith necessary tools and plants, consumables etc.

17.14
It shall be specifically noted that the Contractor may have to work round the clock during the pre-commissioning and commissioning period alongwith BHEL Engineers and hence considerable overtime payment is involved. The Contractor's quoted rates shall be inclusive of all these factors.

17.15
The Contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the Contractor.

17.16
At various stages of completion boiler has to be preserved against corrosion either by wet preservation or by dry preservation as per the requirement of BHEL Engineer. Contractor shall carry out the entire incidental jobs like filling up of water, dozing of chemicals and pressurizing the system to the required pressure, change of gas refills etc. The boilers have a permanent N_2 blanketing arrangement.

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

17.17
Commissioning activities will continue till the completion of trial run, trial operation. During this period Contractor shall make available the services of separate dedicated labor force comprising of suitable skilled and semi/un-skilled hands along with necessary tools and plants, consumables etc.

17.18
It shall be specifically noted that the Contractor may have to work round the clock during the pre-commissioning and commissioning period along with BHEL engineers and hence considerable overtime payment is involved. The Contractor's quoted rates shall be inclusive of all these factors.

17.19
Conducting of performance guarantee test is in the scope of work. Contractor shall install all necessary tapping points, instruments etc and provide necessary assistance in this regard**.**

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

17.20
The Contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the Contractor.

18.2 PRESERVATION & PROTECTION OF COMPONENTS

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

18.3
The Contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

18.4
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of Contractor in compliance of this requirement, BHEL will make suitable arrangement at Contractor's risk and cost.

18.5
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc shall be returned to BHEL stores by the Contractor.

18.6
The Contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilization of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the Contractor. Decision of BHEL on this will be final and binding on the Contractor.

18.7
For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.