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

TENDER NO. BHEL/ NR /SCT/ RAMGARH CCPP/ GTG & STG/ 766

FOR

ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF 1 X 110 MW GTG & 1 X 50 MW STG WITH RELATED AUXILIARIES FOR 160 MW RAMGARH CCPP AT COMBINED CYCLE POWER PLANT OF M/S RAJASTHAN RAJYA VIDYUT UTPADAN LTD (RRVUNL) AT RAMGARH, RAJASTHAN.

PART I – TECHNICAL BID

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

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

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120-2515476 / 2515464 /
Fax 091-0120-2515464 / 2515467
Email: msd@bhelpsnr.co.in/swapan@bhelpsnr.co.in

TENDER NO. BHEL/ NR /SCT/ RAMGARH CCPP/ GTG & STG/ 766

IMPORTANT NOTE

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

THIS TENDER SPECIFICATION ISSUED TO:

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

Rev 00
6th July 2010

NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited

ISO 9001-2000, ISO 14001 and OHSAS 18001 certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301.INDIA
Phone: 0091-0120-2515476 / 2515464 / 2515479
Fax 091-0120-2515464 / 2515467
Email: swapan@bhelpsnr.co.in / msd@bhelpsnr.co.in

DOMESTIC NOTICE INVITING TENDER

LAST DATE OF SALE: 10.01.2011 DATE OF SUBMISSION: 10.01.2011

NIT NO. / DESCRIPTION OF WORK
TENDER NO. BHEL/ NR /SCT/ RAMGARH CCPP/ GTG & STG/ 766 **ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF 1 X 110 MW GTG & 1 X 50 MW STG WITH RELATED AUXILIARIES FOR 160 MW RAMGARH CCPP AT COMBINED CYCLE POWER PLANT OF M/S RAJASTHAN RAJYA VIDYUT UTPADAN LTD AT RAMGARH, RAJASTHAN.**

NOTES

1. Please visit our website at www.bhel.com for details.
2. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper

SDGM / SCT

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NOTICE INVITING TENDER (NIT)
NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES
OR
PURCHASE TENDERS FROM THIS OFFICE ALSO

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To

Dear Sir/Madam,

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	TENDER NUMBER	BHEL/ NR /SCT/ RAMGARH CCPP/ GTG & STG/ 766	
ii	Broad Scope of job	ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF 1 X 110 MW GTG & 1 X 50 MW STG WITH RELATED AUXILIARIES FOR 160 MW RAMGARH CCPP AT COMBINED CYCLE POWER PLANT OF M/S RAJASTHAN RAJYA VIDYUT UTPADAN LTD (RRVUNL) AT RAMGARH, RAJASTHAN.	
iii	DETAILS OF TENDER DOCUMENT		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	Issue of Tender Documents	1. *Sale from BHEL PS Regional office at :* *Start : 25.12.2010, Time :10.00 hours* *Closes:* **10.01.2011** *, Time : 12.30 hours* 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 :* **10.01.2011***, Time : 15.30 hours* *Place : Noida*	*Applicable*
vi	OPENING OF TENDER	*1/2 hour after the latest due date and time of Offer submission* *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*

vii	EMD AMOUNT	*Rs 2,00,000/-*	*Applicable*
viii	COST OF TENDER	*Rs 2000/-.*	*Applicable/~~Not Applicable~~*
ix	LAST DATE FOR SEEKING CLARIFICATION	*Date: 04.01.2011.* *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 : _ _ /_ _/ _ _ _ _ , Time :* *Place :*	*~~Applicable~~ /* *Not applicable.*
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)		*~~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 Noida issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Noida, Sundays and second/ last Saturdays

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

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

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

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 : BHEL/ NR /SCT/ RAMGARH CCPP/ GTG & STG/ 766 NAME OF WORK : ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF 1 X 110 MW GTG & 1 X 50 MW STG WITH RELATED AUXILIARIES	

	PROJECT: RAMGARH, RAJASTHAN. 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: Shall not be applicable for this tender
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 'Rer' = $(X_1 + X_2 + .. + X_n)$ divided by n
   b) PS WR's Rating 'Rwr' = $(X_1 + X_2 + .. + X_n)$ divided by n
   c) PS SR's Rating 'Rsr' = $(X_1 + X_2 + .. + X_n)$ 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 Auxilliaries) or Synchronisation (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

(SCT)

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List .
03 Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	**ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF 1X110 MW GTG &1X 50 MW STG WITH RELATED AUXILIARIES FOR 160 MW RAMGARH CCPP AT COMBINED CYCLE POWER PLANT OF M/S RAJASTHAN RAJYA VIDYUT UTPADAN LTD (RRVUNL) AT RAMGARH, RAJASTHAN**
TENDER NO.	**TENDER NO. BHEL/ NR /SCT/ RAMGARH CCPP/ GTG & STG/ 766**

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)**	**Not Applicable for this tender.**	
C 1.0	**Technical** **Bidder who wish to participate:** **1.1 Should have executed similar works of 50 MW STG or of higher rating during last 7 years, as on the date of opening of Technical Bid.** **'OR'** **1.2 Should be executing similar works of at least two units of 50 MW STG or of higher rating against BHEL's direct order.** **(Relevant document in support of above shall be submitted.)** **'AND'** **Bidder who wish to participate:** **2.1 Should have executed similar works of Frame 6 Gas Turbine or equivalent or of higher rating Gas Turbines during last 7 years, as on the date of opening of Technical Bid.** **'OR'** **2.2 Should be executing similar works of at least two units of Frame 6 Gas**		
2.0			

	Turbines or equivalent or of higher rating against BHEL's direct order. **(Relevant document in support of above shall be submitted.**		
D	**Financial** **TURNOVER** **Tenderers should have an average annual turnover of minimum of Rs 130 Lac (Rs one hundred thirty lacs only) based on the audited accounts of last three financial years (2007-08, 2008-09 & 2009-10). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.**		
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** Bidders selection is subject to customer's approval(RRVUNL)	
F	**Consortium criteria (if applicable)**	**Applicable** **Tie Up Arrangement:** **i)** In case, tenderers do not possess experiences either in STG or in GTG, they can be allowed to have a tie up arrangement for the work for which they do not possess the requisite experience. The tie up shall be subject to approval of BHEL. The composition of the Tie-up arrangement and role and responsibility of each constituent must be well defined. The tenderer shall be the lead partner**.** **ii)** In such a case of tie up, the number of partners including the Lead Partner shall not exceed two. The tenderer (Lead Partner) shall give an undertaking that the responsibility of execution of entire work shall lie with him and	

		also that in case of dissolution of Tie up, the Lead Partner shall be liable for arranging another tie up partner meeting the requisite qualifying requirements and completing the work as per the terms of contract without any additional cost to BHEL or without affecting project schedule. Legal documents of tie up agreement, signed by all the partners, shall be submitted as a part of technical bid. **iii)** For the purpose of qualifying requirements as given at SL NO. D above i.e. Financial Turnover, the financial position of Prime Bidder only shall be Considered. **NOTE: The tenderer qualifying in any one of the 'Executing' category' will not be allowed to have Tie up arrangement with some other party in the other 'Executing category'**	
	Explanatory Notes for QR 1.For the Technical experience, the tenderer is reqd. to fulfill the QR's at Sl No.1.0 and QR's at SL NO. 2.0 Of 'C'. 2. '**Executed'** mentioned above means that the unit should have been synchronised. 3. '**Executing'** means that work has already started at site. 4. If the Qualifying work is executed in the 7 years period as specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.		

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.

ANNEXURE - 2

CHECK LIST

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

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

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

TECHINICAL CONDITIONS OF CONTRACT

TENDER NO. BHEL/ NR /SCT/ RAMGARH CCPP/ GTG & STG/ 766

FOR

Work of Erection, Testing, Commissioning and Trial Operation & Handing over of 1 x 110 MW GTG & 1 X 50 MW STG with related Auxiliaries for 160 MW RAMGARH CCPP at Combined Cycle Power Plant of M/s Rajasthan Rajya Vidyut Utpadan Ltd (RRVUNL) at RAMGARH, Rajasthan.

PART- I OF TCC

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

PART-I OF TCC

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Chapter - 1: Project Information

1. PROJECT INFORMATION

Name of the Owner		RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM **LIMITED**
Address		RRVUNL,160 MW,Combine cycle gas based power Plant,Ramgarh,Stage III,Distt. Jaisalmer,Rajasthan.
Location	:	situated on Jaisalmer –Ramgarh Road
Installed Capacity		Stage I Gas Turbine 35.5 MW
		Stage II Gas Turbine 37.5 MW & STG 37.5MW
		.
Nearest City	:	Jaisalmer 60 Km
Maximum Temperature	:	48 Deg C
Minimum Temperature	:	3 Deg C

Chapter - 2: SCOPE OF WORKS

2.0 SCOPE OF WORK

2.1 BHEL has been entrusted the work of– Design, Engineering, Manufacturing, supply, Erection, testing & commissioning of 160 MW RAMGARH CCPP of M/s Rajasthan Rajya Vidyut Utpadan Ltd (RRVUNL) at RAMGARH, Rajasthan. The equipments consists of 110 MW Gas Turbine Generator set, 50 MW steam generator set, Heat Recovery Steam Generator (HRSG) & associated auxiliaries and Power cycle Piping valves including C&I etc.

2.2 The scope of work under this tender for Erection ,testing, commissioning of 1X110 MW Gas Turbine Generator, 1X50 MW Steam Turbine Generator sets along with related auxiliaries, broadly consists of:

1. Receipt of Materials from BHEL Store/ yards/ other designated places and transportation to erection site/ TG Floor. Their preservation, safe keeping, watch and ward.
2. Checking, dressing, chipping and leveling of foundations. Pre-assembly, erection, alignment of various equipment, machining.
3. Welding, heat treatment, radiography (including supply of radioactive sources) and other non-destructive tests wherever required
4. Erection and commissioning of Gas Turbine & Gas Turbine generator with all auxiliaries.
5. Erection and Commissioning of Steam turbine & steam turbine generator with all Auxiliaries.
6. Erection and Commissioning of all Boiler Feed Pumps ,Condenser Extraction, CPHRC Pumps
7. Erection and commissioning of Surface condenser, Gland Steam Condenser, Drain Cooler.
8. Erection and Commissioning of Deaerator with Feed Storage Tank with platform and accessories.
9. Assembly of expansion joints, which will be sent in eight parts**.** Supplier of expansion joints may provide necessary supervision at site to carry out assembly of expansion joint.
10. Painting, insulation of all equipments as per requirement along with supply of required materials, machineries and other resources as required to carry out the job.
11. Arranging statutory co-ordination for IBR related activities.

12. Erection and Commissioning of Auxiliaries of Turbine, Generator, BFPs and other systems.

13. Erection, Commissioning of Turbine lub oil, governing oil, Generator seal oil system, gas system, Jacking oil system, control fluid system, Primary Water system, dirty/ waste fluid system, Gland steam system, Water drainage system, Turbine Governing System with Valves and their servomotors,

14. Vacuum pumps with connected piping and other integral piping.

15. Erection and Commissioning of MS, Strainers, Coolers, with associated pipelines etc.

16. Preservation of TG & Aux. Components after receipt from BHEL Store.

17. Chemical cleaning (assistance) and associated testing plus related activities of different system and normalization

18. Arrangement of fixing of steam blowing and hydro-test blanks and restoration.

19. Flushing, steam blowing, related testing, pre-commissioning, commissioning activities of lub oil system, governing oil, gas systems, water lines and other systems of Turbine, Generator, Condenser, BFP and other auxiliaries. This includes preparation for flushing, hydro-test, chemical cleaning, steam blowing, other cleaning activities, actual execution of the activities, normalization etc.

20. Setting and commissioning of governing system.

21. Preparation of MIRs, following of safety and quality norms and documentation, preparation of material status and up-gradation of activities, networks at regular intervals.

22. Assistance during PG Testing of main equipment along with all auxiliaries. Completion of punch points and assistance for handing over of unit (s) to customer.

23. Unit trial operation, resolving any deficiencies observed and handing over of 160 MW CCPP at Ramgarh of RRVUNL, Rajasthan.

2.3 The contractor shall provide the following manpower services for 77 manmonths exclusively for BHEL within the quoted price:

a) Skilled computer operator – 11 manmonths

b) Skilled worker - 22 manmonths

c) UnSkilled worker - 44 man months

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

In case, contractor fails to provide above-mentioned manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man months as per above provision, fully or partly; recovery at the rate of the prevailing minimum wages at RRVUNL for the categories given plus 10% will be made from the final bill of the contractor.

2.4 Major Equipment to be Installed, Tested and Commissioned under this specification is given below:.

A. 50 MW Steam Turbine

- Steam Turbine including HP valve blocks with Emergency Stop Valve& control valve , LP injection Steam Emergency Stop Valves & control valves ,Steam Strainer Built into Emergency Stop Valve, Blanket plate for steam blowing, Coupling bolts and Coupling Guard; and Coupling and Coupling Guard between Gearbox & Generator, Solenoid Valve for Remote Tripping, Turbine Sole Plates, Foundation Bolts; Shaft Grounding Device; Mating Flanges for Turbine Inlet and Injection steam Flanges, Gland Sealing System (Automatic), Exhaust-hood spray system, Relief diaphragm on Exhaust-hood, vacuum breaker valve, bolt heating equipment(gas)
- Manual Barring Device and Turning Device -Hydraulic
- Interconnecting piping between HP valve block & Turbine, Gland Steam Leak-off Line to Gland steam condenser.
- Steam Piping for STG integral portion, Turbine Drain Water Piping within TG Block; Complete Lube Oil Piping (Stainless Steel Material after filter outlet); Complete Jacking Oil Piping , Relief Valves ; Complete Control Oil Piping (Stainless Steel Material); Overhead Lube Oil Tank Piping (Stainless Steel), condensate piping
- Turbine Enclosure (To meet noise level requirements)
- Turbine Insulation (mineral Wool Mattresses with CAT-9 cement layer)

B. 50 MW Turbine auxiliaries

- Main Oil Tank (Carbon Steel) Including
- Overhead Lube Oil Tank

- Main Oil Pump with AC Motor
- Auxiliary Oil Pump with AC Motor
- Emergency Oil Pump with DC Motor
- Jacking Oil Pump with AC Motor & DC motor
- Duplex Filter for Lube Oil
- Transflow valves for duplex oil filters
- Oil cooler 2 No.
- Oil Mist Fan with AC Motor (2x100%)
- Oil Accumulators
- Oil centrifuge (2400 LPH)
- Governing Console
- SURFACE CONDENSER consisting of appx. 13100 Tubes (47 MT) of size dia. 22 x1x 6500 mm
- STEAM JET AIR EJECTOR consisting of Running ejectors 2 X 1 00%; Starting ejector 1 X 100% ; nter /after condensers 2 X 100%
- GLAND STEAM CONDENSER.
- DEAERATOR
- ST oil cooler 2X100%.
- STG AIR COOLER
- Condensate Extraction Pumps 2 x 100% (Vertical) along with drive motors and accessories.
- Boiler Feed Pumps 2 x 100% along with drive motors and accessories.
- Boiler feed booster Pump 2 x 100% along with drive motors and accessories
- LP Boiler Feed Pump 2 x 100% along with drive motors and accessories
- CPHRC pumps 3X50 % along with drive motors and accessories
- Vaccum Pump 2X100%

C. 50 MW GENERATOR AND AUXILIARIES

- CLOSED circuit air cooled Generator
- Brush-less exciter and PMG
- CO2 fire extinguisher equipment for generator.
- GENERATOR AIR COOLERS.
- **Due to inadequate capacity of EOT crane AVAILABLE IN TG HALL & space constrains, Generator stator (weighing 89MT) has to be lifted BY STRAND & JACKS / LIFT & SHIFT ARRANGEMENT METHOD. SCOPE UNDER THIS TENDER INCLUDES ARRANGING THE STRAND & JACKS**

/LIFT & SHIFT ARRANGEMENTS, MAKING RESTING FOUNDATIONS /FOOTINGS TO SUIT THE INSTALLATION OF HIS STRAND & JACKS ARRANGEMENTS (AS REQUIRED) & THEIR ASSEMBLY /INSTALLATION WITH EXPERT SUPERVISION TILL LIFTING & PLACEMENT OF PACKAGE TO REQUIRED FOUNDATION / ELEVATION.

All the arrangement required for making foundation and grouting of bolts, including supply of cement, sand, gravel and any other required material, shuttering, etc., shall be arranged by the contractor at his cost. The material shall be got approved by the contractor from BHEL Engineer. Approval for procedure for Lifting the stator shall be taken from BHEL.

Fabrication & installation of the temporary structure for Strand jack arrangement is in the scope of contractor. This temporary structure is to be removed after the completion of jobs.

Contractor shall deploy these Strand and Jacks arrangements & other resources well in advance to suit the site requirement so as to lift & place these equipments on required foundations in minimum possible time. Some of the renowned agencies such as (1) M/s. Fagioli PSE India Pvt. Ltd.(203,Krishna Bhavan, Govandi Station Road, Deonar, Mumbai-400088,Tel.No. 022-25564388, Fax No. 022-25562565), (2) M/s. Freight Wings (P) Ltd.(309, Rex Chambers, Walchand Hirachand Marg. Ballard Estate, Mumbai-400001,Tel. No.022-22631714/22619988), who are in this field in the country, can be contacted.

D. 110 MW Gas Turbine & AUXILIARIES (01 NOS.)

- Gas Turbine Skids
- Gas Turbine Generator skid

Gas Turbine Generator has already been unloaded and kept around 100meters away from foundation. The work involves shifting of Gas Turbine Generator , making arrangements like approach (rail sleepers etc.) to the foundation, filling the cavity by sleepers etc. **are to be carried out by the contractor within the finally awarded rates.**

- Accessory system skid
- Load couplings
- GT walkways
- Main Filter House

- GT vent ducting
- Air Processing skid
- Compressor water wash skid
- lube oil centrifuge
- Field interconnecting piping
- Inlet Ducting consisting of Silencers
- Expansion Joints & Support Structures
- Exhaust System consisting of Ducts
- Expansion Joints
- Diverter DamperGuillotine Damper
- Stack Transit Pieces
- Silencer in Stack
- Cylinder Stack (4 no)
- Stack support Structures
- Seal Air Fans
- Water injection Skids
- GT & Off Base Enclosures

Foundation Bolting & Embedded parts

The contractor has to inspect of civil foundation, coordinates, elevations, distances including diagonals, verticality, foundation bolt pockets of all the foundation bolts of all main equipment foundations like Accessory, Gas Turbine & Generator. Blue Matching of all the sub-sole plates, solid shim plates & L plates to at least 85% contact are to be done and then, by actual blue matching with the concerned mating part & ensure uniform thickness at all 4 corners. All the shims are to be matched such that there are no burrs, dents & bends. Lapping is required to be done for anchoring pins with the concerned matching parts with tolerances as shown in relevant drawings. All the foundation plates/sub-sole plates of main equipments required to be master levelled within 0.02 mm/meter in all directions & centred to foundation bolts. All the sub-sole plates elevations need to be maintained within 0.20mm. Pockets should be free from any leftover debris during foundation casting & to be chipped–off all around the pockets for at least by 25 mm prior to assembly of concerned sub-sole plates before sub-sole plate grouting.

Gas Turbine Skid

For placement of main equipment like Gas Turbine skid, all the tools & tackles need to be arranged at site by concerned erection agency. Handling and placement of the equipments should to be done carefully at appropriate locations as shown in the applicable documents. All the inputs required for providing jack support plates below the lifting trunions of the base need to be arranged at site by the erection agency in consultation with the concerned erection engineer.

It has to be ensured that all temporary fixtures like rotor locking, transport pin etc fitted to the gas turbine as part of transport requirements are to be removed prior to carrying out checks on the equipment. Drop check & spring back checks are some of the important checks that need to be carried out at site. Shim adjustments, contact area check under the base plates may require several iterations to arrive at an optimum level. All items which were dismantled at works for the purpose of ease of transportation need to be reassembled at site as per applicable documents/lists.

Inter skid alignment followed by spring back check, alignment of on base rotating equipment in line with applicable documents need to be carried out. Assembly of couplings shall be involving bolt stretching in line with applicable documents. Bolt stretching equipment will be provided, while it's operation and maintenance is the responsibility of the erection agency. Temporary coupling bolts (at least 20% of original nos) required for reaming (LGB Generator coupling) purpose needs to be arranged by the erection agency. Alignment fixtures required for a coupling length of more than 450 mm and below 2750 mm will be provided. All the coupling guards and its hardware will be supplied from works, this may require mockup assembly & responsibility of ensuring final fit up in line with applicable document lies with erection agency.

Gas Turbine has already been unloaded and kept at 45 degrees and around 125 meters away from the centerline of GT foundation. All other works related to its erection including dragging, placement on foundation etc, as indicated in the tender are to be carried out by the contractor within the finally awarded rates.

Inlet ducting

Inlet ducting is supplied directly from BHELs vendor works and needs to be assembled at site after ensuring proper assembly of inlet plenum. It involves assembly of inlet ducting from inlet plenum interface to the inlet air filter outlet and their associated support structure, ladders, platforms etc. The overall arrangement should comply with the general arrangement of the unit including coordinates, elevations etc. All the suitable gaskets need to be prepared at site.

Air Inlet filters

Air filters are supplied directly from BHELs vendor works and needs to be assembled at site in line with vendor documentation. It has to be ensured that air filter housing and down stream inlet ducting mating parts is perfectly joined. However if external sealing is required the same may be done to prevent air ingress from the atmosphere into the clean air side of the air filters.

Enclosures

It is required to be assembled at site in line with drawings / documents. The scope of enclosures covers mainly, but not limited to

(a) Foundation bolting arrgt, frames & support structures, panels arrgt, doors, dampers & partition from compartment to compartment

(b) Lighting of compartments, provision of the extra power points etc, hooters Including conduiting

(c) CO_2 fire fighting piping with GI piping capable of handling 55 kgs/cm^2 pressure including CO_2 nozzles, CO_2 damper actuators, impulse tubing for all Vent fan dampers etc. Mounting of DP switch & tubing.

(d) Walk ways, platforms & handrails to suit the site requirements. Rail & hoist assembly needs to be erected, where ever applicable, in line with applicable documents.

The erection of enclosures is to be done to ensure proper interfacing with adjacent equipments, like casings, heat exchangers, combustion chambers, valves, piping etc, to allow adequate space for O&M and at the same time ensure perfect sealing of the respective compartments.

Vent fans & Ductings

It is required to be assembled at site in line with drawings / documents. It involves assembly of all loose parts like fan casings, impeller, motor, outlet damper with CO_2 latch, transition piece, Gravity louvers, rain protection hood for motor, silencer, differential pressure switch / limit switch, fasteners with gaskets & matching of associated vent ducting with their associated fans in line with applicable vendor documentation. Required supporting of the fan ducting is needed to be fabricated at site as per site requirement. The CO_2 piping is to be connected to fan CO_2 damper latch.

Water Washing skid

This equipment is also supplied directly from vendor works, needs to be erected at site in line with vendor documentation. The skid involves centering, leveling & grouting in line with applicable vendor documentation.

Mist Eliminator skid

It is required to be assembled at site in line with drawings / documents. All the loose parts like filters, drain pot, instrumentation, Vent pipes, NRVs etc may need to be assembled at site after centering, leveling & grouting in line with

applicable vendor documentation & needs to be integrated with General arrangement of the unit.

Fire Protection System

It is required to be assembled at site in line with drawings / documents. It involves assembly of loose parts like Carbon dioxide cylinders, master valve with solenoid, NRVs, discharge hoses, actuation hoses, enclosure, pressure witches, manifolds, tubes and tube fittings, safety relief valves, manual release levers, weighing devices, limit switches etc on to the frame and subsequent centering, leveling and grouting of the frame in line with applicable vendor documentation.

Air Processing Unit with coolers

It is required to be assembled at site **in** line with drawings / documents. Loose parts like filter, drain valves, stream dip pot arrangements, SRV, Solenoid etc may need to be assembled at site after centering, leveling & grouting in line with applicable documents. Interconnecting with Cooler needs to be done at site as Air Processing Unit and Cooler are being interfaced altogether.

Diverter Damper & Guillotine Dampers

It is required to be assembled at site in line with drawings / documents. Erection of dampers involves assembly of loose parts like gear boxes, actuators, piping, valves, seal air fan skids, limit switches, sealing plates, inter connecting rods, position indicators, control panels, insulation, gaskets, fasteners, accessories for

maintenance etc after centering, leveling & grouting in line with applicable vendor documentation & needs to integrated with other equipments like By pass stack, exhaust ducting etc as per applicable documentation of the over all unit. Both the equipments are sourced from different vendors and may need close inspection of the equipment at time of receipt and involves welding of the flanges and supports after positioning.

Water injection skid

This equipment is required to be assembled at site after centering, leveling & grouting in line with applicable general arrangements drgs. Loose parts if any like filters, strainers, control & Stop Valves, solenoid valves, Control Panels, pumps, conduiting, impulse tubing etc. are to installed and commissioned on to the skid

Mobile Centrifuge

Full unit required to be operated and maintained by the contractor.

Piping inter connection

Inter connection piping should be routed based on schematics. All the piping that needs to be fabricated and erected shall have to be tested & to under go NDT testing like DPT, radiographic examination, hydraulic testing in line with applicable standards & followed by mechanical cleaning like flushing, cardboard blasting, steam blowing as required. For fuel gas piping & CO_2 piping leak test needs to be conducted. All the vents & drain piping are required to be fabricated & erected at site with applicable standards. Valves, other pipe fittings and supports etc shall form the part of the piping systems are required to be erected as per drawings and documents and engineers instructions.

Temporary piping required for flushing of lube oil system needs to be fabricated and erected at site as per schematics within the scope of this contract.

Piping

Piping system shall involve - Gas fuel system Piping, Liquid Fuel Piping, Piping for Lubricating and control Oil Systems, ACW Piping, Service / Instrument air system, Miscellaneous piping, Piping for Instrumentation and other Misc. Piping of materials CS /AS /SS including its insulations and painting are within the scope of contract.

Outlet Ductwork

Outlet ductwork with support steel will be erected to connect between the HRSG outlet and the Chimney as per spec / data sheets.

However, changes in design may occur as is usual in any such large scale work for which no compensation will be payable and contractor shall complete the entire work as detailed in tender specifications within finally accepted rates / prices.

Approx. weight of major components has been indicated in Annexure I

The contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above system and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted rates.

2.5 ADDITIONAL PLATFORM / STRUCTURES

Additional platforms and approaches wherever required by the engineer to facilitate operation are to be fabricated and installed. Bidders are required to quote rate in Rs per MT against ITEM NO.2 of RATE SCHEDULE for fabrication & erection of such platforms & approaches. This does not include those of de-aerator and FST.

2.6 INSULATION

All piping and equipment, as per requirement / drawings are to be thermally insulated with bonded / unbounded mineral wool /LRB mineral wool and to be covered with aluminum cladding. Only spray insulation wherever applicable is not covered in this scope of work.

2.7 **Terminal points** and **Exclusions** as applicable to this specification have been given in **Annexure II & III** respectively.

Chapter - III: Facilities in the scope of Contractor/BHEL

3.0 FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

S. N.	Description	Scope /to be taken care by		Remarks
		BHEL	Bidder	
1.1.0	**ESTABLISHMENT**			
1.1.1	**FOR CONSTRUCTION PURPOSE**			
A.	Open space for office	**YES**		Free of charge. As and where made available by M/s RRVUNL
B.	Open space for storage	**YES**		Free of charge. As and where made available by M/s RRVUNL
1.1.2	**FOR LABOUR COLONY**			
A	Open space	**YES**		Free of charge. As and where made available by M/s RRVUNL
1.2.0	**ELECTRICITY**			

1.2.1.	Electricity for construction purposes (chargeable/free)			FREE OF CHARGE
1.2.1.A	Electricity for labour colony			Chargeable as per rate of state Government / RRVUNL
1.2.1.1	Single point source	**YES**		
1.2.1.2	Further distribution for the work to be done which include supply of materials & execution		**YES**	
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:		**YES**	
1.2.2.1	Distribution from single point including supply of materials & service		**YES**	
1.2.2.2	Supply, Installation & connection of material of energy meter including operation & maintenance		**YES**	
1.2.2.3	Duties & deposits including statutory clearances for above		**YES**	
1.2.2.4	Demobilization of the facilities after completion of works		**YES**	
1.2.2.5	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above lines		**YES**	

1.3.0	**WATER SUPPLY**			
1.3.1	**FOR CONSTRUCTION & LABOUR COLONY:**			
1.3.1.1	Making the water available at single point			Free of charge. As and where made Available by M/s RRVUNL
1.3.1.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**	
1.4.0	**LIGHTING**			
1.4.1	For construction work (supply of all materials) 1. At office storage area 2.At preassembly area 3.At construction site/area		**YES**	
1.4.2	For construction work (execution of lighting work/arrangements) 1. At office storage area 2. At preassembly area 3. At construction site/area		**YES**	
	Providing the necessary consumables like		**YES**	

	bulbs, Switches, etc during the course of construction			
1.5.0	**Communications facilities for site operations of the bidder**			
	Telephone, fax, internet, intranet, email etc.		**YES**	
1.6.0	**COMPRESSED AIR SUPPLY**			
1.6.1	Supply of compressor and all other equipments required for compressor & compressed air system including pipes, valves,storage system etc.		**YES**	
1.6.2	Installation of the above system and operation & maintenance of the same		**YES**	
1.6.3	Supply of all the consumables for the above system during the contract period.		**YES**	
	ERECTION FACILITIES			
2.1.1	Providing erection drawings for all the Equipments covered under this scope	**YES**		
2.1.2	Drawings for construction method	**YES**	**YES**	In consultation with BHEL
2.1.3	As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site		**YES**	**Do**
2.1.4	Shipping lists etc for reference & planning the activities	**YES**	**YES**	**do**

2.1.5	Preparation of site erection schedules and other input requirements		**YES**	**do**
2.1.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	**YES**	**YES**	**do**
2.1.7	Weekly erection schedule based on Sl. No.2.1.5		**YES**	**do**
2.1.8	Daily erection/work plan based on Sl. No.2.1.7		**YES**	**do**
2.1.9	Periodic visit of senior official of bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the official of the bidder should be done once in every two month		**YES**	
2.1.10	Preparation of preassembly bay		**YES**	

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

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

3.3 Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets. **The energy meter to be installed by the contractor & shall be tested and certified by State Electricity Board or any other agency approved by the RRVUNL at his cost.**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.9 Contractor should install a PC ALONG WITH MODEM to connect with our server (LAN) AT SITE.

Chapter - IV: T&Ps and MMEs to be deployed by Contractor

4.0 LIST OF T&P TO BE DEPLOYED BY CONTRACTOR

INDICATIVE LIST OF T&P TO BE DEPLOYED BY CONTRACTOR AT HIS COST				
S.NO.	**EQUIPMENT**	**CAPACITY**	**MINIMUM QTY**	**REMARKS**
1.	Welding Generators, Transformers, Rectifiers & TIG Welding Machine		10 Nos. /APR*	
2.	Tyre mounted Mobile crane	40 T	1 No.	
3.	Tyre mounted Mobile crane	18 T	1 No.	
4.	Low Bed Trailer WITH Prime mover	60 MT	1 No.	
5.	Trailer with Pulling Unit	20 MT	1 No./ higher cap. APR	
6.	Hydra	14 MT	1 No.	
7.	Hydraulic Jack (Low Height)	25/50/100T	APR	
8.	Screw Jacks	5/10/25/50T	APR	
9.	Hydraulic Pipe Bending Machine (Manual and Motorised)		1 No. each.	
10.	Heat Treatment Stress Relieving Arrangements (including oil cooled transformers, heating coils, Panels, Recorders etc		APR	
11.	Vacuum Cleaner (Industrial)		1 number.	
12.	Surface Grinder and other Workshop Equipment		1 set.	
13.	Concrete drilling machine		APR	
14.	Electric Winches	**3 Ton Capacity**	APR	
15.	Electronic / Electrical Tube Expande Tools)		3 Nos.	
16.	Air Compressor (Electric/Diesel operated)	140/210 CFM	APR	
17.	Plasma cutting machine with Air Compressor and Air storage tank	For cutting up to 10 mm thick Stainless	As per requirement	

		Steel		
18.	Scaffolding material	Suitable for working at various heights	APR	
19.	Chain Pulley blocks	Adequate capacity	APR	
20.	Slings (1.5", 12m), Rails, Slippers, D shackles		APR	
21	Pick & Carry Crane	8 – 12 MT	2	
22	Strand and Jack Arrangement for STG Stator Erection	Adequate to erect STG stator	1 set	For STG Stator Erection
23	3-Phase Distribution Board with Complete Set Up for Drawl of Construction Power	As required	As required	
24	Power Cable for drawl of Construction Power	As required	As required	
25	Radiography Arrangement with Radioactive Isotope Source	Iridium-192	1set	
26	Arrangement for UT of higher thickness joints with recording facility	Type USN 50 or equivalent/ upgraded type	1 Set	
27	Radiography Film Viewer	As required	As required	
28	Electro-hydraulic pipe bending machine	Up to 2" Nb and 12 mm thick pipes	1 set	
29	Baking Oven with thermostat and temperature gauge for welding electrodes	As required	3	
30	Holding Oven with thermostat and temperature gauge for welding electrodes	As required	2	
31	Portable Oven for welding electrodes	As required	APR	
32	Profile making M/c	for aluminium sheet cladding work	As required	
33	Nibbling M/c		As required	
34	Shearing M/c		As required	
35	Electric Winch	1 Ton Capacity	2	
36	Portable Grinding M/c	As required	As required	

37	Portable Drilling M/c	As required	As required	
38	Chain Pulley Blocks	Up to 15 MT Capacity	As required	
39	Fire retardant Tarpaulins	As required	As required	
40	Fire Extinguisher	As required	As required	

MMD to be deployed by contractor

		RANGE	ACCURACY	QTY
1.	Hand operated Megger	Up to 200 M ohms 500V/ 1000V	+5% at center scale +10% at end of scal	2 Nos.
2.	Digital Multimeter 3½ digit	Voltage 200 mV to 1000V	+1%+1 digit	2 Nos.
3.	Digital Multimeter 3½ digit	Current 200 mA to 10A DC	+0.8%+1 digit	2 Nos.
4.	Digital Multimeter 3½ digit	Current 20 mA to 20A AC	+0.8%+1 digit	2 Nos.
5.	Digital Multimeter 3½ digit	Resist 200 ohms to 20M ohms	+0.5%+1 digit	2 Nos.
6.	Dumpy level	0 to 350 mm	LC-0.01	1 No.
7.	Surface plate	Up to 1.0 Sq. Mtr	Grade 1,2,3	1 No
8.	Straight Edge	Up to 2 Mtr long	Grade 1,2,3	1 No.
9.	Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable			2 Sets
10.	Master pressure gauge	0 – 4 Kg/cm2	0.02	1 No.

***APR-As per requirement**

NOTES:

1. **The above list specifies only major T&P/MMD (may not be complete to be deployed by the contractor. All additional/ other tools and plants which are**

required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate/ price..

2. If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to get work done at the risk & cost of contractor without prejudice to right of BHEL as in GCC

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

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

Chapter - V: T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

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

LIST OF T&P and MMD being provided by BHEL for use of contractor Free of hire charges on sharing basis.

S.NO.	EQUIPMENT	CAPACITY	QTY
T&Ps			
1.	EOT Crane (in T.G. hall) (by RRVUNL)	50T /10T	1 No.
2.	GTG hall (by RRVUNL)	75T/ 15T	1 No.
3.	Crawler crane	135 / 250 T	APR
4.	Motorized hydraulic test pump		APR
5.	Bolt stretching device		APR

NOTES:

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

2. **Cl.4.2.2.16 e. of SCC shall be read as-** The **operator for** BHEL's cranes **100 MT & above capacity** being provided by BHEL free of cost. **Further, Helpers and fuel for operation of all BHEL cranes, shall be provided by contractor within the final accepted rates.**

3. **The Cranes at Sl. No.3 will be provided as per requirement and for special package handling only at the discretion of the BHEL Engineer.**

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

5. Any other special T&P if supplied by the manufacturer and available with the customer will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for

the purpose for which these are meant and to be returned in good condition. However low height jack may not be made available and will have to be arranged for by the contractor

6. **Other T&P mention above contractor shall transport from BHEL stores, install ,operate, carry out maintenance, dismantle after use and return to BHEL stores.**
7. Other terms and conditions regarding above items shall be as per T&P clause in SCC

Chapter - VI: TIME SCHEDULE

6.0 TIME SCHEDULE

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

6.2 Entire work as detailed in the tender specifications shall be completed within **11 months** from the Zero date as per programme/ milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.
In case due to reasons not attributable to the contractor, the work gets delayed and additional manpower / resources have to be mobilized so as to expedite the work to meet various milestones, same shall be done within the quoted rates as per Rate Schedule, at no extra cost to BHEL. In the event the contractor fails to respond to these requirements, BHEL shall take appropriate actions to meet customer's commitments in line with the provisions of General Conditions of Contract.

6.3 The various milestones dates to be achieved under this tender is as :

MILE STONES	MONTH
Start of GTG erection	Zero
Start of STG erection	2 months
Oil Flushing Completion of GT	5 months
Box-up of TG	6 months
Oil Flushing Completion of TG	7 months
GT firing & FSNL	7 months
GTG Synchronisation	8 months
Barring Gear(TG)	8 months
Synchronisation (TG)	9 months
Open cycle commissioning	9 months
Bottom cycle commissioning	10 months
Trial Run & Handing over	11 months

Note:

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. This project is a fast track project. Customer is making all out efforts to advance the project schedule. In case the civil inputs are advanced by customer, TG erection start and further erection work may have to be advanced to suit project requirement. No extra payment whatsoever shall be paid on this account.

6.4 The contractor has to ensure that work is completed in all respects leaving no pending points. However the punch list/ pending points, which are possible to be attended at site, shall be fully liquidated within two months from successful trial operation of the unit.

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

Chapter - VII: TERMS OF PAYMENT

7.0 TERMS OF PAYMENT

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

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

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

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

7.3.2. PROGESSIVE PAYMENT ON PRORATA BASIS

(A) PROGESSIVE PAYMENT on prorate basis

AA 85% of Lumpsum price item No. 1 of rate schedule
(Applicable on items covered under Annexure I **)**

GT SYSTEM INCLUDING GT/ ACC. COMPARTMENT SKID, INTEGRAL PIPING, OIL SYSTEM, CO_2 SYSTEM,GAS CONDITIONING SKID, VENTILATION SYSTEM ETC.	12%
GAS TURBINE GENERATOR & AUXILIARIES	8%
INLET AIR SYSTEM INCLUDING INLET AIR FILTER, INLET AIR DUCTING, APU ETC.	8%
EXHAUST SYSTEM INCLUDING BYPASS STACK, DIVERTOR/ GUILLOTINE DAMPERS, DUCTING ETC.	8%
CONDENSER	8 %
STEAM TURBINE	10 %
STEAM GENERATOR	6 %

STEAM TURBINE GENERATOR STATOR unloaded from the carrier, onward lifting, above ground handling, finally lowering & placement /Installation of the stator on TG deck foundation at around 11 M level inside power house as certified by BHEL Engineer	10%
DEAERATOR,FEED STORAGE TANK, BOILER FEED PUMPS, VACCUM,CHRC PUMPS CEP,JOP,AOP,EOP, GLAND STEAM CONDENSER,DRAIN COOLERS	15%
TOTAL	**85%**

NOTES:

1. The above break up is only for payment purposes and does not cover all equipment in the scope of the subject work. The total scope of work shall be as detailed in the tender specification.
2. Pro-rata payments shall be made every month in proportion to the work carried out by the contractor during the month, which shall be measured on the basis of percentages fixed above. The engineer shall carry out the assessment of the work for payment within the above percentages and it shall be final and binding on contractor. However, further percentage break up for payment against above clauses, will be mutually discussed and finalized at site

B. 85% of UNIT RATE (item No.2 of rate schedule)

1.	PLACEMENT IN POSITION	50 %
2.	ALIGNMENT	15 %
3.	WELDING/BOLTING/FIXING	20 %

C. STAGE/MILESTONE PAYMENTS (15% of Contract value)

1.	Oil Flushing (GT)	1%
2.	Completion of FSNL	1%
3.	Synchronisation (GT)	1%

4.	Barring Gear (TG)	1%
5.	Rolling and Synchronisation(TG)	1%
6.	Full Load of Unit	2%
7.	Trial Operation of Unit	2%
8.	Painting (including arrow marking, nomenclature, etc	2%
9.	Area cleaning, temporary structures cutting/removal and return of scrap	1%
10.	Punch List points/pending points liquidation	1%
11.	Material Reconciliation	1%
12.	Completion of Contractual Obligations	1%

Note:

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

2. Payment of retention amount and final bill shall be as per clause No. 2.22 and 2.23.2 of GCC.

Chapter - VIII: TAXES, DUTIES, LEVIES

8.0 TAXES, DUTIES, LEVIES

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

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

8.1 Service Tax & Cess on Service Tax

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

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

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

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

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

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

3. Description, classification and value of taxable service provided and

4. The Service Tax payable thereon.

All the four conditions shall be fulfilled in the invoice for payment of Service Tax by BHEL.

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

8.2 VAT (Sales Tax /WCT)

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

The Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill.

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

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

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

8.2.1 Modalities of Tax Incidence on BHEL

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

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

8.2.2 New Taxes/Levies

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

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

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

Chapter - IX: Others

9.0 OTHERS

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

Chapter - X: ANNEXURES

Annexure-I

Indicative Weight Schedule for ETC for 1X110 MW GTG &1X50 MW STG For 1X160 MW RAMGARH CCPP

A. Frame – 9E Gas Turbine, Generator, Ducting and Auxiliaries etc

SL	DESCRIPTION	DIMENSIONS OF (Length x Width x H (m)	WT. (kg)
1	Gas Turbine Fr-9E Flange to Flange	12.6 x 4.6 x 5	230,000
2	Accessory Package (Accessory Base	8.4 x 3.4 x 4.8	60,000
3	Exhaust Frame Blowers	2.2 x 1.5 x 1	1,000
4	Exhaust Plenum	5.661 x 3.113 x 3.632	9137-Top 9818-Lower 460-Loose items
5	Base Exhaust Plenum	6.5 x 1.2 x 1	1000
6	Lube oil Centrifuge	3 x 1.5 x 1.8	3500
7	Load Coupling with Hardware	4.5 x 1.5 x 1.1	2850
8	Accessory Coupling & Hardware	2.2 x 1 x 1	500
9	Guard Coupling Accessory	1.5 x 1 x 1	300
10	Jacking Oil Skid	2.2 x 1.5 x 1.5	1200
11	Piping Lube Oil Flush Field	4.5 x 1.5 x 1.1	700
12	Field Inter Connection Piping	4.5 x 1.5 x 1.1	25000
13	Enclosure GT & Accessory Compartment, GT Walkway + Ladders	6 x 3 x 3	125,000
14	Turbine Vent Fans	2.5 x 2.5 x 2	8,500
15	Generator Enclosure	6 x 3 x 3	75,000

16	Filter house (For GT and Generator)	10 x 3.5 x 3.5	125,000
17	APU	6 x 2 x 2.5	3,000
18	Cooler Finned-APU	6 x 0.5 x 3.5	1500
19	**Inlet Duct**		
	i) Inlet Plenum Extension	4.3 x 2.3 x 3	3,000
	ii) Inlet Duct Transition Pieces	9.8 x 3.5 x 3	3,500
	iii) Inlet Duct Expansion Pieces	10 x 3.5 x 0.6	2,250
	iv) Inlet Duct Elbow	10 x 3.3 x 3.7	11,000
	v) Silencer	10 x 3.5 x 3	20,000
	vi) Duct Pieces	10 x 3.5 x 3	6750
	vii) Support Structure	10 x 3 x 3	5,000
20	**Exhaust Dust**		
	i) Plenum Cover	8x 3.5 x 1.6	17,000
	ii) Horizontal Duct between plenum and E	6.0 x 3.2 x 3.2	15,400
	iii) Horizontal transition Duct after EJ-1	7.0 x 3.2 x 3.2	19,700
	iv) Horizontal Duct before EJ-2	6.0 x 3.2 x 3.2	9,270
	v) Horizontal duct between diverter damp guillotine	6.2x3.1x3.1	5,080
	vi) Horizontal duct after Guillotine	6.2x3.1x3.1	4,000
	vii) Silencer Inlet Transitino	8 x 3.2 x 3.2	4,300
	viii) Silencer Assembly with panels	8 x 3.2 x 3.2	74,730
	ix) Stack Transition	6 x 3.2 x 3.2	16,600
	x) Vertical Stack Assembly	6 x.3.2 x 3.1	50,550
	xi) Ladder & Platforms	6 x 3.2 x 1.2	15,800
	xii) Support structure Assembly	6 x 3.2 x 1.2	59,000
	xiv) Expansion Joint (EJ-1)	5.6 x 3.0 x 0.6	1,980
	xv) Expansion Joint (EJ-2)	5.6 x 3.0 x 0.6	2.480

	xvi) Expansion Joint (EJ-3)	5.6 x 3.0 x 0.6	2,100
	xvii) Expansion Joint (EJ-4)	5.6 x 3.0 x 0.6	2,480
21	Gas Valve Module	3 x 2 x 4.2	5000
22	CO2 Rack (CO2 bottle Racks)	3.5 x 1 x 2.5	4,000
23	Lube Oil Demister	2.5 x 1.6 x 2.5 (1 no)	3,000
24	Water Wash Skid	3.5 x 3.2 x 8	9000
25	Water injection skid	6.5 x 3.2 x 3.2	6500
26	Diverter Damper	3.2 x 3.2 x 3	38000
27	Guillotine Damper	3.2 x 3.2 x 1.8	20000
29	GENERATOR PACKAGE	9000x4100x4700	210000
30	FOUNDATION ITMES		80000
31	GENERATOR ENCLOSURE	12600x5600x5100	8000
32	EXCITER	4600x2020x1800	7000
			1425935

B. STEAM TURBINE (HNK 71/3.2-4)

SL	ITEM DESCRIPTION	QTY	DIMENSIONS	TOTAL WEIGHT (Kgs)
1.	Outer Casing – Upper Part	1	3725x3110x1600	14000
2.	Outer Casing- Lower Part	1	3495x3100x1600	15000
3.	Exhaust hood – Upper part	1	5800x2100x2000	15000
4.	Exhaust hood – Lower part	1	6200x2300x2700	22000
5.	Rotor assembly	1	7200x2300x2300	23000
6.	Front Bearing Housing assly including Bed plate	1	1600x2000x1500	7500
7.	Rear Bearing Housing assly	1	4300X1600X1500	7000
8.	Inner Casing	1	1300x1500x1250	4000
9.	Guide blade carrier-I	1	600x1300x1200	1800

10.	Guide blade carrier-II	1	600x1500x1500	4700
11.	Guide blade carrier-III	1	350x2000x2000	3500
12.	Guide blade carrier-IV	1	420x2400x2200	4800
13.	Lube oil pump assly.	2	2500x1000x900	2200
14.	EOP Assly. (DC)	1	1600 x 750 x 700	700
15.	JOP Assly. (AC & DC)	1	1550x1350x800	2000
16.	Oil accumulators	1set	1000x500x2300	585
17.	Lube oil tank	1	4450x2700x3000	5500
18.	Oil centrifuge	1	2200x1900x2000	1000
19.	Duplex filter	1	1500x500x2000	500
20.	Overhead oil tank	1	2800x2700x2800	3000
21.	Governing console	1	1800x1500x1500	1000
22.	Valve Block	2	2000x700x950	4000
				142785

C. SURFACE CONDENSER

Sl.No	Equipment	Overall Dimensions (in mm)	Quantity	Dry Weight (in kgs)
1	***Surface Condenser***			
	Tubes	OD 22 x Thk 1 x L 6500		47946
	Front water box assly	L 1700 x W 3300 x H 4600		19000
	Rear water box assly	L 1700 x W 3300 x H 4400		15200
	Front water chamber assly	L 500 x W 3200 x H 5200		11200
	Rear water chamber assly	L 500 x W 3200 x H 5200		11200
	Hotwell assly	L 6300 x W 2000 x H 1200		5700
	Bottom Plate assly	L 4000 x W 6000 x H 800		17000
	Support plate assly	W 2700 x H 4800 x Thk 12		27600
	Side wall assly	L 6500 x H 2600 x Thk 16		20000
	Dome assly #1	L 6500 x H 3600		13600
	Dome assly #2	L 5000 x H 900		10800
	Dome assly #3	L 6300 x H 3900		18000
	Dome assly #4	L 4600 x H 2400		15200
	Dome stiffeners	Dia 168.3 x Thk 21.97 x L 6000		87000

	Dome stiffeners plate	Pl 32 x 2500 x 6300		8000
	Loose items	-		18000
				345446

D.STEAM TURBINE GENERATOR

S.NO	DESCRIPTION EQUIPMENT	Qty.	OVERALL DIMENSIONS IN MM			Weight in tonnes
			LENGTH	BREADTH	HEIGHT	
1	GENERATOR STATOR	1	6000	3300	3300	89
2	GENERATOR ROTOR	1	7700	950	950	20.2
3	FOUNDATION ITMES	LOOSE ITEMS				5.4
4	BEARINGS	2	1810	540	1228	2.3
5	AIR COOLER UNIT	LOOSE ITEMS				2.7
6	EXCITER	1	3000	2000	2000	5
7	CO_2 EQUIPMENT	1	3000	1000	1500	3
						127.6

E.TURBINE AUXILIARIES

	Vacuum pump (2 x 100%)			
	Assly	-		12600
	Gland Steam Condenser			
	Complete Assly.	L 2750 x W 1300 x H 1400		1400
	Fan & Motor	L 1000 x W 600 x H 800		1000
	Water to Water Heat Exchanger			
	Complete Assly.	Ø 600 x L 5000		3000
	GTG Air Cooler			
		L 3000 x W 700 x H 550		10500

	ST oil Cooler			
		Ø 700 x H 3300		6600
	STG Air Cooler			
		L 4200 x W 800 x H 530		10800
	Spray cum Tray Deaerator			
	Header	L 7800 x W 2250 x H 2900		12000
	Feed Storage Tank	L 12400 x W 3050 x H 3600		19000
				76900

E.1.Boiler Feed Pump (BFP)-FK6D30 & Booster Pump (BP)-FA1B56

	Description of Equipment	Dimensions(mm) Length xBreadth x Height	Unit Weight (kg)	Total Qty. (No.)	Total Weight (kg)
	BFP Skid (Pump Assly. + Base Plate + tubing + Seal Coolers)	2250 x 1000 x1050	5770	2	**11540**
	BP Skid (Pump Assly. + Base Plate + tubing)	1650 x 1200 x 950	2550	2	**5100**
	Gear Box (DD).	1150 x 1000 x 860	1200	2	**2400**
	Suction Strainer at BP Suction DD)	900 x 800 x 1400	800	2	**1600**
	BFP Recirculation valve (DD)	1800 x 550 x 1400	350	2	**700**
	Loose Items	-----	3000	---	**3000**
					24340

E.2.CONDENSATE EXTRACTION PUMP (CEP)

S.N.	Description of Equipment	Dimensions(mm) Length xBreadth x Height	Unit Weight (kg)	Total Qty. (Nos.)/Unit	Total Weight (kg)/Un
1	CEP Assembly	1100 x 3250	2100	2	**4200**
2	Canister	900 x 3100	510	2	**1020**
3	CEP Foundation Ring	1100 x 1100 x 150	185	2	**370**
4	CEP Suction Strainer	900 x 800 x 1400	800	2	**1600**
					7190

E.3.LPBFP

S.N.	Description of Equipment	Dimensions(mm) gth xBreadth x Heigh	t Weight (kg)	tal Qty. Nos.)	tal Weight (kg)
1	LPBFP Assembly	1,000 x 600 x 350	750	2	**1500**
	LPBFP drive motor	1,000 x 600 x 2	270	2	**540**
	LPBFP Suction Strainer	300 x 300 x 40	300	2	**600**
	LPBFP R.C. Valve	800 x 300 x 100	200	2	**400**
	Common foundation frame	2500 x 600 x 20	525	2	**1050**
					4090

E.4.CPHRCP

S.N.	Description of Equipment	Dimensions(mm) Length xBreadth x Height	Unit Weight (kg)	Tota Qty. (Nos	Total Weight (kg)
	CPHRCP Assembly	1,000 x 600 x 350	1500	3	**4500**
	CPHRCP drive motor	2350 x 1400 x 1350	3800	3	**11400**

	CPHRCP Suction Strainer	700 x 500 x 400	800	3	**2400**
	CPHRCP R.C. Valve	800 x 300 x 1000	300	3	**900**
	Common foundation frame	2500 x 600 x 200	1200	3	**3600**
					22800

E.5.TANKS

SL. N	DESCRIPTION	SHIPPING DIMENSION		DRY WEIGHT (MT
	Misc. Tanks			
1	Reserve feed water -60	9.3(L) x 3.52 OD x 0.016		17.1
2	Atmospheric Flash Vess	1.500(H) x 1.0 OD x 0.01		1
3	RE Joint – Conventional 1100 NB	1.750 OD x 0.800		0.625

Annexure-II

SYSTEMS	TERMINAL POINTS
HP Inlet Steam	At Turbine inlet Steam Emergency Stop valve Nozzles
LP Injection Steam	At Turbine Flange
All Integral steam drains	At a suitable point with in TG hall
Aux. Steam for GSC	Inlet Nozzles of GSC at suitable parameters
Bypass steam	At condenser Nozzle
Exhaust hood spray from CEP	At a point near TG deck.
A/C & D/C Aux. Power	At respective Motor Terminals
Generator	Power at Generator terminals
DM water	Make-up to the condenser nozzle/condensate storage tank at 3.5 to 4 bar line at terminal point
CW system	At the Inlet/Outlet of condenser flanges
Instrument air	Respective consumption points
Service air	Respective consumption points
BFP,CEP,LPBFP, CHRC Pumps	Suction & Discharge of BFP,CEP,LPBFP, CHRC Pumps

Annexure -III

EXCLUSIONS

All civil works other than dressing/ chipping of foundation surfaces, fixing of supports and hangers in trenches, walls.

All cabling work other than those supplied by BHEL with the equipment..

Complete control and instrumentation work other than those specifically included in this specification.

All AC & DC motor starters, switchgears and associated controls center unless otherwise specifically mentioned in the specification.

Application of spray insulation for steam turbines and accostics insulation for TG.

Supply of lubricants for TG set.

Supply of chemicals required for chemical cleaning.

Supply of H_2 and CO_2 gases for generator filling.

Supply of all shims and gaskets, which go finally as part of equipment.

ANNEXURE –IV

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this enquiry for the subject item / system with detailed scope of supply as ı tender specification, BHEL-PSNR, NOIDA may resort to "REVERSE AUCTION PROCE i.e. **ONLINE BIDDING on INTERNET.**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. In case BHEL decides to conduct reverse auction, BHEL's service provider shall contact the vendor directly and impart them the training.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. **Total Price quoted shall be inclusive of all taxes except service tax in line with the NIT conditions for the subject work in Indian Rupees (INR), which is to be worked out as per the BOQ (Rate Schedule) given in tender enquiry and subsequent changes made, if any. EXCEL Sheet shall be provided, if applicable.**
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider after completion of event on the same day preferably.
10. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
11. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.

ANNEXURE - V

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

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

Chapter - XI: RATE SCHEDULE

RATE SCHEDULE

Sl.	DESCRIPTION OF WORK	**LS PRICE/RATE IN RUPEES**	**AMOUNT IN RUPEES** (In figures and words)
1	**Lump sum** price for complete scope of work of erection, testing, commissioning, trial operation and handing over of 1X110MW Gas Turbine & auxiliaries and 1X50MW Steam Turbine & auxiliaries, as per tender specifications for items indicated in Annexure I.	**N A**	
2	**Rate in Rs / MT for fabrication** and installation of additional platforms, structures, ladders and H&S(which are not indicated in the drawings) as per site requirement **(Approximately 50 MT)**		
	TOTAL		

NOTES:

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

2. Evaluation of bids shall be done on total price against this Rate Schedule / BOQ.

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

TECHINICAL CONDITIONS OF CONTRACT

TENDER NO. BHEL/ NR /SCT/ RAMGARH CCPP/ GTG & STG/ 766

FOR

Work of Erection, Testing, Commissioning and Trial Operation & Handing over of 1 x 110 MW GTG & 1 X 50 MW STG with related Auxiliaries for 160 MW RAMGARH CCPP at Combined Cycle Power Plant of M/s Rajasthan Rajya Vidyut Utpadan Ltd (RRVUNL) at RAMGARH, Rajasthan.

PART – II OF TCC

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

PART-II

Sl	DESCRIPTION	Chapter No.	PAGES
	Part-II: Technical Specifications		
1.	GENERAL	Chapter-I	
2.	CIVIL WORKS, FOUNDATION, GROUTING	Chapter-II	
3.	ERECTION	Chapter-III	
4.	WELDING, HEAT-TREATMENT, RADIOGRAPHY AND N	Chapter-IV	
5.	APPLICATION OF INSULATION	Chapter-V	
6.	PAINTING INCLUDING FINISH PAINTING	Chapter-VI	
7.	TESTING, PRE-COMMISSIONING, COMMISSIONING, A POST-COMMISSIONING	Chapter-VII	

Chapter - 1: GENERAL

1.0 GENERAL

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

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

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

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

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

B Proper out-turn as per BHEL’s plan and commitment

C Completion of work as per BHEL Schedule.

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

E Repair and rectification

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

G HOUSE KEEPING-The contractor is supposed to carryout house keeping of the work area on regular basis to keep the work place neat and tidy and available for the SAFE Working. The scrap, generated daily during the Execution activities, is to be dumped at designated area as decided by BHEL/ RRVUNL on daily basis. The erection materials issued to the

contractor and kept near the work area should also be staged properly at site. Compliance report on above shall be submitted by the contractor to BHEL on Daily basis. In case the contractor fails to do so, BHEL have rights to carry out the same from the other party at the Risk and cost of the contractor. The cost applicable with BHEL overheads shall also be recovered from the monthly running bills of contractor.

1.5 Contractor shall ensure following:

I. Contractor has to maintain contact with local hospital having ambulance facility, scanning & other ultra modern medical facilities required during emergency.

II. Contractor has to ensure pre employment medical check for all staff & workers.

III. Contractor has to ensure that adequate First Aid facilities with trained nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following

- Male nurse (in shifts)
- Oxygen set up
- Breathing apparatus
- Eye wash facility
- Stretcher
- Trauma blanket
- Medicines.

In addition to above, BHEL (through its other contractor) has arranged ambulance at work site for emergency purpose, which can be utilized by the contractor in case of emergency. The charges for the same will be decided mutually at site. In case, under unavoidable circumstances, if the ambulance is not available / being used elsewhere, the contractor will have to arrange for the same as under clause 1.5 (i).

1.6 The contractor shall comply with following towards Social Accountability;

a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.
b) The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.
c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.
d) The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimation/ Corporal punishment for failure in meeting with relevant requirements.
e) The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.
f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.

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

1.7 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least 100 trees or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers.

1.8 PRELIMINARY WORKS

1.81 The contractor shall, as a first field activity check the foundations for turbine, generator and all auxiliaries for the correctness of the same as per the drawings and satisfy himself in all aspects. He should ensure location of foundations, their consolidation, absence of voids, levels, correctness of boltholes, pockets levels and centerlines etc. All measurements should be recorded and submitted to Engineer for approval before erection

1.82 Before starting erection job, contractor shall ensure that TG area/ GTG area is sufficiently enclosed against ingress of dust and water, and all debris has been cleared off from the floor to a designated area as per instruction of Engineer. The contractor shall arrange to get the working area and surroundings cleaned daily to ensure a dust free atmosphere for working.

Contractor shall first cover all openings on operating floor and put temporary hand railings on all sides of the floor to avoid any accident to the personal working. Material for above work, if available can be issued by BHEL on returnable basis.

1.83 The contractor shall provide his tool stores for special tools and instruments at a convenient location near to the place of working in TG hall / GTG hall. Necessary area shall be provided to contractor by BHEL. This is to be cleared after completion of the work. If so required he will have shift the same if required giving fronts to other agencies engaged at site.

1.84 The contractor shall set up longitudinal and transverse axes and two or more level bench marks accurately on TG floor. BHEL Engineer shall certify these. The certified TG-Center lines and datum level shall be the reference for TG and all auxiliaries' erection and alignment work. The contractor shall transfer these axes to all the floors to facilitate further execution.

1.85 All matching surfaces of components shall be well cleaned with cleaning agent and burrs shall be removed by filing and blue matched wherever required. Wherever necessary sealing/ lubricating/ anti-seize compounds shall be applied as per recommendation of Engineer. Machining/ grinding required for fitting of keys, pins, packers & dowels etc. shall be carried out by contractor at his cost. The contractor is expected to have his own arrangements for machining activities.

1.86 The accuracy of all equipment/ instruments and their functioning shall be established before they are permitted for use on the job. If the Engineer doubts the accuracy of the precision tools, any time during erection, the contractor shall arrange the checking/ calibration of tools/ equipment/ instruments at his cost.

Chapter - II: CIVIL WORKS, FOUNDATION, GROUTING

2.0 CIVIL WORKS, FOUNDATION, GROUTING

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

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

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

2.4 Entire grouting work of foundation of all equipments including materials will be carried by any other agency /customer M/s RRVUNL The contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor

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

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

Chapter - III: ERECTION

3.0 ERECTION

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

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

3.2 Preassembly of Non-Mettalic expansion joints (NMEJ) shall be in the scope of this contract.

3.2.1 Welding, Joining & assembling the Split Steel Frames and Fixing of Fabric, Cladding Bolster, Welding & Fixing of Cladding Pins, Cladding Sheet etc. with alight check.

3.2.2 Entire Insulation and Cladding shall be the part of scope of Work.

3.2.3 <u>Site Assembly / Erection Procedure of NMEJ</u>

3.2.3.1 welding of all the parts of Angle Frames, Positioning, aligning as per G.A. Drawing.

3.2.3.2 Fabric Fixing Nut to be Tack Welded at the bottom of the Angle Frame for easy fastening & removal.

3.2.3.3 Appropriate Fixing (Fastening) of Fabric, Back-up Bar on the Steel Frame

3.2.3.4 Welding of Required Cladding Pins on the peripheral of the steel frame at different locations and placing / fixing the Cladding Bolster on them.

3.2.3.5 Cladding sheets are fixed around the Bolster fully shielded.

3.2.3.6 Cladding pin nuts are tag welded on the Cladding Sheet.

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

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

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

3.6 Corrections like straightening of ladders, tube support plates adjustment / removal of ovulates in pipes and opening or closing the fabricated bends of piping to suit the layout shall be considered part of the work and the contractor is required to carry out such work within finally accepted price / rate as per instructions of Engineer.

3.7 The contractor shall carry out assembly and erection of condenser components normally on the condenser foundation directly. This includes

- Assembly and welding of bottom plate, side plates, hot well, springs and steam throw device.
- Complete fabrication and welding of shell out of loose side-walls dome walls, and stand pipes.
- Assembly and welding of water chambers and water-boxes.
- Assembly and welding of support plates, baffles and stiffening structure,
- Tubes insertion, expansion and cutting/ trimming.

Hydraulic test and water fill test and any other fitting/ assemblies required to complete the assembly.

3.8 The contractor shall carry out the condenser tube insertion and expansion at site after the installation of condenser on its foundation. Condenser tubes shall be handled strictly as per instructions of BHEL Engineer. Before installation of tubes, the contractor shall check for any dents, mechanical damages or any other defects of tubes caused during storage. These should be thoroughly internally and externally cleaned for all extraneous matter as per the directions of the engineer.

3.9 Before insertion of tubes, the contractor shall clean the surface of the holes in the main tube plates and tube support plates for paint, corrosion spots oxide scale etc. as per the instructions of the engineer. Even reaming of support plates if required for smooth insertion of tubes is to be carried out by contractor at his cost and reaming and its arrangement is to be arranged by contractor.

The contractor shall carry out the tube insertion & expansion of the condenser strictly in accordance with the instructions issued by the engineer. Tubes may require adjustment of length on both ends. The contractor shall ensure to provide covering above the top row of tubes to avoid any damage to the tubes prior to tube insertion as per instruction of BHEL Engineer at his cost.

3.10 The contractor shall carry out the condenser neck welding with casing only after final installation of casing. However the contractor shall adjust the gap between condenser neck and LP exhaust hood uniformly by suitably lifting the condenser as directed by engineer. Also the makeup pieces required for this purpose shall be fabricated and welded to the dome walls by the contractor.

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

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

3.13 All the shafts of rotating equipment shall be properly aligned to those of the matching equipment to as perfect and as accurately as practicable. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

3.14 All the motors and equipment shall be suitably doweled after alignment of shafts with tapered/parallel machined dowels. The contractor at his own cost shall arrange for the machining of dowel pins required for the same. However the materials for dowel pins shall be issued by BHEL free of cost.

3.15 The bearings shells will be blue matched at site and checked for bearing clearances. The contractor shall carry out scraping of bearing housing, if required to any extent. No extra claim for blue matching of any two surfaces up to 1mm initial gap will be entertained. The contractor shall also check air gap and adjustment of stator/ rotor to magnetic center shall be carried out as part of erection.

3.16 The contractor shall fabricate and weld pipes, special bends, as required for installing lube oil systems. The contractor shall also service the lube oil

system, carry out the hydraulic test of oil coolers and piping systems as required.

3.17 The contractor as part of the scope of work if required or if directed by BHEL shall carry out the servicing and realignment of skid-mounted equipment.

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

3.19 The contractor shall completely erect and test all the piping systems including their hangers, supports, valves, insulation, and accessories including sampling lines and coolers as per specifications and drawings. The services will include welding, pre-heating, stress relieving, bolting, testing, cleaning insulation and painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings

3.20 Pipes sent in standard length shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends upto 80 mm nb will be fabricated at site wherever required.

3.21 Certain adjustments in length may be necessary while erecting high-pressure pipelines. The contractor should remove the extra lengths/ add extra lengths to suit the final layout after preparing edges a fresh by adopting specified heat treatment procedures, at no extra cost.

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

3.23 The contractor shall be responsible for any modifications of shop fabricated pipes prior to installation to accommodate minor site alteration in pipe routing at no extra cost

3.24 All vents and drains for piping equipment covered in the scope whether shown in the drawings or not, shall be terminated outside the TG hall in atmosphere and at sump-pit as directed by the engineer.

3.25 Wherever piping erected by the contractor is connected to equipment/ piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor of this specification.

3.26 Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like `T' pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes/valves for welding.

3.27 The valves will have to be checked, cleaned or overhauled (including lapping of seat) in full or in part before erection and/or after chemical cleaning and during commissioning.

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

3.29 Steel for suspensions for piping, will be supplied in running lengths. These are to be cut to suitable sizes and adjusted as per requirement.

3.30 No temporary supports should be welded on the piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases heat treatment, if required, shall be carried out by the contractor

3.31 All hangers, supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and erected by the contractor. The raw materials required for fabricating such supports shall be supplied by BHEL free of cost and contractor shall be eligible for payment of such additional supports as per applicable rate for item No 5 of rate schedule.

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

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

3.34 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The procedure to be followed, the tools and the equipment deployed shall be subject to the approval of Engineer. All the torque wrenches shall be calibrated as per requirement and before they are put in use on any job.

3.35 The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer. The contractor shall inspect the hangers associated with the piping systems as follows:

- After hydraulic test, with the piping in the cold position, with all travel stops removed, with the pipe completely insulated and complete in all respect ready for start up.
- Piping in the hot position with the unit operating at the maximum load.

- Piping in the cold position during the first complete shut down.

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

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

3.38 Erection, testing and commissioning of power cylinders, electrically operated valves and their actuators etc. coming under various groups is covered under the scope of this specification

3.39 All valves, including valves, flap valves, dampers and actuators, shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates

3.40 The contractor shall also or grind the valve seat, if required, to ensure satisfactory performance of valves at no extra cost. All parts such as gaskets, gland packing which form the permanent part of equipment shall be supplied by BHEL free of cost.

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

- Product groups, under which these items are released, are not covered in the scope of this tender.
- Items are supplied by any agency other than BHEL.

NOTE: ADDITIONAL THERMOWELLS AS REQUIRED FOR CONDUCTANCE OF THE PERFORMANCE GUARANTEE TEST ARE TO BE INSTALLED BY THE CONTRACTOR.

3.42 Erection of CO_2 and H_2 systems complete in all respects, including cylinders stands, connecting piping, valves, distribution headers, main control panels etc is in the scope of contractor. The delivery gas cylinders is to be taken from BHEL / its client stores, their handling and filling of gases in the system as and when required, till unit is commissioned and handed over, shall be the responsibility of the contractor. The empty cylinders are to be returned to BHEL/its client stores.

3.43 Additional platforms and ladders of permanent nature incidental to the job for approaching different equipment / valves as per site requirement, which may not be indicated in drawings, shall be fabricated and installed by the contractor.

The materials required will be supplied by BHEL free of cost. The contractor will be eligible for payment for such additional platform and ladders at the rate applicable rate against item No. 5 of the rate schedule.

3.44 The contractor shall carry out Kerosene oil / dye penetration tests of all the bearing housing of turbine & generator. The Kerosene oil DPT kit for the tests shall also be arranged by the contractor at his cost.

3.45 All cabling work (system cabling i.e. cables from local control panel to system drives / instruments etc.) including laying of cable trays for oil centrifuge machine, gas drier and on load condenser tube cleaning system is in the scope of subject work.

3.46 Wherever cables are to be laid under the scope of subject work the same shall be laid in cable trays, dressed, properly glanded and terminated.

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

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

3.49 The feed storage tank will be received in 3 pieces and is to be assembled, welded and tested at site. Besides the provisions under T&P Clause, all other arrangements for erection of feed storage tank and deaerator has to be made by contractor within their finally accepted price

3.50 The contractor shall assist BHEL in preparation of as built piping drawing.

Chapter - IV: WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

4.0 WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

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

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

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

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

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

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

4.7 All expenses for testing of contractor's welders including destructive and nondestructive tests conducted by BHEL at site or at laboratory shall have to

be borne by the contractor only. Limited quantity of raw material required for making test pieces will be supplied by BHEL free of cost.

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

4.9 **Only BHEL/ CUSTOMER approved electrodes and filler wire are to be arranged and used by the contractor, within the finally quoted price. BHEL/ RRVUNL reserve the right to test from the certified lab of approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor.** All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number/ batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved/ accredited test house traceable to National/ International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same.

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

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

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

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

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

4.15 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders,

thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. The contractor should take a note of the following,

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

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

4.16 The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by BHEL. Necessary help in conducting the UT shall however be rendered by contractor.

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

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

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

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

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

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

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

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

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

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

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

4.28 Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out

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

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

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

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

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

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

4.35 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of progress. The contractor shall make

all necessary arrangements including labour, supervisors/ Engineer required for the work as per directions of BHEL.

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

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

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

Chapter - V: APPLICATION OF INSULATION

5.0 APPLICATION OF INSULATION

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

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

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

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

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

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

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

5.8 Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them

to required size, grooving, fabricating bends, boxes etc., for proper covering is contractors responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract.

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

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

1. Wool / LRB mattresses and cladding sheets 2%
2. Insulation bricks and mortar 2%
3. Castable refractory 1%

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

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

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

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

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

Chapter - VI: PAINTING INCLUDING FINISH PAINTING

6.0 PAINTING INCLUDING FINISH PAINTING

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

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

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

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

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

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

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

6.8 The contractor shall ensure availability of

- Ford Cup-4 to measure consistency of paint,

- Automatic magnetic gauge to measure the dry film thickness and
- SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.

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

6.10 CONDENSER PAINTING

6.10a The condenser main tube plates will be dispatched to site from the works with surface protection only on water box side. The same shall be removed adopting one of the suitable methods indicated elsewhere in this specification. The contractor shall do the surface protection of these tube plates after the completion of the tube insertion and expansion activities. The surface shall be first painted with at least two or more coats of approved quality chemical resistant epoxy zinc chromate primer after thoroughly cleaning all such parts of al dirt, rust scales greases, oils and other foreign materials by adopting suitable methods as approved by BHEL. Afterwards the above parts shall be finished with two or more coats of approved quality high build black coal tar coating. Before the painting is taken up, the contractor shall plug all the holes with suitable tapered plastic / wooden plugs to avoid any damage to the tube ends. The plastic / wooden plugs and paints required for the above operations shall have to be arranged by the contractor at his cost. The above paints are also to be applied on water chamber / box. The thickness is to be confirmed by suitable measurement.

6.10b The condenser steam space shall be surface protected with at least two coats of suitable steam washable paint. Before the painting is taken up, the contractor shall clean the surfaces to be coated by adopting suitable methods. The contractor at no extra cost shall procure paint to BHEL.

Chapter - VII: TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING

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

7.1 The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would include hydraulic test of condenser, land flow test, chemical cleaning, alkali flushing and water flushing of piping, oil flushing of oil system etc. as instructed by BHEL.

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

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

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

7.2 The contractor shall carry out the air-tightness test on assembled generator to the satisfaction of BHEL Engineer. The necessary arrangement for testing with dry-clean air shall be made by the contractor at his cost. Compressed air for testing can be taken by the contractor from the existing system

7.3 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall repairs all joints (shop welded or site welded) failed during testing.

7.4 All items / material required for conducting hydraulic test, Detergent flushing, oil flushing, steam blowing etc., will be supplied by BHEL / its customer.

While the Detergent cleaning operation including the required looping in piping , draining and disposal will be carried out by another agency , the Contractor will have to ensure the readiness and availability of CEP , associated systems and the piping which is to be cleaned . Any work required on the permanent system will have to be carried out by the Contractor.

All temporary piping along with their supports for steam blowing in the systems erected by the Contractor, and the required loops for chemical cleaning of the piping erected by the contractor will have to be erected within the quoted rates.

The Contractor will also be responsible for their installation wherever required. He will dismantle the total system and return the same to BHEL / their customer store as directed. No separate payment will be released for erection & dismantling of the required equipment & piping.

7.5 Thermal shocks will be required during oil flushing operations. The contractor is required to make all arrangements for the same. This would include fabrication of heating tank with nozzles and requisite piping with supports. Complete erection with pumps, tanks, electrical fittings including and other accessories is to be carried out. All material and equipment will be provided on returnable basis by BHEL.

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

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

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

7.9 It shall be specifically noted that the employees of the contractor may have to work round the clock along with BHEL/Customer Engineers and hence overtime payment by the contractor may be involved. The contractor's finally accepted rates/ price shall be inclusive of all these factors also.

7.10 It shall be the responsibility of the contractor to provide various category of workmen in sufficient numbers along with supervisors with necessary consumables, T&P, IMTEs etc., along with any other assistance required during pre-commissioning, commissioning and post -commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over.

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

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

7.12 During commissioning, opening / closing of valves, changing of gaskets, realignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. This is included in the scope of work.

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

7.14 The water boxes of the condenser will be tested hydraulically to 1.5 times the design pressure after its assembly at site. The arrangement of all the blanking for carrying out the hydraulic test shall be the responsibility of the contractor at no additional cost. However only the main blanking flanges with fasteners for CW inlet and CW outlet of the condenser shall be provided by BHEL free of cost. Fabrication of blanks will be carried out by the contractor.

7.15 The water-fill test of the steam space shall be carried out by filling the water upto 1 Meter or as required above the top row of tubes to facilitate leak detection. Hydraulic testing shall be carried out on the condenser water boxes. Dummy plates shall be provided by BHEL.

7.16 The contractor shall fill the condenser upto the specified level as many times as called for by the Engineer for checking of the turbine at no additional cost

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

7.18 During hydraulic testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.

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

7.20 Cleaning & servicing of all the filters / strainers, toppings of oils coming in the system shall be done by the contractor till the completion of trial operation and handing over of the unit within the quoted price .

7.21 The contractor shall incorporate all the changes / decisions proposed by BHEL Engineer at no additional cost.