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

NO: BHE/PW/PUR/KHZI-BLR/988

RECEIPT / COLLECTION / LOADING/ UNLOADING / TRANSPORATION OF MATERIALS FROM BHEL / CLIENT'S STORES/STORAGE YARDS TO SITE OF WORK, **ERECTION, TESTING, COMMISSIONING OF 1x190TPH HEAT RECOVERY STEAM GENERATOR & AUXILIARIES**,PIPING,CHIMNEY,APPLICATION OF THERMAL INSULATION, FINAL PAINTING, CO-GENERATION OPERATION AND HANDING OVER FOR 1x72 MW CPP REVAMP KRIBHCO PROJECT.

AT

KRIBHCO (KRISHAK BHARATI COOPERATIVE LIMITED) PROJECT

HAZIRA, DIST. SURAT ,STATE- GUJARAT

VOLUME – I

CONSISTING OF:

- **Notice Inviting Tender,**
- **Volume-IA : Technical Conditions of Contract-,**
- **Volume-IB : Special conditions of Contract,**
- **Volume-IC : General conditions of Contract**
- **Volume-ID : Forms & Procedures**

Bharat Heavy Electricals Limited
(A Government of India Undertaking)
Power Sector - Western Region345-Kingsway, Nagpur-440001

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NIL	Notice Inviting Tender	13	(Part of **Vol-IA-988**)
I-A	Technical Conditions of Contract	69	Vol-IA-988
I-B	Special Conditions of Contract	47	Vol-IBCD-988
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DRAWING REF 561-93601 Rev 02 ‘GA Drawing’ is uploaded as file titled ‘Drawing.

Tender Specification Issue Details

Tender Specification No: BHE/PW/PUR/KHZI-BLR/988

RECEIPT / COLLECTION / LOADING/ UNLOADING / TRANSPORATION OF MATERIALS FROM BHEL / CLIENT'S STORES/STORAGE YARDS TO SITE OF WORK, **ERECTION, TESTING, COMMISSIONING OF 1x190TPH HEAT RECOVERY STEAM GENERATOR & AUXILIARIES**,PIPING,CHIMNEY,APPLICATION OF THERMAL INSULATION, FINAL PAINTING, CO-GENERATION OPERATION AND HANDING OVER FOR 1x72 MW CPP REVAMP KRIBHCO HAZIRA PROJECT.

AT

KRIBHCO (KRISHAK BHARATI COOPERATIVE LIMITED) PROJECT

HAZIRA, DIST. SURAT, STATE- GUJARAT

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION: Refer Notice Inviting Tender

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

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date:

988

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/KHZI-BLR/988 Date: 30/03/2012

NOTICE INVITING TENDER (NIT)

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

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To

Dear Sir/Madam

Sub: NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHE/PW/PUR/KHZI-BLR/988**	
ii	**Broad Scope of job**	RECEIPT / COLLECTION / LOADING/ UNLOADING / TRANSPORATION OF MATERIALS FROM BHEL / CLIENT'S STORES/STORAGE YARDS TO SITE OF WORK, **ERECTION, TESTING, COMMISSIONING OF 1x190TPH HEAT RECOVERY STEAM GENERATOR & AUXILIARIES**, PIPING,CHIMNEY,APPLICATION OF THERMAL INSULATION, FINAL PAINTING, CO-GENERATION OPERATION AND HANDING OVER FOR 1x72 MW CPP REVAMP KRIBHCO HAZIRA PROJECT.	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of	Applicable

		Quantities, Terms of payment, etc	
b	Volume-IB	Special Conditions of Contract (SCC)	Applicable
c	Volume-IC	General Conditions of Contract (GCC)	Applicable
d	Volume-ID	Forms and Procedures	Applicable
e	Volume-II	Price Schedule (Absolute value).	Applicable
iv	**Issue of Tender Documents**	**1. Sale from BHEL PS Regional office at :Nagpur** **Start : 30/03/2012** **Closes: 19/04/2012, Time :16.00 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 : 20/04/2012 , Time :15.00Hrs** **Place : BHEL PS Regional office at :Nagpur** Tenders being submitted through representative shall be handed over to any of the following BHEL officials after making entry/registration at the reception: RK Ranade/ Sr Manager (Purchase) Pratish Gee Varghese/Engineer(Purchase)	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 5 days before the due date of offer submission Along with soft version also, addressing to undersigned & to others as per contact address given below	Applicable
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	Date : Not applicable.	Not applicable.
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	Not Applicable	Not 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 – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER)	

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

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

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

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

7.0 No Deviation with respect to tender clauses and no additional clauses/ suggestions/ in Techno-commercial bid/ Price bid shall normally 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 as per the following:

I. **Assigning Weightages (A) for Similar Jobs Under-Execution**: Weightages shall be worked out and assigned based on the average number of Similar Works under execution including works yet to be commenced by the agency, in the following manner:

i). Number of Similar Jobs
- a) No. of jobs in BHEL, PSER : Say 'J'
- b) No. of jobs in BHEL, PSSR : Say 'K'
- c) No. of jobs in BHEL, PSWR : Say 'L'
- d) No. of jobs in BHEL, PSNR : Say 'M'
- e) No. of jobs with other customers* : Say 'N' (*: Other than BHEL PSER, PSSR, PSWR & PSNR)
- f) Average No. of Jobs is 'P'= (J+K+L+M+N) divided by 5

ii) Weightage "A" assigned to bidders based on Average Number of jobs "P";
- a) If 'P' = 0-1, "A" will be equal to '3'
- b) If 'P' = 2-3, "A" will be equal to '2'
- c) If 'P' = 4-5, "A" will be equal to '1'
- d) If 'P' is Above 5, "A" will be equal to '0'

II. **Weightage "B" for Quarterly Performance Reports of Vendors**: This shall be based on the averages of the net weighted score obtained by the bidder for the jobs under execution (excluding works not commenced) for the quarter previous to the last quarter reckoned from the date of latest due date of submission, in all four Regions i.e. BHEL PSER, PSSR, PSWR & PSNR, in the following manner.

i). Ratings by Power Sector Region:
- a) PS ER's Rating 'R**e**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- b) PS WR's Rating 'R**w**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- c) PS SR's Rating 'R**s**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- d) PS NR's Rating 'Rnr' = $(X_1 + X_2 + .. + X_n)$ divided by n

e) **Over all Power Sector Region Rating** 'R_{BHEL}'= (Rer+ Rwr+ Rsr+ Rnr) divided by 4

(where "X_1, X_2, X_3,…X_n" is the net weighted score obtained by the bidder as per the "Evaluation of Contractor Performance (Quarterly)" against the various contracts 'n' under execution in the respective Region).

ii) Weightage "B" assigned to bidders based on Overall Power Sector Rating (R_{BHEL}):

a) If R_{BHEL} is 80% and above, "B" will be equal to '6'
b) If R_{BHEL} is > 70% < 80%, "B" will be equal to '5'
c) If R_{BHEL} is > 60% < 70%, "B" will be equal to '4'
d) If R_{BHEL} is = < 60%, "B" will be equal to '0'

III. Evaluation of Bidders capacity to execute the job under tender: shall be based on the sum of scores obtained in 'A' and 'B', as below:

a) 6 or above : Considered 'Qualified' for the job under tender
b) Less than 6: Considered 'NOT Qualified' for the job under tender

IV. **Explanatory note**:

a) Similar work means Boiler or Turbine or Civil or Electrical or CI, etc irrespective of rating of Plant
b) Quarter shall be as per the quarter defined in the "Evaluation of Contractor performance (Quarterly)". For contracts where annexed Quarterly Evaluation performance was not part of the contract, 'Quarterly Performance Reports' previous to the last quarter reckoned from the date of latest due date of submission, given by the respective project site against the contract will be the basis for evaluation.

c) Vendors who are not executing any jobs presently in the Region and first timers to the Region, may be considered subject to satisfying all other tender conditions

d) 'Under execution' shall mean works in progress upto Boiler Steam Blowing (for Boiler and Auxiliaries) or Synchronization (for all other jobs including Civil) shall be considered.

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 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. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of above.

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 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 (xi) of 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 pre-qualification evaluation/ techno-commercial bids, approval/ acceptance of customer (as applicable), etc. and date of opening of price bids shall be intimated to only such bidders.

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) or specified otherwise in SCC of tender.

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 In case Consortium Bidding is allowed as per Pre Qualifying Requirement, then Prime Bidder and Consortium Partner shall enter into Consortium Agreement. Validity period of Consortium Agreement shall be 6 months after which the same can be re validated.

'Stand alone' bidder cannot become a '**prime bidder' or a 'consortium bidder' in a consortium 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. .

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: Important Information
04 Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	RECEIPT / COLLECTION / LOADING/ UNLOADING / TRANSPORATION OF MATERIALS FROM BHEL / CLIENT'S STORES/STORAGE YARDS TO SITE OF WORK, **ERECTION, TESTING, COMMISSIONING OF 1x190TPH HEAT RECOVERY STEAM GENERATOR & AUXILIARIES**, PIPING, CHIMNEY, APPLICATION OF THERMAL INSULATION, FINAL PAINTING, CO-GENERATION OPERATION AND HANDING OVER FOR 1x72 MW CPP REVAMP KRIBHCO PROJECT. AT KRIBHCO HAZIRA - SURAT , GUJARAT STATE
TENDER NO	**BHE/PW/PUR/KHZI-BLR/988**

SL NO	**PRE QUALIFICATION CRITERIA**	**Bidders claim in respect of fulfilling the PQR Criteria**	
		Name and Description of qualifying criteria	Page no of supporting document
A	Submission of Integrity Pact duly signed (if applicable)	**NOT APPLICABLE**	
B	Assessment of Capacity of Bidder to execute the work as per Sl no 9 of NIT (if applicable)	**APPLICABLE**	
C	**Technical** **C) Bidder must have, achieved any one of the following in last seven years as on the latest date of offer Submission.** C.1) Executed One Boiler (Consisting of Pressure Parts, Structures/ESP and IBR/Power Cycle Piping of the same Unit as a stand alone bidder) of a Unit of rating 100 TPH or above OR C.2) Executed One job of Steam Generator of rating 100 TPH or above comprising of Pressure Parts (200 MT)/Power Cycle Piping (IBR) of 200 MT, and Structures of 400 MT with his own T&Ps and consumables. OR C.3) Executed Two jobs of Renovation and modernization or Capital Overhaul of a Boiler of Rating 200 TPH or higher, each of value 150 Lakhs or above under direct order of BHEL OR C.4) Executed One STG of 100 MW or higher under direct order of BHEL.		

D 1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (Audited) of **Rs. 150 Lakhs** or more over last three Financial Years (FY) i.e, 2008-2009, 2009-2010, 2010-11.		
2	NETWORTH Net worth of the Bidder based on the latest Audited Accounts as furnished for 'D1' above should be positive		
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 'D1 above based on latest Audited Accounts.		
E	Approval of Customer (if applicable) 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 (if applicable)	**NOT APPLICABLE**	

Explanatory Notes for 'PQR'

A) Explanatory Notes for PQR 'C'- 'Technical'

1. 'Executed' means the vendor should have achieved the criteria specified in the Common QRs even if the Contract has not been completed or closed.
2. Unless otherwise specified, for the purpose of PQR, the word 'EXECUTED' means:
    a. "Boiler light Up" in respect of Boiler & Aux and ESP
    b. "Synchronisation" in respect of STG/GTG/HTG
    c. "Steam Blowing Completing" in respect of Power Cycle Piping
    d. "Hydraulic Test" of the system in respect of Structures, Pressure Parts/IBR Piping
3. Boiler means HRSG or WHRB or any other types of Steam Generator
4. Critical/power cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass Lines.
5. For the purpose of PQR, 3.5 TPH shall be considered equivalent to one MW where ever rating of BOILER is mentioned in TPH. ~~Similarly where ever rating of Gas Turbine is mentioned in terms of frame Size, ISO rating of the same in terms of MW shall be considered for evaluation.~~

B) Explanatory Notes for PQR 'D'- 'Financial'

1. Net Worth = Paid up share capital + Reserves (Share Capital OR Partnership Capital OR Proprietor Capital as the case may be)
2. Profit shall be NET Profit (PAT + Non Cash Expenditure viz depreciation).

In case audited financial statement have not been submitted for all the three years as indicated in 'D1' above, then applicable audited statement submitted by the bidder against the requisite three year, will be averaged for

	three years.

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.

IMPORTANT INFORMATION

1. PRICE VARIATION COMPENSATION

Refer Clause 2.17 of Volume I C 'General Conditions of Contract' (Price Variation Compensation): For the purpose of calculating PVC, following 'Commodities shall be reckoned for the respective categories:

Category	Commodity to be Used for PVC Calculation
Electrode	**Welding Rod**(Individual Commodity)
High Speed Diesel	**High Speed Diesel** (Individual Commodity)
Cement	**Grey cement** (Individual Commodity)
Structural & Reinforcement Steel	**a1. Iron & semis** (Group Item)
Materials (Other than Cement & Steel)	**All Commodities**(Group Item)

2. INTEREST BEARING RECOVERABLE ADVANCE

Refer Clause 2.13 of Volume I C 'General Conditions of Contract' (Interest Bearing Recoverable Advance): Following additional points shall be noted:

- **Bank Guarantee towards 'Interest Bearing Advance' shall be atleast 110% of the advance so as to enable recovery of not only principle amount but also the interest portion, if so required.**
- **'Interest Bearing Recoverable Advance' shall not be paid in less than two installments. Contractor shall establish the utilization of advance drawn before the release of next installment.**

3. **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)**

CHECK LIST ANNEXURE - 2

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

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

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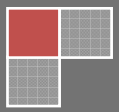
TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED



SI No	DESCRIPTION	Chapter	No. OF PAGES
Volume-IA	**Part-I: Contract specific details**		
1	Project Information	Chapter-I	2
2	Scope of Works	Chapter-II	2
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	6
4	T&Ps and MMEs to be deployed by Contractor	Chapter-IV	3
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V	1
6	Time Schedule	Chapter-VI	2
7	Terms of Payment	Chapter-VII	5
8	Taxes and other Duties	Chapter-VIII	3
10	Specific Exclusion	Chapter-IX	1
11	Annexures		
	Estimated Weights of Various Systems in Scope of Work	Annexure I	8
	List Of IBR Weld Joints	Annexure II	1
	Painting Scheme	Annexure III	1
Volume-IA	**Part-II : Technical Specifications**		
1	General	Chapter-X	6
2	Boiler, Auxiliaries and Piping	Chapter-IX	10
3	Foundation & Grouting	Chapter-XII	2
4	Welding, Radiography, NDT, Heat Treatment	Chapter-XIII	5

5	Lining & Insulation	Chapter-XIV	2
6	Painting	Chapter-XV	3
7	Testing, Pre-Commissioning, Commissioning	Chapter-XVI	3
8	Preservation & Protection of Components	Chapter-XVII	1

1.0 Project Information

1.1 INTROUCTION

KRIBHCO is operating a mega Fertilizer Complex at Hazira, District Surat, in the State of Gujarat, India. The fertilizer complex comprises of two streams of Ammonia plants of 1520 MT/day capacity each and four Urea streams of 1310 MT/day each.

KRIBHCO has undertaken a major revamp project of Ammonia & Urea plants for capacity enhancement. The project is under implementation and has been scheduled to be completed by Dec. 2011. Present requirement of Power & HP steam by the fertilizer complex is 24MW and 260 MT/hr respectively.

On completion of this revamp project, surplus HP steam will be generated in the Ammonia plants which will be exported to Urea plants. Under this scenario HP steam requirement from the SGPG plant shall reduce to 174 MT/hr from present level of 260 MT/hr. The power requirement of the complex however shall increase to 37 MW from present requirement of 24 MW. Thus the CPP (i.e. Steam and Power Generation plant), after revamp of fertilizer plant needs to produce 174 MT/hr HP steam and 37 MW power for in-house consumption. Beside this, the surplus power generated from CPP shall be exported to outside consumers through state / central grid.

BHEL has been awarded Project Management, System Design, Detailed Engineering, Manufacturing, Procurement, Civil Works, Supply, Fabrication, Inspection, Transportation, Storage, Installation, Comprehensive MCE Insurance, Testing, Mechanical Completion, Pre-commissioning, Commissioning and performance Guarantee test runs of 1xFr 6 FA GTG + 1x190 TPH HRSG based Cogen CPP .

Zero Date of contract	05/09/2011
Completion date of Contract	05/02/2013

Site information

a)	Location	KRIBHCO Hazira PO – KRIBHCO Nagar, Surat-394515, Gujarat
b)	Nearest Railway Station	Surat (20km from project site)
c)	Nearest Air port	Surat

1.2 CLIMATIC CONDITIONS

1)	**Seismic data**	
	Seismic Intensity	Acc to BIS- 1893 (1975)
	Zone	III
	Importance Factor	1.75
2)	**Ambient Air Temperature**	
	Design ambient dry bulb temperature	35° C
3)	**Relative Humidity**	65% (Average)
4)	**Barometric pressure**	1005 mbar (Average)
5)	**Rain fall**	
	Average in a month	325 mm
	Heaviest in a day	270 mm
	Maximum in one hour	100 mm
6)	**Wind data**	
	Wind code	IS-875-1964
	Base wind pressure	150 kg/m^2
	Wind load Upto 30 M	150 kg/m^2

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 ERECTION TESTING & COMMISSIONING

THE WORK TO BE CARRIED OUT UNDER THE SCOPE OF THESE SPECIFICATIONS IS BROADLY AS UNDER: -

The scope of work for Erection, Welding, Alignment, Testing, Commissioning, Chemical Cleaning/Flushing, Final Painting and Handing over of 1x190 TPH Supplementary fired HRSG with Aux., Equipments, Systems, Piping, Insulation, Final Painting of 1x72 MW GTG Based Co-gen, KRIBHCO HAZIRA Project shall broadly be as under:

1. Receipt/collection/loading/ unloading/ transportation of materials from BHEL/client's stores /storage yards, Transportation to site of work /Erection site including the heavy consignment like Boiler Drums etc.

2. Pre-assembly, Assembly and pre-assembly checks as applicable.

3. Lifting, Placement, Erection, Fit-up, Alignment etc. of Equipments with Aux., Systems, Piping etc. as the scope of these specifications.

4. Erection, Alignment, Fit-up and welding/bolting/fastening, Pre-heat treatment/Post Heat treatment etc. of Equipments with Aux., systems, Field piping & Integral Piping with supports etc. including primer painting of site weld joints with Chlorinated based Zinc Phosphate primer.

5. Assembly, Fixing, Welding of HRSGs casings (Comprising of Stainless Steel Sheet, Insulation, Outer sheet with Stainless Steel fixing components/ retainers/hooks etc.), welding etc. at site and erection.

6. Non Destructive Examination, Radiography etc.

7. Chipping, Preparation of equipments & structures foundations.

8. Secondary grouting of Equipments & Structures with related Aux., Rotating machines etc. including the associated form works like shuttering and related facilities & process for grout mixing.

9. Testing, Pre-commissioning, Commissioning, Hydraulic Testing, Chemical cleaning/ Air Blowing/ Flushing, Alkali Boil out, Steam Blowing, Safety Valve etc.

10. Assembly of Chimney shells, Fit-up, Welding with NDE/Radiography etc. of Chimney.

11. Application of refractory/lining & thermal insulation with retainers, fixing components, cladding sheet etc. of HRSGs with Aux., Equipments, Ducts, Piping, Tanks, Vessels including Chimney and other associated equipments as per scope under these specifications.

12. Erection, Laying, Welding, NDE/Radiography of temporary Piping, Valves, Tanks, Supports etc. for Air Blowing, Steam Blowing, Chemical Cleaning/ Flushing etc. and their subsequent dismantling after completion of work.

13. Handling and filling of Chemicals, Lubricants/gas/ preservatives during, erection, preservation, Chemical cleaning / flushing / blowing, pre-commissioning, Commissioning and subsequent topping up till Trial operation completion.

14. Pre-commissioning checks, Trial runs, testing and commissioning.

15. Surface preparation and Final painting of equipments, related Aux., Systems, Structures, Piping with valves, fittings, supports etc.

16. Safety Valve Floating, Trial operation.

17. Completion of facility points (as applicable)

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 labor colony (as per availability)		Yes	Contractor has to make his own arrangements for space, shelter and transportation of labors as per their requirement.
b	Labor Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	***ELECTRICITY***			

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.2.1	***Electricity for construction purposes 3 Phase*** *415/440 V* ***(To be specified whether chargeable or free)***			Free
a	Single point source	Yes		Shall be provided by BHEL/KRIBCO free of cost (three phase, 415 V/ 440 V) at one point near the site at a distance of approx. 500M
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***.			
a	Single point source	Yes		As provided by Customer
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	

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
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)***			
a	Making the water available at single point	Yes		Shall be provided by BHEL/KRIBCO free of cost.
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	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	***Water supply for Living Purpose***			Contractor has to make his own arrangement.
a	Making the water available at single point		Yes	

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
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	Contractor has to make his own arrangement.
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	Contractor has to make his own arrangement.
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	Contractor has to make his own arrangement.
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***			

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

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

Sl.No	Description **PART II** ***3.9.0 ERECTION FACILITIES***	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	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
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	
L	Arranging the materials required for preassembly		Yes	

SN	DESCRIPTION OF EQUIPMENT	CAPACITY	MINIMUM QUANTITY	REMARKS
01	CRAWLER CRANE	75 T	1	TO BE DEPLOYED FROM BEGINNING FOR START OF ERECTION TILL COMPLETION
02	CRAWLER/TYRE-MOUNTED CRANE	18 T	01	TO BE DEPLOYED FROM START OF ERECTION
03	PICK AND CARRY CRANE	10/8 T	01	TO BE DEPLOYED FROM START OF ERECTION
04	TRAILER WITH HORSE	15 TON - 20 TON	01	TO BE DEPLOYED FROM START OF ERECTION
05	AIR COMPRESSOR (ELECTRIC)	140 CFM	01	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
06	TIG WELDING SET	-	4 NOS. AND FURTHER AS PER REQUIREMENT	
07	3 ph DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWING CONSTRUCTION POWER, FITTED WITH ENERGY METER	600 Amp	As required	AS REQUIRED AND AS PER INSTRUCTION OF BHEL ENGINEER
08	PRE-HEATING/STRESS RELEIVED SET(HEATING CONTROL PANEL, CABLES,HEATING ELEMENTS ETC)	AS PER REQUIREMENT	AS PER REQUIREMENT	
09	RADIOGRAPHY ARRANGEMENT INCLUDING SOURCE	IR 192	AS PER REQUIREMENT	
10	WELDING GENERATOR (ELECTRIC & DIESEL)	300 AMPS	15 NOS AND FURTHER AS PER REQUIREMENT	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
11	RADIOGRAPHY FILM VIEWER	AS PER REQUIREMENT	1 NO	

12	ELECTRIC WINCH	2 TON / 3 TON	AS PER REQUIREMENT	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
13	ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER	AS REQUIRED	AS REQUIRED	
14	PIPE BENDING MACHINE-HAND OPERATED	UP TO 55 MM Nb PIPES	AS PER REQUIREMENT	
15	BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR BAKING COATED WELDING ELECTRODES	AS REQUIRED	01 SET EACH	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
16	PORTABLE OVEN FOR COATED WELDING ELECTRODES	AS REQUIRED	15 SET	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
17	ELECTRIC MOTOR DRIVENHYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC	400 Kg/cm2 250 Kg/cm2	1 NO. 1 NO.	
18	SCAFFOLDING MATERIALS (SCAFFOLDING PIPES WITH CLAMPS ETC.)	ADEQUATE TO SUIT THE REQUIREMENT	800 SETS AND FURTHER AS PER REQUIREMENT	
19	ALU SHEET CLAD PROFILE MAKING MACHINE	AS PER REQUIREMENT	AS REQUIRED	
20	HAND TOOLS, CUTTING TOOLS GRINDING MACHINES ETC	AS PER REQUIREMENT	AS REQUIRED	
21	NIBBLING MACHINE	AS REQUIRED	AS REQUIRED	
22	SHEARING MACHINE	AS PER REQUIREMENT	AS REQUIRED	

:

MEASURING AND MONITORING DEVICES (MMD):

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

PER FIELD QUALITY PLAN AND OTHER ERECTION, TESTING RELATED ACTIVITIES.

NOTE:

1) 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) 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.THE SAME SHALL BE RECOVERED FROM RUNNING BILL.

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

SN	DESCRIPTION AND CAPACITY OF T&P	QUANTITY	REMARKS
01	CRAWLER CRANE 250 T	01 NO.	CRANE SHALL BE PROVIDED FOR erection of Major items beyond the capacity of 75T crane.
02	CRAWLER CRANE 150 T/180 T	01 SET	This crane shall be Alternate in case of 250 MT Crane is not available .

NOTE:

1. THESE CRANES ARE OWNED OR HIRED BY BHEL. OPERATOR FOR BHEL OWNED CRANE SHALLL BE ARRANGED BY BHEL.

2. CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENTS LIKE LYING 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

3. BHEL MAY OBTAIN THESE CRANES ON HIRING BASIS INCLUDING OPERATING AND MAINTENANCE CREW.

4. OPERATORS FOR HIRED CRANE WILL BE PROVIDED BY THE HIRING AGENCY.

5. CONTRACTOR SHALL PROVIDE THE FUEL FOR BHEL PROVIDED CRANES FOR HIS USE.

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.

6.1 TIME SCHEDULE & MOBILIZATION

6.1.1 INITIAL MOBILIZATION

After receipt of fax LOI, Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall mobilize necessary resources within 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 HRSG and progressively augment the resources to match schedule of the project.

6.1.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

Erection/placement on its designated foundation / location, of the first major permanent equipment / component / column covered in the scope of these specifications shall be recognized as "**Start of contract period for erection, testing, assistance for commissioning etc** ". Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period.

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

SL No.	Milestones	UNIT - 1
	Zero Date	**5-Sep-11**
1	HRSG Erection start	May'12
2	Drum Lifting Completion)	Nov'12
3	Hydraulic Test	Dec'12
4	HRSG Gas in	Jan'13
5	Safety Valve Floating	Feb-13
6	Reliability Run(CoGen)	Feb-13
7	PG Test	Feb-13

In order to meet above schedule in general, and any other intermediate targets set, to meet customer/ project schedule requirements, Contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

The contract period for completion of entire work of HRSG under this scope shall be 12**(Twelve months)** from the "**Start of contract period for erection, testing, assistance for commissioning etc**" as specified earlier.

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

The progressive payment for Erection, Testing and Commissioning on accepted price of contract value (**Rate Schedule SECTION B**) will be released as per the break up given hereinafter:

TERMS OF PAYMENT FOR STEAM GENERATOR

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

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											
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											
1.21.3	Completion of erection and alignment of modules											
1.21.4	Completion of erection, alignment and welding of Pin Rack assembly and Drive assembly											
1.21.5	Completion of seals setting											
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											
1.21.7	Completion of PGMA											

1.21.8	Air preheater Trial Run											
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	**85**	**85**	**85**					**85**	**85**	**85**	**85**
II	**STAGE/MILESTONE PAYMENTS (15%)**											
2.1	AIR & GAS TIGHTNESS TEST		--						--			--
2.2	GAS DISTRIBUTION TEST		--	--					--			--
2.3	CHARGING OF ESP FIELDS		--	--					--			--
2.4	COMPLETION OF AIR & GAS TIGHTNESS TEST FOR FURNACE											
2.5	BOILER HYDRAULIC TEST (DRAINABLE)	2	2	2	2				2	2	2	2
2.6	BOILER HYDRAULIC TEST (NON DRAINABLE)											
2.7	Reheater Coils Hydraulic Test											
2.8	Clean Air Flow test											
2.9	HRSG Gas-In	2	2	2	2				2	2	2	2
2.10	ABO											
2.11	Steam Blowing	1	1	1	1				1	1	1	1
2.12.	SVF											

2.13	Oil Flushing (TG)											
2.14	Barring Gear (TG)											
2.15	Rolling and Synchronisation	0	0	0	0				0	0	0	0
2.16	Coal Firing											
2.17	Full Load	1	1	1	1				1	1	1	1
2.18	Trial Operation of Unit	2	2	2	2				2	2	2	2
2.19	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	0	0	0	0				0	0	0	0
2.20	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing											
2.21	Painting	1	1	1	1				1	1	1	1
2.22	Area cleaning, temporary structures cutting/removal and return of scrap	1	1	1	1				1	1	1	1
2.23	Punch List points/pending points liquidation	2	2	2	2				2	2	2	2
2.24	Submission of 'As Built Drawings'											
2.25	Material Reconciliation	1	1	1	1				1	1	1	1
2.26	Completion of Contractual Obligation	2	2	2	2				2	2	2	2
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	**15**	**15**	**15**	**15**				**15**	**15**	**15**	**15**

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

8.1 TAXES, DUTIES, LEVIES

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

Service Tax and Cess on Service Tax as applicable on Services are excluded from contractor's scope; therefore 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 10.3 %) 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,

I. **The name, address and the registration number of the contractor,**
II. **The name and address of the party receiving taxable service,**
III. **Description, classification and value of taxable service provided and,**
IV. **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) 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 **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. 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. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is

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

8.1.4 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.

8.1.5 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.

8.1.6 Submission of Periodical Reports

Contractor shall submit periodical reports in respect of following aspects of operation:

1) Consumption of welding electrodes and gases
2) Consumption of construction power
3) Manpower reports
4) Daily and Monthly Progress reports
5) Field calibration reports

BHEL at site will inform formats for these reports.

8.1.7 It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer/ BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permit for working beyond normal working hours

8.2 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.

9.0 EXCLUSIONS

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

- Civil works except to the extent specifically indicated elsewhere in this tender.
- Supply of primer and paints for final painting

- 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.

- All electrical and control & instrumentation related to items except those specified elsewhere in these specifications.
- Testing and commissioning of heating elements, thermostats, HV rectifier transformers.
- Pneumatic copper tubing and fittings thereof.
- Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.

APPENDIX -1
LIST OF APPLICABLE PGMA

STRUCTURES			
CUST No.	**PGMA**	**DESCRIPTION**	**DESIGN Wt.(MT)**
5760	35010	FOUNDATION MATER	17.4
5760	35110	MAIN COLUMNS LEF	43.8
5760	35120	MAIN COLUMNS RIG	43.8
5760	35131	INLET DUCT SUPPO	16.0
5760	35140	AUXILIARY COLUMN	4.1
5760	35220	PIPING SUPPORT -	0.3
5760	35391	MODULE TRANSPORT	45.0
5760	35392	SINGLE MODULE LI	1.5
5760	35393	MODULE UPRIGHTIN	4.0
5760	35540	AUXILIARYCOLUMN	4.0
5760	35591	BOTTOM BRACING B	16.6
5760	35592	TOP BRACING BEAM	20.0
5760	35593	BASE BEAMS OR MO	11.2
5760	35594	DUCT STIFFENER B	17.8
5760	35595	LATERAL SUPPORT	6.6
5760	35596	LATERAL SUPPORT	15.1
5760	35597	MODULE AND DRUM	14.5
5760	35610	BOILER ROOF STRU	32.0
5760	35611	BOILER ROOF SHEE	9.0
5760	36210	MAIN FLOOR 1ST L	9.0
5760	36220	MAIN FLOOR 2ND L	6.0
5760	36230	MAIN FLOOR 3RD L	5.5
5760	36240	MAIN FLOOR 4TH L	12.5
5760	36250	MAIN FLOOR 5TH L	4.5
5760	36390	MISCELLANEOUS PL	3.5
5760	36810	FLOOR GRILLS AND	14.0
5760	36820	STAIRS AND LADDE	10.0
5760	36850	HANDRAILS AND HA	12.0
SUB-TOTAL			399.7

PRESSURE PARTS			
CUST	**PGMA**	**DESCRIPTION**	**DESIGN Wt.(MT)**

No.			
5760	04116	BOILER DRUM WITH	90.0
5760	04148	DRUM SLIDE BEARI	0.1
5760	04158	FASTENERS FOR DR	0.0
5760	07206	RISER PIPES	4.0
5760	07210	RISER HEADERS &	5.0
5760	07411	DOWNCOMER SUSPEN	0.6
5760	07504	DISC SPRING FOR	0.5
5760	07505	EVAP. MODULE SUP	1.0
5760	07506	EVAP. MODULE SUP	1.9
5760	07507	EVAP. MODULE SUP	0.5
5760	07992	IMPORTED ELECTRO	0.1
5760	07993	ERECTION MATERIA	0.5
5760	08910	EXPANSION MOVEME	0.3
5760	10100	Saturated Steam	1.5
5760	10121	Final SH Inlet H	1.8
5760	10135	DESH Inlet Heade	2.5
5760	10221	Final SH Outlet	1.8
5760	10235	DESH Outlet Head	2.5
5760	12850	Saturated Steam	2.0
5760	12851	Main Steam Line	3.0
5760	12852	DESH Links	11.2
5760	12900	DESH	1.5
5760	12901	Supports for Sat	2.0
5760	12902	Supports for DES	2.0
5760	12911	Supports for SH	0.8
5760	12912	Supports for SH	1.0
5760	12992	Welding Consumab	0.1
5760	12993	Erection materia	0.5
5760	19101	WPH INLET LINE	0.8
5760	19102	WPH OUTLET LINE	0.8
5760	19702	Economiser outle	1.0
5760	19850	Economiser feed	1.7
5760	19851	Eco to Drum link	1.5
5760	19852	Eco stage-II int	2.0
5760	19853	Eco part bypass	1.0
5760	19856	Eco stage-I inte	2.0
5760	19901	Supports for eco	1.0

5760	19902	Supports for eco	1.0
5760	19908	WPH INLET AND OU	0.2
5760	19911	WPH MODULE SUPPO	0.1
5760	19912	Supports for Eco	0.8
5760	19913	Supports for Eco	1.8
5760	19914	Supports for Eco	1.8
5760	19915	Supports for Eco	1.8
5760	19916	Supports for Eco	1.6
5760	19992	Welding Consumab	0.1
5760	19993	Erection materia	0.5
5760	24400	HP DRAINS,VENTS&	27.0
5760	24401	BLR TRIM PIPING	7.5
5760	24420	HP SAFETY VALVE	4.0
5760	24425	HP SAFETY VALVE	4.0
5760	24460	BHEL VALVES	11.0
5760	24465	SUB DELIVERY VAL	7.0
5760	24473	HP DWLG	0.3
5760	24475	HP DRAIN HEADERS	0.8
5760	24480	HP SAFETY VALVES	0.4
5760	24485	HP SAFETY VALVE	2.5
5760	24490	HP START-UP-VENT	1.2
5760	24955	LAPPING TOOLS FO	0.0
5760	24960	LAPPING TOOLS FO	0.0
5760	24989	COMMISSINING SPA	0.0
5760	24992	IMPORTED ELECTRO	0.1
5760	24993	ERECTION MATERIA	0.9
5760	24994	NAME PLATES	0.2
5760	HL101	EVAPORATOR MODUL	16.5
5760	HL102	EVAPORATOR MODUL	16.5
5760	HL103	EVAPORATOR MODUL	20.2
5760	HL104	EVAPORATOR MODUL	20.2
5760	HL105	EVAPORATOR MODUL	22.8
5760	HL106	EVAPORATOR MODUL	22.8
5760	HL131	SH Stage-II Modu	10.0
5760	HL132	SH Stage-II Modu	10.0
5760	HL133	SH Stage-I Modul	20.8
5760	HL134	SH Stage-I Modul	20.8
5760	HL151	Eco Stage-II Mod	16.1

5760	HL152	Eco Stage-II Mod	16.1
5760	HL153	Eco Stage-II Mod	38.6
5760	HL154	Eco Stage-II Mod	38.6
5760	HL155	Eco Stage-II Mod	19.3
5760	HL156	Eco Stage-II Mod	19.3
5760	HL157	Eco Stage-I Modu	19.3
5760	HL158	Eco Stage-I Modu	19.3
5760	HL159	Eco Stage-I Modu	38.6
5760	HL160	Eco Stage-I Modu	38.6
5760	HL161	Eco Stage-I Modu	35.3
5760	HL162	Eco Stage-I Modu	35.3
5760	HL171	WPH MODULE ASSY.	3.2
5760	HL172	WPH MODULE ASSY.	3.2
5760	HL201	LINKS FOR EVAP.	0.9
5760	HL202	LINKS FOR EVAP.	0.9
5760	HL203	LINKS FOR EVAP.	5.8
5760	HL204	LINKS FOR EVAP.	5.8
5760	HL205	LINKS FOR EVAP.	1.5
5760	HL206	LINKS FOR EVAP.	1.5
5760	HL231	SH Stage-II modu	2.8
5760	HL232	SH Stage-II modu	2.8
5760	HL233	SH Stage-I modul	2.8
5760	HL234	SH Stage-I modul	2.8
5760	HL251	Eco Stage-II Mod	0.7
5760	HL252	Eco Stage-II Mod	0.7
5760	HL253	Eco Stage-II Mod	1.0
5760	HL254	Eco Stage-II Mod	1.0
5760	HL255	Eco Stage-II Mod	1.1
5760	HL256	Eco Stage-II Mod	1.1
5760	HL257	Eco Stage-I Modu	1.0
5760	HL258	Eco Stage-I Modu	1.0
5760	HL259	Eco Stage-I Modu	1.0
5760	HL260	Eco Stage-I Modu	1.0
5760	HL261	Eco Stage-I Modu	1.2
5760	HL262	Eco Stage-I Modu	1.2
5760	HL271	LINKS FOR WPH MO	0.2
5760	HL272	LINKS FOR WPH MO	0.2
SUB-TOTAL			788.5

INSULATION			
CUST No.	**PGMA**	**DESCRIPTION**	**DESIGN Wt.(MT)**
5760	28700	CLADDING SHEET F	6.2
5760	32010	CLADDING SHEET I	6.0
5760	32020	CLADDING SHEET B	12.0
5760	32055	EXTERNAL INSULAT	3.5
5760	32110	CLADDING SHEET -	13.0
5760	32810	CLADDING SHEET -	1.3
5760	32993	ERECTION MATERIA	0.8
5760	33021	CERAMIC WOOL	51.0
5760	33621	MINERAL WOOL FOR	15.0
5760	33970	WIRE MESH	0.8
5760	33975	SEALING COMPONEN	0.2
SUB-TOTAL			109.8

PIPING			
CUST No.	**PGMA**	**DESCRIPTION**	**DESIGN Wt.(MT)**
5760	80145	BD TANK EXHAUSTS	3.2
5760	80219	DOSING SYSTEM	4.0
5760	80273	BLOW DOWN SYSTEM	0.5
5760	80274	CBD TANK SAFETY	0.0
5760	80600	DOSING PIPING	0.4
5760	80992	IMP0RTED ELECTRO	0.0
5760	81005	IBD TANK	3.5
5760	81011	CBD TANK	2.0
5760	81411	BLOW DOWN TANK L	0.1
5760	81413	BDT CONTROL VALV	0.2
		PIPING,VALVES,FITTINGS	650.0
SUB-TOTAL			663.9

NON-PRESSURE PARTS			
CUST No.	**PGMA**	**DESCRIPTION**	**DESIGN Wt.(MT)**
5760	37810	OUTER CASING SHE	3.5
5760	41130	Duct Burner Assy	14.0

5760	41450	Pipe type Gas Ig	0.8
5760	41988	Commissioning Sp	0.0
5760	42001	Pneumatic fittin	0.1
5760	42002	Steam Blow mater	0.2
5760	42005	Instrument Fitti	0.2
5760	42076	Skid Assy - Burn	3.5
5760	42155	Operating Floor	3.0
5760	42156	Operating Floor	0.5
5760	42270	SD - FF SKIDS	1.0
5760	42988	Commissioning Sp	0.1
5760	43002	Scanner Cooling	3.0
5760	43202	SD - Scanner and	2.0
5760	48200	INSTRUMENT TAPPI	0.3
5760	48422	HRSG INLET DUCT	18.5
5760	48424	EXP. JOINT - INL	0.5
5760	48452	DUCT BOILER OUTL	5.3
5760	48454	EXP.PIECES - OUT	1.0
5760	48700	BULKED BPS COMPO	0.1
5760	48993	ERECTION MATERIA	0.9
5760	97401	GAUGES	0.1
5760	97402	ELECTRONIC WATER	0.5
5760	97411	CONTROL INSTRUME	0.6
5760	97414	TEMPERATURE SENS	0.2
5760	97416	FLOW ELEMENTS &	0.4
5760	97417	CONDENSING POT	0.1
5760	97419	BURNER MANAGEMEN	0.3
5760	97421	GAS ANALYSERS	0.3
5760	97422	STEAM AND WATER	0.4
5760	97442	FIELD INSTRUMENT	2.7
5760	97443	LT ELECTRICAL PA	6.5
5760	97444	PB AND JUNCTION	0.8
5760	97451	POWER & CONTROL	17.0
5760	97453	CABLE TRAYS	3.0
5760	97454	INSTRUMENT CABLE	7.0
5760	97455	TUBING'S AND FIT	0.2
5760	97457	ANGLES AND CHANN	3.0
5760	97470	EARTHING MATERIA	0.2
5760	HL098	COLUMN-CASING BR	2.9

5760	HL301	EVAPORATOR BAFFL	2.2
5760	HL302	EVAPORATOR BAFFL	2.2
5760	HL303	EVAPORATOR BAFFL	2.0
5760	HL304	EVAPORATOR BAFFL	2.0
5760	HL305	EVAPORATOR BAFFL	2.0
5760	HL306	EVAPORATOR BAFFL	2.0
5760	HL351	Eco-Stage-II Mod	3.0
5760	HL352	Eco-Stage-II Mod	3.0
5760	HL353	Eco-Stage-II Mod	3.0
5760	HL354	Eco-Stage-II Mod	3.0
5760	HL355	Eco-Stage-I Modu	3.0
5760	HL356	Eco-Stage-I Modu	3.0
5760	HL357	Eco-Stage-I Modu	3.0
5760	HL358	Eco-Stage-I Modu	3.0
5760	HL501	SIDE CASING S1	6.5
5760	HL503	SIDE CASING S3	6.1
5760	HL504	SIDE CASING S4	5.9
5760	HL505	SIDE CASING S5	5.9
5760	HL506	SIDE CASING S6	5.9
5760	HL507	SIDE CASING S7	5.9
5760	HL508	SIDE CASING S8	5.9
5760	HL509	SIDE CASING S9	5.9
5760	HL601	TOP & BOTTOM CAS	3.4
5760	HL603	TOP & BOTTOM CAS	3.4
5760	HL604	TOP & BOTTOM CAS	3.4
5760	HL605	TOP & BOTTOM CAS	3.4
5760	HL606	TOP & BOTTOM CAS	3.4
5760	HL607	TOP & BOTTOM CAS	3.4
5760	HL608	TOP & BOTTOM CAS	3.4
5760	HL609	TOP & BOTTOM CAS	3.4
5760	87010	CHIMNEY FDN MATERIAL	4.5
5760	87100	CHIMNEY SHELL	76.1
5760	87150	CHIMNEY STRAKES	18.1
5760	87200	PAINTER TROLLEY	1.2
5760	87300	PLATFORMS & LADDERS	9.5
5760	87930	AVIATION LAMPS	1.2
5760	87950	CHIMNEY INSULATION	6.5
5760	87960	CHIMN INS FIX COMP	2.7

SUB-TOTAL	336.1

NOTES:

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

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

3. Rate Schedule Identified for PGMAs of 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.

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

5. Besides the above, weight of all temporary piping, valves, pumps, tanks and other miscellaneous equipments etc as stated elsewhere will get added.

To be issued during execution.

To be issued during execution.

GENERAL REQUIREMENTS – COMMON TO ALL WORK OF ERECTION TESTING AND COMMISSIONING

10..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.

10..2
The terminal points decided by BHEL should be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.

10..3
The work shall be executed under the usual conditions and space constraints 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.

10.4
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.

10.5
Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL/KRIBHCO 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.

10.6
All necessary certificates and licenses, permits & clearances wherever required to carry out this work from the respective statutory authorities are to be arranged by the contractor expeditiously at his cost in time to ensure smooth progress of work.

10.7
The HRSG and piping will be erected as per relevant provisions of Indian Boiler Regulations & latest amendments/revisions thereof.

10.8
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.

10.9
The contractor shall perform any services; tests etc. which may not be specified but nevertheless required for the completion of work within quoted rates.

10.10
The contractor shall execute the work in the most substantial and workmanlike manner.

10.11
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.

10.12
All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, materials, 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 him unless otherwise specified in the relevant clauses. The contractor's quoted rates should be inclusive of all such contingencies.

10.13
During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc., may become necessary on account of feed back / revision of drawing. 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 as per relevant clauses of GCC

10.14
All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, 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.

10.15

The contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. BHEL will not provide any steel for this.

10.16
The contractor shall take delivery of the components, equipments, chemicals, 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.

10.17
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. No claim for extra payment for such work will be entertained.

10.18
Plant materials should not be used for any temporary supports / scaffolding / preparing pre-assembly bed etc.

10.19
The details of equipments to be erected under this contract is generally as per the details of quantity given in Appendix-II. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the erection documents which will be furnished in the course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

10.20
All welded joints should be painted with anticorrosive paint immediately after completion of radiography and stress relieving works. Necessary paints and other consumables for the above work are in the scope of the contractor.

10.21
Hangers & suspensions, supports and supporting structures 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.

10.22
Spring suspension/constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc., have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/ instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done. This exercise may have to be repeated till satisfactory results are achieved.

10.23
Layout of field routed/ small bore piping shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection. Such changes will be incidental to work hence no separate/ additional payment will be made.

10.24
Welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow metering & measurement devices, and control valves to be provided on HRSG and their respective auxiliaries, integral & external pipe lines covered within the scope of this specification, will also be the responsibility of the contractor and shall be done as per the instructions of BHEL site engineer. 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.

10.25
Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power Cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc. Are received in assembled condition as integral part of equipments. Contractor shall dismount, where instructed so, such instruments for calibration and storage/re-erection. Calibration will be done by C&I erection agency.

10.26
Fixing and seal welding of thermo wells & plugs before hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermo wells after hydro test/steam blowing of lines as part of work.

10.27
Actuators/drives of valves, dampers, gates, powered vanes etc. may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.

10.28
All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. BHEL will provide the motorized insulation testers

10.29
In installation of various equipments it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials.

Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipments to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements will be provided by BHEL on free - returnable basis which shall be returned to BHEL after the use.

10.30
The work shall be carried out strictly in accordance to the "Field Quality Plan" approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.

10.31
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.

10.32
Interconnection/ hookup, if any, with the existing system shall form part of work. Such interconnections, hookups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

10.33
Contractor shall regulate flow of material to and from site in such a manner and sequence that material accumulation at site does not lead to congestion at site. In case it is necessary to shift and restack the materials kept at work areas / site to enable other agencies to carry out their work or further any other reason, it shall be done by the Contractor most expeditiously. No claim for extra payment for such work will be entertained.

10.34
It may so happen that certain components like manhole doors, hanger etc may be supplied in loose items. They need to be assembled as per relevent drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.

10.35
The Contractor shall have total responsibility for all equipment and materials in his custody at Contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

10.36

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.

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.

10.37
Gases like argon, oxygen, acetylene etc that are required for erection related activities shall be arranged by the Contractor at his cost. For T-91 material site weld joints argon as per grade-3 of is 5760: 1998 with oxygen and water vapour restricted to max 6 ppm each and with argon purity level of minimum 99.99% shall be arranged and used by the Contractor. The supply should accompany test certificate for the batch indicating individual element 'ppm' level and overall purity level.

10.38
Nitrogen gas, if required, for preservation of boiler and nitrogen capping during chemical cleaning process, will be provided by BHEL free of charge. Contractor shall arrange necessary connector, nipple, regulator, header and piping for usage of such gas from cylinders.

10.39
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

DETAILS OF SCOPE OF WORK FOR ERECTION TESTING AND COMMISSIONING

11..0 **ERECTION OF HRSG, ITS AUXILIARIES & PIPING**

11..1 **HRSG**

11.1.1 **RECEIPT, UNLOADING, STACKING AND ERECTION OF MODULES**:

11.1.1.a
The heat transfer modules will be sent loose, 2-3 Nos. with intermediate wooden packing, in light crating-cum-arrestor arrangement welded to the trailer bed. The crate-arrestor has to be cut at site for unloading the modules one-by-one. For unloading the modules special unloading frames have to be used as the modules being flexible have propensity to bending. Utmost care is, therefore, essential while unloading & handling the modules and a special frame will have to be used for unloading which shall be fabricated at site .

These modules will be unloaded directly at site and only 2-3 modules, with wooden packing between them at appropriate locations, shall be kept in each stack.

For erection of these modules yet another frame, for making the module vertical, will be required. Frame will have to be fabricated at site by the contractor as per instruction of BHEL Engineer.

Required materials for fabrication of special frames for unloading as-well-as vertical frame shall be issued in random sizes by BHEL on free-returnable basis. No separate payment is envisaged for this fabrication.

In all these handling of modules polyester flat webbing sling shall be used and same shall be provided by contractor.

There are total about 45 modules. The SUPER Heater Modules (released under PGMA HL-131 & HL-132) are of Alloy Steel and other remaining modules are of Carbon Steel. The dimension of each module is about 4M (width) x10M (height) x150mm (Thick). The weight of each module is approx. 3.5 MT.

11.1.1.b
The modules, their links & components have been released under PGMA “HL-XXX” and the supports & other components have been released under PG-07, PG-12 etc. Insulation has been released in relevant PG of insulation group.

11.1.2
Any fixtures, concrete block supports, steel structures, required for supporting for pre-assembly or checking and welding for lifting and handling during pre-assembly and erection shall be arranged by the contractor as scope erection and commissioning work.

11.1.3
It shall be the responsibility of the contractor to provide temporary ladders on columns, chimney etc in a manner prescribed by BHEL using their own material till such time as permanent stairways are completed.

11.1.4
Pressure parts components like headers, modules, loose tubes etc. have to be checked for dimensional accuracy and configuration and minor rectifications, if necessary will have to be done before erection. This will involve making appropriate bed of steel structures over the concrete blocks. Steel, in random sizes, for this purpose will be provided by BHEL from the packing materials / scraps etc., where as necessary concrete blocks shall be arranged by the contractor. Bed shall be fabricated as per requirement. These shall be dismantled & returned to BHEL at appropriate stage. No separate payment for making / dismantling such bed is envisaged.

11.1.5
Normally the high pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like “t” pieces, weld neck flanges, reducers, etc., shall be suitably matched with pipes for welding (this is applicable to piping work also).

11.1.6
Tubes or pipes wherever deemed convenient, will be sent in random lengths. Tubes / pipes sent in standard/ random length shall be cut and edge prepared to suit the site conditions and the layouts. Bends of tubes up to OD 65 mm will have to be formed at site as incidental to the work. This is applicable to piping work also.

11.1.7
Welding of all attachments on casing, non-pressure parts, pressure parts/ piping including those required for insulation work is in the scope of work.

11.1.8
Furnace area and heat recovery area of flue gas passage has to be made leak proof by seal welding. Air leak test by pressurization has to be conducted to prove effectiveness of the seal weld and bubble/ soap test will have to be carried out for the entire seal welds to ascertain the effective sealing is achieved. The tests may have to be repeated till satisfactory result achieved.

11.1.9
If required, the pressure parts, after initial erection and tests, will have to be preserved by either dry or wet preservation procedure. Contractor shall render all assistance for this and erect temporary piping with valves & fittings wherever necessary. Required material will be provided by BHEL.

11.1.10
The drum internals, if already installed, may have to be removed to facilitate tube expansion, inspection by statutory authorities and chemical cleaning. The drum internals are to be preserved properly and refitted afterwards as part of work.

11.1.11
The work on piping systems (air, water, fuel, oil/lube oil, steam, gas etc.) will include cutting to required length, laying, edge preparation, 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.

11.1.12

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

11.1.13
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.

11.1.14
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.

11.1.15
It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipments. Necessary protocols have to be prepared for such fit-up alongwith BHEL /customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, are also within the scope of work / specification.

11.1.16
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.

11.1.17
For integral piping all attachments etc will be supplied as loose items and are to be welded to the main pipes at site as per instructions. Necessary drilling of holes on main pipe for welding stub shall also be done at site by the contractor.

11.1.18 HRSG Erection Sequence

Usually, the Loose Modules HRSG supplied by BHEL are erected by first completing the Structural Columns and Beams, then the casing with insulations and then the Modules are inserted from Top. The preferred sequence is

1)	The Foundation should be checked as per the Foundation Plan drawing.
2)	The HRSG Structure has to be Erected as detailed in the HRSG Structure Erection Guidelines and as per Technical Circular on Structural Steel Column Stability during Erection
2a	Assembly of columns (PGMA 35-110, 35-120) , bottom bracing beams (PGMA 35-591) and top bracing beams (PGMA 35-592) , assembly of lateral support beams (PGMA 35-595, 35-596), assembly of stiffened beams (Stiffener Beams of PGMA 35-594)).
2b	While the Columns are erected, they have to be held with Guy ropes till structural stability has been achieved. Structural Stability is achieved in Transverse direction when the Bottom Bracing Beams and Top Bracings Beams are welded with columns and in Longitudinal direction when 4 such rows of Column and Beams are erected along with Stiffener Beams and Duct Casing in between them. The columns should be grouted and the Stopper plates should be welded
2c	Duct Casing sheet, with or without insulations are to be completed atleast upto first 4 columns, i.e S1-S2, S2-S3, S3-S4 (L&R)
3)	Assembly of HRSG insulation – where the modules needs to be erected
4)	Erection of Sound Baffle in case of Multi width boiler.
5)	Erection of Temporary support Beams (PGMA 35-593)
6)	Erection of baffles like Baffle on unfinned portion at top and Bottom, Gas Deflector Baffle at the beginning of Modules, Side baffle on the extreme tubes of each Modules, T Baffle between Headers of Modules, (wherever applicable) and which needs to be done before Module Erection.
7)	Uprighting of Modules using Uprighting Frame and erection of Modules from Top of HRSG. The erected Modules has to supported on the Temporary Saddle support to be fabricated from the Module Transport Structure and resting on Beams released in PGMA 35-593. The modules has to be held horizontally with temporary support taken from the Lateral Beams (PGMA 35-595 & 35-596)
8)	Erection of Drum Support Beam and Drum may be erected now. HRSG Drum has to be lifted from outside and placed on the structure. Slide Bearing arrangement to be be erected at Saddle location before placing the drum on the support beam
9)	Erection of Top and Bottom casing, Erection of Links, Erection of Module Top support beams (PGMA 35-597), Erection of Module Tie Rods along with Expansion bellows, etc can be taken parallel

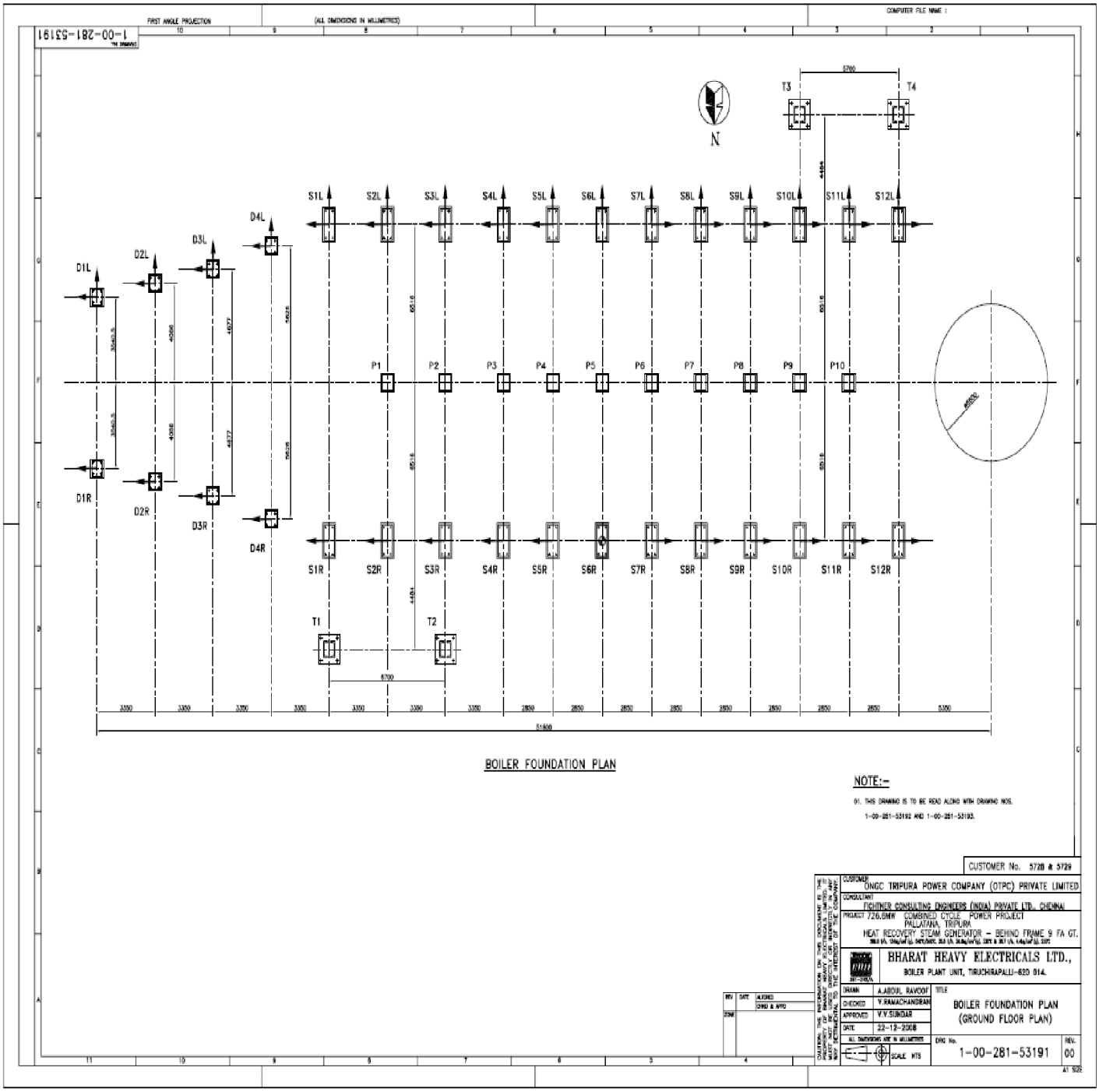
10)	Assembly of HRSG pipelines. (Expansion Bellows to be fixed simultaneously while erecting the Pipe lines or Tie Rods)

11.1.19 HRSG STRUCTURAL ERECTION GUIDELINES

1) The Structural Members of Heat Recovery Steam Generator (HRSG) are connected with the Duct and the stability of the structure is obtained when Ducts are connected integral with the Structure. The Stability of HRSG in Transverse Direction (perpendicular to Gas Flow) is achieved only after full Groove welding of Top and Bottom Bracing Beams and in the Longitudinal Direction (along the Gas Flow) by the erection of Duct casings and Stiffener Beams which act like Shear walls.
2) The HRSG Structure is designed as a Moment resisting frame with the Column base assumed as pinned connection. This means that the Foundation does not resist any moment and the column cannot stand on its own without beams and Ducts.
3) All care shall be taken to provide temporary support to the structure during erection, till structural stability is achieved. The Erection of Structure should be carried out strictly as per the "Technical Circular on General Instruction on Steel Column Stability during Erection", Document No: PWR/TSX/BLR/05/182/00/09. The Structural Stability is achieved, when the following minimum structure are erected.

- Four Adjacent Rows of HRSG Column (S-Row) are erected (Eight Columns) (PGMA 35-110 & 120).
- The Top and Bottom Bracing Beams between the left and right columns are completely welded (Groove Weld) with the above erected Column (PGMA 35-591 & 592).
- The Stiffener Beams with connection plates are erected and welded at all levels between the above erected Columns (PGMA 35-594).
- The side casing ducts are erected and welded between the above Columns (PGMA HL-5xx).
- The Stopper plates at Column base are welded to the Column Bearing Plate (PGMA 35-010).
- The column base grouted.

11.1.20 BOILER FOUNDATION PLAN



11.1.21 General Erection sequence is provided below for Site Clarity.

a)	The Erection of HRSG Structure ("S" row Columns) should be taken up first before Inlet Duct Support Structure ("D" row Columns).
b)	Column S1L is to be erected on its Foundation using Shim Plates (Packer Plates). The column should be held with four Guy Ropes of Ø 20mm at top, which are perpendicular to each other. The angle between adjacent Guy ropes should be nearing to 90 degrees. The Bottom of the Column should be arrested with the Side of Foundation using the temporary Brackets. This will prevent the movement of Column Base. The Bolts should be tightened during erection. For larger size columns, guy ropes to be provided at two levels as indicated in the drawing. The guy ropes are to be properly anchored and the angle with the horizontal shall not exceed 45°. Site should understand that the column cannot stand on its own without the Guy ropes.
c)	Similarly erect columns S1R as detailed in Pt. b and hold it with another set of Guy ropes.
d)	Erect and Weld the Top and Bottom Bracing beams between S1L and S1R Columns.
e)	Erect S2L Column and S2R Column row in the same sequence as detailed in Pt. b, c & d. (Guy ropes to be provided as indicated in Pt. b)
f)	Weld all Stiffener Beams between Columns S1L and S2L and S1R and S2R along with the connection brackets. Weld the Duct side casings between these two Columns.
h)	Repeat Pt. e and f for erecting Column Rows S3L-S3R and S4L-S4R
i)	Weld the Stopper Plates at the Column Bases and Grout the Base.
J)	The Guy ropes used to hold the above erected Columns can be removed now wherever it is causing hindrance.
K)	Erect column row S5, as per the procedure detailed in Pt. b, c, d, f & h. Note that the Guy ropes are required till step h is completed.
l)	Proceed similarly for other rows of columns by erecting one Column row at a time.
m)	Erect the Inlet Duct column row just adjacent to S1 Row. Repeat Pt. b, c, d, f & h except there will be no stiffener beam connecting D-Row columns. The Duct casings between the columns should be erected before removal of Guy Ropes. Similarly erect other row of "D" Columns also.

11..2 **SERVICE & INSTRUMENT AIR PIPES**

11..2.1
Laying of S.S./G.I. Pipes with fittings and supports of instrument air lines/process air shall include air blowing, hacksaw / cutting from running length to the size, threading, welding, installation of isolation valves, headers, root valves, moisture traps, check valves, supports and clamps etc by providing the required consumables shall be carried out by contractor.

11..2.2
Line shall be provided with proper slope as per drawing / standards and shall be supported at recommended pitching.

11.2.3
Hydraulic / pressure testing of pipelines, wherever called for, shall be conducted as part of work till satisfactory results are obtained.

11.3 Other products and systems

11.3.1
Ducts / expansion bellows are normally supplied in loose wall plates / segments and these are to be assembled and welded at site before erection. All joints connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be tested by LPI and made leak proof as per technical instruction / requirement.

11.3.2
Certain structural items like silencer supports, roof cladding structure, platform etc., will be supplied in running lengths which shall be cut to required suitable sizes and adjusted/trimmed as part of work.

11.3.3
Additional platforms of permanent nature for approaching different equipments like actuators, valves, instruments etc. As per site / BHEL client's requirements, which may not be indicated in drawings, but essential for safe access, shall be made by the contractor from structural steel / materials supplied in random lengths / sizes. The contractor will be paid for this work on accepted erection tonnage rate for structures.

11.4 CHIMNEY ERECTION

1. Steel chimney of each HRSG having 40 Meters tall, Self-supported, Straight Cylindrical, Diameter 4 Meters and of varying shell thickness has to be erected.The material of Chimney shells is Carbon Steel (IS 2062)

2. Chimney is being dispatched in 16 full round sections. The length of each shell section is 2.5 meters and thickness of these shell sections vary from 8mm to 24mm.

3. The heaviest shell section as dispatched from works weighs about 7MT and minimum weight shell section weighs about 2.5 MT.

4. The Joints between Chimney shells are Butt Weld joints with flanges for fit up.

5. Providing all platforms, ladders & tapping for sampling, aviation lamps, earthing strip and earth-pit and openings for connection of the duct, access, measurement tap offs etc. shall be within the scope of work.

6. Welding of chimney joints shall be carried out by certified welder. Wherever necessary, radiography have to be taken to meet the BHEL/Statutory requirements/KRIBHCO requirements.

7. Chimney has to be insulated up to full height with outer cladding work of Plain Aluminium sheet of thickness 0.71 mm. The insulation is lightly resin bonded mineral wool to be covered with plain aluminum cladding sheet.

8. Helical strokes as indicated in the erection drawing are to be welded onto the chimney.

9. The Base Ring (Base Plate and Stool Plate) of Chimney will be dispatched in 2 pieces and to be assembled & welded at site.

10. Painter's trolley will be supplied in parts and will have to be assembled.

11. Lighting arrestor and associated Aviation lamps, cabling, Junction boxes etc. the complete erection and commissioning is in the scope of contractor under these specifications.

11.5
Overhauling, cleaning, provisioning, servicing of pumps, governing system, equipments, valves etc. During erection and commissioning stages, are in the scope of work. Gaskets/packing for replacement will be provided by BHEL free of cost. All equipments shall be preserved and protected periodically before and after erection as per the advice of BHEL engineer at no extra cost. All ht motors should be, if necessary, serviced and reassembled before erection as per the advice of BHEL engineer.

11.6
Providing necessary engineer/supervisors/technicians/electricians as required by BHEL engineer for drying out the LT/HT motors is within the scope of the work. Job includes testing the motor

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

12.0 PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENT

12.1
Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by the BHEL/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.

12.2
All minor foundations and anchor points required for installing erection equipments like winches, anchors etc. are to be cast by the contractor.

12.3
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-1/GP-2 or equivalent).

12.3.1
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 essentially 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.

12.3.2
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.

12.4
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.

12.5
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 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.

12.6
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.

12.7
Further, the surface preparation, cleaning, curing, procedure and mixing of grout mix etc. for secondary grouting shall be carried out as per the instruction of BHEL site Engineer.

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

13.1 WELDING

13.11
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.

13.1.2
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.

13.1.3
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.

13.1.4
Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.

13.1.5
All the welders (structural and high pressure) shall be tested and approved by BHEL engineer before they are actually engaged on work though they may possess the IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason.

13.1.6
Unsatisfactory and continuous poor performance may result in discontinuation of concerned welder.

13.1.7
The welded surface shall be cleaned of slag and painted with Chlorinated based Zinc Phosphate primer paint to prevent rusting, corrosion. For this consumables like paint etc will be in the contractor's scope.

13.1.8
HP joint fit-ups should be protected, where required, by use of tapes/protective paint as may be prescribed by BHEL. The contractor shall supply consumables like protective paints/tapes etc.

13.1.9
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. Normally the electric resistance heating method will be adopted. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for labor, 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.

13.1.10
All the recorded graphs for heat treatment works shall be the property of BHEL and shall be handed over to BHEL engineer when demanded.

13.1.11
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.

13.1.12
Heat treatment may be required to be carried out at any time (day and night) to ensure the continuity of the process. The contractor shall make all arrangements including labor required for the work as per direction of BHEL.

13.1.13
Radiography work of welds connected with this contract shall be arranged by the contractor including provision of services of technician and necessary equipment and consumables like isotope camera, x-ray/gamma ray films, chemicals etc., and necessary labor required such as riggers, helpers, etc., to assist the technician for carrying out the radiography work and making other arrangements such as providing scaffolding, approaches, platform lighting arrangements, etc., at their cost and the work has to be arranged as per the instruction of BHEL. It may please be noted that invariably the radiography work will be carried out after the normal working hours and close of other site activities only.

13.1.14
Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL engineer. The 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.

13.1.15
All x-ray / gamma ray films of joints shall be preserved properly and be handed over to BHEL. These shall become the property of BHEL.

13.1.16
The field welded joints shall be subject to dye-penetrant/ other non-destructive examination as specified in the respective engineering documents/ as instructed by BHEL.

13.1.17
Where required, surface preparation, like smooth grinding of welded area, prior to radiography shall be done as specified. 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.

13.2 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 at a later date. 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.

13.2.2
Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.

13.2.3
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.

13.2.4
Welding of all IBR & Non-IBR joints for all materials (Carbon steel, Alloy Steel and Stainless Steel) including seal welding works shall be as per specification, drawing requirement and scope of work. No separate payment for welding work is envisaged and no any claim on such welding account shall be entertained.

13.3 HEAT TREATMENT:

13.3.1
For the purpose of temperature recording of stress relieving process wherever applicable, 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.

13.3.2
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.

13.3.3
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.

13.3.4
In certain cases only the pre-heating of weld joints may be called for.

13.3.5
For weld joints of heavy structural sections, if heat treatment is required, the same shall be carried out as part of the work.

13.3.6
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.

13.3.7
All the recorded graphs for heat treatment shall be handed over to BHEL/ IBR authorities and due clearances obtained.

13.3.8
Results of these processes shall be verified/ validated as per requirements of BHEL/client.

13.4 NON DESTRUCTIVE EXAMINATION:

13.4.1
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.

13.4.2
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 arreage 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.

13.4.3
All X-Ray / Gamma Ray films of weld joints shall be preserved properly and be handed over to BHEL and requisite clearances shall be obtained by the Contractor.

13.4.4
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.

13.4.5
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.

13.4.6
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.

13.4.7
100% radiograph of certain sizes in piping have to be taken as per BHEL standards/ drawings.

13.4.8
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.

13.4.9
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.

13.4.10
No separate payment for any NDE activities (including radiography) will be made.

14 LINING AND INSULATION

INSULATION

14.1
Inlet and outlet ducts have to be fully insulated with ceramic wool and SS cladding from inside i.e. on gas flow path side, at site. HRSG casing(Ducts) will be fabricated at site from Stainless Steel Sheets & Carbon sheet, Stainless Steel Hooks/Retainers and outer cladding sheet including packing/fixing of insulation in HRSG casing (Ducts).

The Stainless Steel Sheets will be used for cladding the insulation on HRSG casing (Ducts) inside surface at high temperature region upto Evaporator Section.

The Carbon Steel Sheets will be used for cladding the insulation on HRSG casing (Ducts) inside surface at low temperature region after Evaporator Section.

The GI / Aluminium Sheet work is involved to clad (outer sheeting) the external insulation of Steam Generator Drum, Piping with valves & fittings, Chimney, Tanks, Vessels, Ducts and all other associated Aux./systems/components as per drawings/documents.

14.2
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) Insulation material would be ceramic wool/ mineral wool mattress of density as per design requirement. HRSG to be insulated from inside. Steam drums and all external piping to be insulated externally with mineral wool with outer pain GI/aluminium cladding. All insulation including HRSG internal insulation shall be carried out at site. Insulation material supplied to site will be loose.

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

C) 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.

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

E) Outer sheet cladding by fabrication of aluminum / GI sheets to the sizes and shapes specified in drawings, beading, swaging, beveling 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.

F) 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.

G) Painting the inner side of aluminum/GI/steel cladding, with anti-corrosive paint as specified. The required paint and thinner is in the contractor's scope. Also all other accessories for painting, cleaning the surfaces etc. shall be arranged by the contractor.

H) 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 etc. These gaps will have to be finished as per drawings at a later date by the contractor at no extra cost to BHEL.

I) The skin casing plates 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.

J) Wastage allowance for the materials issued shall be as under :-

- Refractory 2%
- Wool Insulation 2%
- Cladding sheets 2%

15 PAINTING

15.1
All exposed metal parts of the equipment including piping, structures, raillings 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.

15.2 Touch-up painting on damaged areas -

a) For coatings damaged up to metal surface

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

Primer coat of touch-up primer to be applied by brush immediately after the surface preparation.

Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.

Tentative Painting scheme is enclosed for information at **Annexure-III**. However, for execution only the latest document shall be applicable and no claim whatsoever shall be entertained in case of any variance between such documents. Similarly, documents as provided progressively during the execution of work for all other products/ equipments etc shall be applicable.

15.3
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.

15.4
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.

15.5
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 mechanised 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.

15.6
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.

15.7
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.

15.8
During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, Contractor shall repair the same free of cost to BHEL. BHEL will make available only the primer and paints free of any charge to Contractor.

15.9
Specified drying time shall be permitted from one to another coat.

15.10
This work requires working at higher altitudes from ground level to as high as 30 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.

15.11
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.

15.12
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.

15.13
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.

15.14
The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

15.15
Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

15.16 RIMER AND PAINTS FOR FINAL PAINTING

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

The Contractor, however, shall provide account of all the items issued to him and return all primer, paints etc remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores. In case of any misuse or excess use over the normal requirement, BHEL reserves the right to recover the cost of such misuse/ excess use. Decision of BHEL Engineer in this regard will be final and binding on the Contractor.

Testing, pre-commissioning, commissioning and post commissioning:

16.1
Testing, pre-commissioning, & commissioning will involve, though not limited to these, various testing, trial runs of various equipments erected and systems installed; flushing of the lines by air, water, oil/lube oil, gas, steam as the case may be; chemical cleaning /Alkali boil out of various systems & piping; steam blowing of the pipe lines; floating of safety valves till the trial operation in combined cycle operation, Reliability run/Performance Guarantee test 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.

16.2
All the above tests should be repeated till all the equipments satisfy the requirement / obligations of BHEL to their client and also the relevant statutory authority.

16.3
Contractor shall lay / install necessary temporary piping, tanks, 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. 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.

16.4
For the installation of temporary system as above BHEL will provide the piping, structural items for supports and access platforms, tanks/ plates for fabrication of tank, valves, gauges and their fittings, thermal insulation and Circulation Pumps with Motors. These will be supplied in random sizes / lengths. However, 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. All above works shall be carried out by contractor as part of scope of work including the making of foundations/Frames for pumps with motors and their subsequent installation/erection, alignment, cabling, providing switches/starters and commissioning etc.. The temporary lines for chemical cleaning/ Flushing/ Steam Blowing shall be required to be laid to suitable & safe locations/ neutralizing pits (the location as decided as per the instruction of BHEL Engineer at site. Contractor shall collect all these materials form BHEL/Customer stores/Storage yard etc. All these works shall be the part of scope of work of contractor. No separate payment is envisaged for these works.

16.5
Fabrication, fit-up, pre-heating, welding, 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.

16.6
Cleaning, servicing of tanks, valves, pumps, equipments, governing system during various stages of erection and commissioning are in the scope of work. Gaskets, packing & spares for replacement will be provided free of charges by BHEL.

16.7
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.

16.8
During trials/ 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.

16.9
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. If any readjustment and realignment are necessary, the same shall be done as per BHEL engineer's instructions. Claim, if any, for these works from the contractor shall be governed as per relevant clauses of GCC.

16.10
Contractor shall cut / open / dismantle work, if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

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

16.11
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 unit is taken over.

16.12
Commissioning activities will continue till the completion of trial operation. During this period contractor shall make available the services of separate dedicated workforce comprising of suitable skilled and semi-skilled / un-skilled workmen and supervisory staff along with necessary tools and plants, consumables etc as part of work.

16.13
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.

16.14
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.

16.15
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, rotating machinery and other system as per scope of tender specification before and after oil flushing is in the scope of work.

16.16
Transportation of Chemicals/Lubricants/lube oils etc. from customer's/BHEL's stores/storage yard, filling for flushing/cleaning, first fill of lubricants and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly, 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 and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.

16.17
Contractor shall arrange all necessary T&Ps and lifting/handling/transportation arrangements for lifting/placement to required foundation/elevation, erection of the equipments like HRSG components, HRSG modules ,Piping & Chimney shells/Sections etc. including unloading & handling of heavier consignments/equipment as per the requirement.

17 SECURITY, HOUSE KEEPING & OTHER RESPONSIBILITIES OF THE CONTRACTOR

17.1
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.

17.2 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.

17.3
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.

17.4
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.

17.5
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc., shall be returned to BHEL/KRIBHCO stores by the contractor as per instruction of BHEL Engineer at site.

17.6
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