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

NO: BHE/PW/PUR/ PLT-STG/920

FOR

RECEIPT OF MATERIALS FROM BHEL/CUSTOMER STORES/STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION BETWEEN STORES AND SITE OF WORK, ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING, INSULATION, FINAL PAINTING AND HANDING OVER OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT AND UNLOADING FROM WAGON/ TRAILER), CONDENSER, TG INTEGRAL PIPING, EXTERNAL/ REGENERATIVE SYSTEM EQUIPMENT/TANKS/VESSELS, PIPING, DEAERATOR WITH ASSOCIATED PLATFORM, HP-LP BYPASS SYSTEM, BOILER FEED PUMPS, POWER CYCLE PUMPS, CW PUMPS, ACW PUMPS & ASSOCIATED AUXILIARIES , R.E. JOINTS & B.F. VALVES ETC. OF 250 MW NEW PARLT TPS UNIT #3

AT

NEW PARLI THERMAL POWER PROJECT

MAHARASHTRA STATE POWER GENERATION COMPANY LTD

PARLI VAIJNATH – 431 520

DISTT. BEED, MAHARASHTRA

VOLUME – I

CONSISTING OF:

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

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

CONTENTS			
Volume No	Description	No. of pages	Hosted in website bhel.com as files titled
NIL	Tender Specification Issue Details	1	(Part of **Vol-IA-920**)
NIL	Notice Inviting Tender	12	(Part of **Vol-IA-920**)
I-A	Technical Conditions of Contract	96	Vol-IA-920
I-B	Special Conditions of Contract	47	Vol-IBCD-920
I-C	General Conditions of Contract	29	(Part of Vol-IBCD-920)
I-D	Forms & Procedures	69	(Part of Vol-IBCD-920)
II	Price Bid Specification	3	Vol-II-920

Tender Specification Issue Details

Tender Specification No: BHE/PW/PUR/ PLT- STG / 920

FOR

RECEIPT OF MATERIALS FROM BHEL/CUSTOMER STORES/STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION BETWEEN STORES AND SITE OF WORK, ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING, INSULATION, FINAL PAINTING AND HANDING OVER OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT AND UNLOADING FROM WAGON/ TRAILER), CONDENSER, TG INTEGRAL PIPING, EXTERNAL/ REGENERATIVE SYSTEM EQUIPMENT/TANKS/VESSELS, PIPING, DEAERATOR WITH ASSOCIATED PLATFORM, HP-LP BYPASS SYSTEM, BOILER FEED PUMPS, POWER CYCLE PUMPS, CW PUMPS, ACW PUMPS & ASSOCIATED AUXILIARIES , R.E. JOINTS & B.F. VALVES ETC. OF 250 MW NEW PARLT TPS UNIT #3

AT

NEW PARLI THERMAL POWER PROJECT

MAHARASHTRA STATE POWER GENERATION COMPANY LTD

PARLI VAIJNATH – 431 520

DISTT. BEED, MAHARASHTRA

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION . Refer Notice Inviting Tender

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

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date :

920

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/ PLT- STG/920 Date: 16/11/2011

NOTICE INVITING TENDER (NIT)

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

==========

To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 **Salient Features of NIT**

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHE/PW/PUR/PLT-STG/920**	
ii	**Broad Scope of job**	**RECEIPT OF MATERIALS FROM BHEL / CUSTOMER STORES / STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION TO SITE OF WORK, ERECTION, TESTING, ASSISTANCES FOR COMMISSIONING & TRIAL OPERATION, INSULATION, FINAL PAINTING AND HANDING OVER OF STEAM TURBINE, TURBO-GENERATOR, CONDENSER AND ASSOCIATED AUXILIARIES INCLUDING BOUGHT OUT ITEMS, ETC. OF 1X250 MW THERMAL POWER PLANT NEW PARLI UNIT – 3, PARLI VAIJANATH DIST: BEED MAHARASTRA 431520**	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :Nagpur*** ***Start :16/11/2011***	*Applicable*

		Closes: 07/12/2011 , Time :16.00 Hrs **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 08/12/2011 , Time :15.00Hrs*** ***Place : BHEL PS Regional office at :Nagpur*** Tenders being submitted through representative shall be handed over to any of the following BHEL officials after making entry/registration at the reception: RK Ranade/ Sr. Manager (Purchase) Pratish Gee Varghese/Engineer(Purchase) Umesh Agalawe/ET(purchase)	*Applicable*
vi	**OPENING OF TENDER**	***1 hours after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	*Rs 2,00,000/- (Rupees Two Lakhs Only)*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Date: Atleast 5 days before the due date of offer submission* *Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	*Date : Not applicable.*	*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	*Not Applicable*	*Not Applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

1.0 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.**

2.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Nagpur issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day;

and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Nagpur, Sundays and second/ last Saturdays.

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

4.0 **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)

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

Sl no	Description	Remarks
	Part-I A	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	

vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

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

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

	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION:	

	CONTAINING THE FOLLOWING:	
i	o Envelopes I o Envelopes II o Envelopes III	

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

6.0 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.

7.0 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).

8.0 **Assessment of Capacity of Bidders:**

Bidders capacity for executing the job under tender shall be assessed as per the following:

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

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

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

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

i). Ratings by Power Sector Region:
- a) PS ER's Rating 'R**e**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- b) PS WR's Rating 'R**w**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- c) PS SR's Rating 'R**s**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- d) PS NR's Rating 'Rnr' = $(X_1 + X_2 + .. + X_n)$ divided by n
- e) **Over all Power Sector Region Rating** 'R_{BHEL}'= (R**e**r+ R**w**r+ R**s**r+ R**n**r) divided by 4

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

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

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

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

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

IV. **Explanatory note**:

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

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

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

9.0 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.

10.0 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.

11.0 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.

12.0 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.

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

14.0 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.**

15.0 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.

16.0 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 authorized 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.

17.0 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.

18.0 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.

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

20.0 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.

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

22.0 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. .

23.0 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.

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

25.0 Order of Precedence

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

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

for BHARAT HEAVY ELECTRICALS LTD

AGM/(Purchase)

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03 Annexure 3 Important Information
03 Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	**RECEIPT OF MATERIALS FROM BHEL / CUSTOMER STORES / STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION TO SITE OF WORK, ERECTION, TESTING, ASSISTANCES FOR COMMISSIONING & TRIAL OPERATION, INSULATION, FINAL PAINTING AND HANDING OVER OF STEAM TURBINE, TURBO-GENERATOR, CONDENSER AND ASSOCIATED AUXILIARIES INCLUDING BOUGHT OUT ITEMS, ETC. OF 1X250 MW THERMAL POWER PLANT NEW PARLI UNIT 3, PARLI VAIJANATH DIST: BEED MAHARASTRA 431520**
TENDER NO	**BHE/PW/PUR/PLT-STG/920**

SL NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document
A	Submission of Integrity Pact duly signed (if applicable)	**NOT APPLICABLE**	
B	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	**APPLICABLE**	
C	**Technical** **C) Bidder must have, achieved any one of the following in last seven years as on the latest date of offer Submission**. C.1) Executed Erection, Testing and Commissioning (Up to Synchronization of the Unit or beyond) of One set of Steam Turbine Generator (STG) of 100 MW or higher rating. C.2) Executed Erection, Testing and Commissioning (Upto Synchronization of the Unit or beyond) of One set of Gas Turbine Generator of 190 MW or higher rating C.3) Executed One BOILER**(with rotating machinery) (upto synchronization or beyond) of one unit of above 400 MW , under direct order from BHEL subject to: a) Experience of STG of atleast 60 MW (E & C upto synchronization or beyond). OR b) Technical Tie-up with an agency who has experience of STG of 60 MW or above (E & C upto synchronization or beyond).		
D 1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (Audited) of **Rs 144 Lakhs** or more over last three Financial Years (FY) i.e 2008-2009, 2009-2010, 2010-11		
2	NETWORTH Net worth of the Bidder based on the latest Audited Accounts		

	as furnished for 'D1' above should be positive		
3	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'D1 above based on latest Audited Accounts.		
E	Approval of Customer Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	**APPLICABLE**	
F	**Technical Tie-up Criteria**	**APPLICABLE AS PER PQR SL N. C.3**	
	Explanatory Notes for QR 'A' **SHALL BE UPLOADED SHORTLY**		

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	
		APPLICABILITY	BIDDER REPLY
5	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
6	Whether Audited profit and Loss Account for the last three years submitted	Applicable	YES/NO
7	Whether Copy of PAN Card submitted	Applicable	YES/NO
8	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	YES/NO
9	Integrity Pact	Not Applicable	Not Applicable
10	Declaration by Authorised Signatory	Applicable	YES/NO
11	Whether No Deviation Certificate submitted	Applicable	YES/NO
12	Whether Declaration confirming knowledge about Site Conditions submitted	Applicable	YES/NO
13	Whether Declaration for relation in BHEL submitted	Applicable	YES/NO
14	Whether Non Disclosure Certificate submitted	Applicable	YES/NO
15	Whether Bank Account Details for E-Payment submitted	Applicable	YES/NO
16	Capacity Evaluation of Bidder for current Tender	Applicable	YES/NO
17	Tie Ups/Consortium Agreement are submitted as per format	Not Applicable	Not Applicable
18	Whether Power of Attorney for Submission of Tender/Signing Contract Agreement submitted	Applicable	YES/NO
19	Whether Analysis of Unit rates submitted	Applicable	YES/NO

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE 3:

IMPORTANT INFORMATION

1 PRICE VARIATION COMPENSATION

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

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

2. INTEREST BEARING RECOVERABLE ADVANCE

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

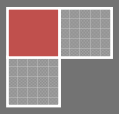
- **Bank Guarantee towards 'Interest Bearing Advance' shall be atleast 110% of the advance so as to enable recovery of not only principle amount but also the interest portion, if so required.**
- **'Interest Bearing Recoverable Advance' shall not be paid in less than two installments. Contractor shall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

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

920

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

1.0 Project Information

1.1 INTROUCTION

The owner Maharashtra State Power Generation Company Limited is setting up a New 1x250MW Thermal power station named as New Parli Power Project Unit #3. The project is about 6 KM From the existing Parli Thermal Power Station.
This tender is for 3RD unit of New Parli Power project.

APPROACH TO SITE

Nearest railway station: Parli Railway station under South Central Railway. This project shall be connected to the Parli Vaijnath Rly siding as well as existing Rly Siding through broad guage rail system.

Site is also approachable by all weather Parbhani-Parli road.

Nearest Airport : Nanded about 130 KM & Aurangabad about 221 KM.

CLIMATE

1. Maximum temperature	:	48-50 Deg Celcius
2. Minimum temperature	:	6-8 Deg Celcius
3. Maximum Relative Humidity	:	91%
4. Minimum Relative Humidity	:	18%
5. Average Annual rainfall	:	860 mm
6. Seismic Zone	:	II
7. Height above MSL	:	433.5 M

2.0 SCOPE OF WORK

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

Collection of materials from BHEL/client's stores/storage yard; transportation to site; erection, testing & assistance for commissioning, trial operation, PG Test and handing over of the following:-

1. Steam Turbines & Turbo Generators along with associated equipment.
2. Condensate system comprising of Surface condenser, Gland steam Condenser.
3. Regenerative cycle auxiliaries comprising of CEP, LP Heaters, MDBFP, HP Heaters along with associated piping for each Steam Turbine.
4. HP/LP Bypass system
5. FST & Deaerator
6. 2x100% Condenser air evacuation system
7. CW & ACW pump
8. Hot well make up Pump and associated piping & control valves.
9. Central Lube oil storage & transfer system (common for Turbine Generator set).
10. TG integral piping
11. External piping
12. Thermal insulation refractory & cladding of piping & equipments.
13. CW piping up to A row along with associate BFV's RE joints and debris filter.
14. Condenser On load Tube cleaning system.
15. Special grouts like Pagel VI for grouting for TG.
16. Empty H2 & CO2 cylinder.
17. Filling & top up of H2, CO2 & N2, lube oil, lubricants and consumable till handing over.
18. Generator Hydrogen gas purity analyzer including all accessories like piping, valves, flanges etc.
19. Operating platforms around the deaerator for pipe hangers of critical pipelines at turbine side, local platforms for various inaccessible valves and equipment etc
20. Painting of all erected equipments and structures.

of 1x250 MW New Parli # 3.

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Open space for labour colony (as per availability)		Yes	
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	**Electricity For construction purposes** of Voltage 415/440 V	Yes		Free; however, bidder shall be required to pay for electricity duty and taxes as levied by the Govt at the prevailing rates
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc of the bidder**			Chargeable as per standard rates

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	Bidder	
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**			Chargeable as per standard rates
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	**WATER SUPPLY**			

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.3.1	**For construction purposes**			Free; duty & taxes, if levied by the Govt, shall be payable by the bidder
a	Making the water available at single point	Yes		In case of inadequate supply / non-availability of construction water from customer, contractor shall have to arrange construction water at his own expenses.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**Water supply for Living Purpose**			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Telephone, fax, internet, intranet, e-mail etc		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	

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

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

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

A: MAJOR TOOLS AND PLANTS & MMDs TO BE DEPLOYED BY THE CONTRACTOR

S.N.	DESCRIPITION	CAPACITY	QUANTITY
1	CRANES	OF SUITABLE CAPACITY	AS PER REQUIREMENT
2	TRAILER WITH HORSE	OF SUITABLE CAPACITY	-DO-
3	TRAILER TROLLEY	OF SUITABLE CAPACITY	-DO-
4	WELDING GENERATOR SETS (ELECTRIC AS WELL AS DIESEL)		AS PER REQUIREMENT
5	3- PHASE COMPLETE SET UP FOR DRAWAL OF POWER		-DO-
6	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURSE AND FILM VIEWER		-DO-
7	TIG WELDING SET		-DO-
8	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS		-DO-
9	ELECTRICAL BAKING OVEN – BIG		-DO-
10	ELECTRODE BAKING OVEN – PORTABLE		-DO-
11	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS		-DO-
12	VACUUM CLEANER (INDUSTRIAL)		-DO-
13	PIPE CUTTING AND BEVELLING MACHINE		-DO-
14	PIPE BENDING M/C	ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE	-DO-
15	AIR COMPRESSOR	120 CFM	01 NO
16	STEP DOWN TRANSFORMER	230V/24V	AS PER REQUIREMENT
17	CONDENSER TUBE EXPANDER SET		DO
18	ELECTRICALLY OPERATED WINCHES	3T/5T	DO
19	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)		DO
20	**HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :**		
	A) - JACKS (WITH HAND OPERATED PUMPS)	100 MT	04 NOS.
	B) - JACKS (WITH HAND OPERATED PUMPS)	50 MT	04 NOS.
	GANG OPERATED JACKS CONSISTING OF THE FOLLOWING :		
	A) - JACKS (HAVING BROAD BASE ONE INCH LIFT)	100 MT	04 NOS.
	B) - JACKS (WITH 4-6 INCH LIFT , FOR GEN.	63 MT	04 NOS.

	END SHIELDS)		
	C) - LONG HIGH PRESSURE HOSES (FOR GENERATOR ALIGNMENT)		08 NOS.
ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.			
21	TORQUE WRENCH	0 TO 200 N-M	01 NO.
22	TORQUE WRENCH	UPTO 2000 N-M	01 NO.
23	SLINGS FOR LP TURBINE ROTOR		01SET
24	SLINGS FOR HP TURBINE MODULE		01SET
25	SLINGS FOR GENERATOR ROTOR		01SET
26	BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FOUNDATION BOLTS)		AS PER REQUIREMENT
27	LONG FEELER GAUGE SET		AS PER REQUIREMENT
28	SPANNERS / EYE BOLTS (OF ALL SIZES)		AS PER REQUIREMENT
29	HYDRAULIC TEST PUMPS AND FILL PUMPS		AS PER REQUIREMENT
30	**ANY OTHER MAJOR T&P REQUIRED FOR SATISFACTORY COMPLETION OF THE WORKS.**		

B: MEASURING AND MONITORING DEVICES (MMD):

To be finalized at site as per requirement.

NOTE:

The above list at A & B is only indicative and neither exhaustive nor limiting. Quantities indicated above are only the minimum required. Contractor shall deploy all necessary T&P to meet the schedules & as prescribed by BHEL engineer and required for completion of work.

SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
01	130/30 MT EOT CRANE IN TG HALL	2 Nos.	FOR HANDLING AND ERECTION WITHIN TG HALL ON SHARING BASIS AS AVAILABLE AND SUBJECT TO THEIR ACCESSIBILITY AND APPROACHABILITY.

NOTE:

1. **Operator for EOT crane will be provided by the contractor.**

2. EOT crane will be used on sharing basis by other agencies working within the TG hall under the instruction of BHEL. The contractor shall extend the services of his operator to such other agencies as well on mutually agreed mode of cost sharing.

3. Above T&P will be provided on sharing basis only. Contractor has to plan his activities well in advance and inform BHEL Engineer in charge/ Construction Manager the date of actual use.

6.1 MOBILIZATION, TIME SCHEDULE & CONTRACT PERIOD

6.1.1
INITIAL MOBILIZATION

Contractor shall reach site, make his site establishment and be ready to commence the erection work within two weeks from the date of issue of Fax Letter of Intent or as per the directions of Construction Manager/ Project Manager of BHEL.

6.1.2
MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC

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

6.1.3
COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

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

Based on the availability of civil foundations from customer and materials from manufacturing units, contractor may have to advance the start of erection after getting clearance from construction manager, or the start of erection may get delayed due to site condition.

The contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:

ACTIVITY	TENTATIVE SCHEDULE OF COMPLETION FROM START OF CONDENSER ERECTION
Turbine Box up	9th month
Barring Gear	11th month
Rolling & Synchronization	12th month
Completion of Trial Operation	14th month
PG Test & Completion of all facilities	15th month

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 as per the instructions of BHEL.

6.1.4

DURATION

The total contract period for completion of entire work shall be **15 (Fifteen) months** from the start of erection. Erection of the first major equipment, as identified by BHEL site-in-charge, on its permanent location/ foundation shall be reckoned as the start of contract period. Erection of small components like packer plates, insert plates, etc. will not be considered for this purpose.

However the contractor shall have to mobilize his resources earlier than the start of contract period for preparatory work like taking over and chipping of foundations, blue-matching and grouting of packer plates etc.

The contractor shall complete all the works in the scope of this contract within the contract period. Pending points identified by the customer/BHEL during the execution of the contract are to be liquidated during the contract period itself. Contractor to carry out installation of impulse pipes, fittings, thermowells /thermo couples etc required for successful completion of Performance Guarantee test and provide in assistance for installation & removal of PG test instruments and conductance of test.

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

FOR EACH STG

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	PIPING (8) ON PER MT BASIS
	Overall weightage for each area out of lumpsum value quoted for STG	**20%**	**18%**	**12%**	**13%**	**11%**	**10%**	**16%**	
Sl. No.	**Activity/Work Description**	**%**							
I	**PRO RATA PAYMENTS (85%)**								
1	**CONDENSER (weightage 20%)**								
1.1	PREPARATION OF FOUNDATION	2%			--			--	
1.2	PLACEMENT, ALIGNMENT, ASSEMBLY AND WELDING OF BOTTOM PLATE SEGMENTS, HOT WELL, NDT AND SPRING ELEMENTS PLACEMENT & GROUTING.	10%			--			--	
1.3	ASSEMBLY AND POSITIONING OF WATER CHAMBER, SIDE PLATES, BOTTOM PLATES, WELDING AND NDT INCLUDING HINGE ASSY	12%		--	--			--	
1.4	ASSEMBLY, ALIGNMENT AND WELDING & NDT OF TUBE SUPPORT PLATES AND INTERNALS LIKE BAFFLE PLATES, AIR EVACUATION PIPES ETC.	13%		--	--			--	
1.5	ASSEMBLY, WELDING & NDT OF DOME WALLS AND DOME STIFFENERS, EXTRACTION PIPING AND STEAM THROW DEVICE, LPH-1 SUPPORT ETC.	10%		--	--			--	
1.6	INSERTION, EXPANSION, CUTTING ETC. OF CONDENSER TUBES	15%		--	--			--	
1.9	HYDRO TEST OF STEAM AND WATER SIDE	10%		--	--			--	
1.10	WELDING OF CONDENSER NECK JOINT AND NDT& COMPLETION OF BALANCE WORKS	10%		--	--			--	
1.11	ERECTION, COMMISSIONING, LOAD TESTING OF CONDENSER WATER BOX HANDLING SYSTEM	3%		--	--			--	

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	PIPING (8) ON PER MT BASIS
	Subtotal for condenser	**85%**							
2	**TURBINE (18 %)**							--	
2.1	PREPARATION OF FOUNDATION, PLACEMENT, ALIGNMENT AND GROUTING OF BASE PLATES OF LPC AND BEARING PEDESTALS	--	7%		--			--	
2.2	PLACEMENT AND ALIGNMENT OF LP OUTER CASING BOTTOM PORTION AND CENTRE GUIDE KEYS	--	5%		--			--	
2.3	PLACEMENT OF LP ROTOR AND ALIGNMENT WITH INNER CASING AND CHECKING OF BLADE CLEARANCE	--	9%		--			--	
2.4	ASSEMBLY, ALIGNMENT & WELDING OF LP OUTER CASING UPPER HALF	--	9%		--			--	
2.5	PLACEMENT AND ALIGNMENT OF IP TURBINE OUTER CASING AND INNER CASING (LOWER HALVES)	--	2%		--			--	
2.6	PLACEMENT AND ALIGNMENT OF IP ROTOR WITH LOWER CASING AND BOXING UP OF INNER & OUTER CASING (UPPER HALVES) & ROLL CHECK	--	5%		--			--	
2.7	FINAL BOX UP OF IP TURBINE	--	0%		--			--	
2.8	BOXING UP OF LP INNER-INNER & INNER- OUTER AND ROLL CHECK	--	5%		--			--	
2.9	PLACEMENT OF HP TURBINE, LOWERING OF HP ROTOR ON BEARINGS AND CHECKING OF CLEARANCES, COUPLING, HP TURBINE SWING CHECKS ETC.	--	5%		--			--	
2.10	ALIGNMENT OF ALL ROTORS INCLUDING REAMING, HONING AND FIXING OF COUPLING BOLTS		9%						
2.11	ASSEMBLY OF GOVERNING SYSTEM/EQUIPMENT		5%						
2.12	INSTALLATION OF ESVS, IVS, LPBP VALVES, MS STRAINERS (INTERNALS), HRH STRAINERS (INTERNALS)	--	9%		--			--	
2.13	ERECTION, ALIGNMENT AND WELDING OF CROSS AROUND PIPING	--	5%		--			--	

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	PIPING (8) ON PER MT BASIS
2.14	FINAL BOX-UP OF LP TURBINE	--	5%		--			--	
2.15	ASSEMBLY AND PREPARATION OF HYDRO-TEST, STEAM BLOWING DEVICES AND NORMALISATION ETC.	--	0%		--			--	
2.16	FINAL BOXING UP OF PEDESTALS AFTER OIL FLUSHING COMPLETION	--	5%		--			--	
	Subtotal for Steam Turbine		**85%**						
3	**TURBO GENERATOR (12%)**	--		--	--			--	
3.1	PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES	--		5%				--	
3.2	LIFTING, LEVELLING AND ALIGNMENT OF STATOR (including erection and dismantling of portal crane if used for stator lifting)			23%				--	
3.3	FIXING OF END SHIELDS ON TO FOUNDATION BEAMS	--	--	6%				--	
3.4	ROTOR INSERTION	--	--	6%				--	
3.5	BOXING UP OF GENERATOR AND ASSEMBLY OF HYDROGEN SEALS	--	--	11%				--	
3.6	ALIGNMENT OF GENERATOR ROTOR WITH LP TURBINE ROTOR, RUN-OUT CHECKS AND REAMING, HONING OF COUPLING HOLES AND FIXING OF COUPLING BOLTS	--	--	9%				--	
3.7	ERECTION OF EXCITATION EQUIPMENTS & ALIGNMENT OF GEN.-EXCITER ROTORS INCLUDING SWING CHECK AND COMPLETION OF BALANCE WORKS	--	--	10%				--	
3.8	INSTALLATION OF ENCLOSURES OF GENERATOR/EXCITER WITH ALL AUXILIARIES	--	--	5%				--	
3.9	GROUTING OF GEN BEARING PEDESTALS AND EXCITOR	--	--	5%				--	
3.10	FINAL GAS TIGHTNESS TEST OF STATOR WITH COMPLETE SYSTEM	--	--	5%				--	
	Subtotal for Generator			**85%**					
4	**PUMPS AND AUXILIARIES (13 %)**	--	--		--			--	

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	PIPING (8) ON PER MT BASIS
4.1	ERECTION / TESTING and commissioning OF MAIN OIL PUMP, JOP, EOP, AOP, CENTRALISED LUBE OIL PURIFICATION SYSTEM, ALONG WITH ALL AUXILLIARIES	--	--		18%			--	
4.2	ERECTION / TESTING and commissioning OF THREE MOTOR DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				44%				
4.3	ERECTION, TESTING, GROUTING ETC. OF DMCW (BOILER & TG) PUMPS	--	--	--	13%			--	
4.4	ERECTION, TESTING, GROUTING ETC. OF CONDENSATE EXTRACTION PUMPS	--	--	--	10%			--	
	Subtotal for pumps and Auxiliaries				**85%**				
5	**HEATERS AND DEAERATORS (11%)**								
5.1	ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS	--	--	--		27%		--	
5.2	ERECTION, TESTING & COMMISSIONING OF GLAND STEAM CONDENSER, DRAIN COOLERS	--	--	--		12%		--	
5.3	ERECTION, TESTING & COMMISSIONING OF DE-AERATOR, FEED STORAGE TANK AND ASSOCIATED APPROACH PLATFORM WITH LADDERS ETC.	--	--	--		46%		--	
	Subtotal FOR HEATERS AND DEAERATORS	**--**	**--**	**--**		**85%**		**--**	
6	**MISCELLANEOUS ITEMS (10%)**								
6.1	DEBRIS FILTERS, RE JOINTS, ME BELLOWS, DIRTY, CLEAN OIL TANKS, ENCLOSURES, CO2/H2 CYLIDER RACKS ETC						17%		
6.2	CW PUMPS, RELATED ITEMS	--	--	--			15%		
6.3	ACW PUMPS, RELATED ITEMS/ BOILER FILL PUMPS	--	--	--			7%		
6.4	ERECTION, TESTING & COMMISSIONING OF CONTROL FLUID TANK, C.F. COOLERS, C.F. PUMPS, PURIFICATION UNIT ETC.	--	--	--			7%		
6.5	ERECTION, TESTING & COMMISSIONING OF FLASH TANKS & FLASH VESSELS	--	--	--			8%		

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	PIPING (8) ON PER MT BASIS
6.6	ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE	--	--	--			8%		
6.7	ERECTION, TESTING & COMMISSIONING OF CONDENSER ON LOAD TUBE CLEANING PACKAGE/ CONDENSATE TRANSFER PUMPS	--	--	--			10%		
6.8	ERECTION, TESTING & COMMISSIONING OF SELF CLEANING STRAINER PACKAGE	--	--	--			5%		
6.9	ERECTION, TESTING & COMMISSIONING OF MISC. HOISTS & CHAIN PULLEY BLOCKS.						8%		
	Subtotal for MISCELLANEOUS ITEMS						**85%**		
7	**INTEGRAL PIPING (16%)**	--	--	--				--	
7.1	Turbine Integral piping and Generator Integral piping consisting of Lube oil, Jacking oil, Oil vapour extraction, Seal Oil, Control oil, Seal steam, Condensate spray/Exhaust Hood spray, Turbine water drainage, Gas Piping, Primary Stator Water piping, etc including all accessories like thermowells, probes, orifices etc and hangers and supports (Erection and commissioning on prorata basis)	--	--	--				85%	
	Total for integral piping							**85%**	
8	**PIPING**								
8.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION TO BE PAID ALONG WITH PLACEMENT IN POSITION)								15%
8.2	PLACEMENT IN POSITION								20%
8.3	ALIGNMENT								15%
8.4	WELDING/BOLTING/FIXING								20%
8.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be clubbed with next activity)								5%
8.6	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG								5%
8.7	HYDRAULIC TEST/PNEUMATIC TEST WHERE EVER APPLICABLE								5%
	Total for Prorata (85%)	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	PIPING (8) ON PER MT BASIS
II	**STAGE/MILESTONE PAYMENTS (15%)**								
1	Boiler Light Up	0%	0%	0%	0%	0%	0%	0%	0%
2	ABO	0%	0%	0%	0%	0%	0%	0%	0%
3	Steam Blowing	0%	0%	0%	0%	0%	0%	0%	0%
4	Safety Valve Floating	0%	0%	0%	0%	0%	0%	0%	0%
5	Oil Flushing (TG)	1%	1%	1%	1%	1%	1%	1%	1%
6	Barring Gear (TG)	1%	1%	1%	1%	1%	1%	1%	1%
7	Rolling and Synchronisation	3%	3%	3%	3%	3%	3%	3%	3%
8	Coal Firing	0%	0%	0%	0%	0%	0%	0%	0%
9	Full Load	2%	2%	2%	2%	2%	2%	2%	2%
10	Trial Operation of Unit	2%	2%	2%	2%	2%	2%	2%	2%
11	Painting (including arrow marking, nomenclature, etc)	2%	2%	2%	2%	2%	2%	2%	2%
12	Area cleaning, temporary structures cutting/removal and return of scrap	1%	1%	1%	1%	1%	1%	1%	1%
13	Punch List points/pending points liquidation	1%	1%	1%	1%	1%	1%	1%	1%
14	Submission of 'As Built Drawings'								
15	Material Reconciliation	1%	1%	1%	1%	1%	1%	1%	1%
16	Completion of Contractual Obligations	1%	1%	1%	1%	1%	1%	1%	1%
	Total for Milestone/Stage payments (15%)	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**
	Total of I & II	**100 %**	**100%**	**100 %**	**100%**	**100%**	**100%**	**100 %**	**100%**

Note:

- Wherever application of INSULATION is applicable, same shall be covered under the respective item/equipment for 'Terms of Payment'.

TAXES, DUTIES, LEVIES

8.1 TAXES, DUTIES, LEVIES

8.1.1

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

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

8.1.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate (presently 10.3 %) on the admitted bill value.

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

I. **The name, address and the registration number of the contractor,**
II. **The name and address of the party receiving taxable service,**
III. **Description, classification and value of taxable service provided and,**
IV. **The service tax payable thereon.**

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

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

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is

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

8.1.5 Modalities of Tax Incidence on BHEL

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

8.1.5 New Taxes/Levies

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

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

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

8.1.6 Submission of Periodical Reports

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

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

BHEL at site will inform formats for these reports.

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

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

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

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

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

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

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

SPECIFIC INCLUSIONS

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

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

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

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

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

9.6
Assembly and installation of strainer elements of MS and HRH system is within the scope of work. Cleaning of these strainer elements during trial operation of machine is also covered under this scope.

9.7
Chipping of foundation, placement, erection, alignment, commissioning, grouting, mounting of equipment mount instruments, panels and other fittings of BHEL (PEM bought out items) supplied pumps & packages are in scope of the work. Erection and commissioning of these equipments/pumps & packages will be required to complete and meet the commissioning schedule/ milestone activities of other areas like boiler, etc. Contractor shall plan and complete erection & commissioning of these equipments on priority as per decision of BHEL engineer/customer requirement. Details of such systems are furnished in relevant appendix.

9.8
Most of the Misc. Pumps with drive motors, base frame, fittings etc will be supplied in loose parts/ dismantled condition as skid mount. These pumps along with drive and fittings shall be assembled at site. The Delivery will be taken from BHEL stores/storage yard and will be assembled/ installed at different locations as per drawing and instruction of BHEL Engineer at site. The work involved is preservation, assembly, installation, erection, alignment, foundation grouting including providing non-shrink free flow grout mix material, fixing of loose items, filling

of lubricants, greasing, commissioning, no load/ load trial run of motors & pumps. All the works shall be carried our as part of scope of work.

These Misc. pumps will be required for erection and commissioning of other systems, pipings, equipments which will be under scope of erection of other agencies. Contractor shall carry out the installation, erection and alignment works etc. as per priority decided by BHEL Engineer at site to enable the other agencies to proceed with their work. Contractor shall carry out the welding of terminal point/interface/matching & connected flanges joints, pipe joints etc. of other system & other agencies as scope of work. The decision of BHEL Engineer shall be final and binding on contractor.

9.9
Electric wire rope hoists shall be erected tested and commissioned for vacuum pump motor handling and CW butterfly valves handling. Chain pulley blocks with trolley (manual operated) shall be erected, tested and commissioned for control fluid system, central lube oil system etc.

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

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

9.12
PRIMERS & PAINTS
BHEL will provide paint & primer for final painting only. Primers and paints for other requirements are in contractor's scope.

9.13
WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES

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

9.14
All the required welding electrodes as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. on receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL regarding type of electrodes, batch number, date of expiry etc. Batch test certificates shall be made available for verification & record before the actual use of the welding consumables.

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

9.15

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

9.16

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

10.0 EXLUSIONS

The following are specific exclusions from the scope of work/ specification:-

A) All cable connections, except those specified as scope of work.

B) Measuring instruments, monitoring, relaying, protection and signaling equipments other than those supplied with the equipments by / on behalf of BHEL and which have been indicated as scope of work.

C) Erection, testing and commissioning of electrical panels and starting resistors for DC JOP and DC EOP pumps

D) Electrical testing of motors, turbo-generator. However erection of these items will be under the scope of this tender specification.

E) Impulse piping and fittings from the tapping points of various equipments other than those specified as scope of work.

F) Civil works to the extent not specifically provided for in this tender.

G) Supply of materials for temporary piping (pipe, valve, structural steel etc.) required for hydraulic test, chemical cleaning, flushing or steam/air blowing of the pipelines.

H) Supply of chemicals and lube oil for pre-commissioning and commissioning activities.

I) Some sub-delivery items and electrical components such as push-buttons, junction boxes etc.

J) E&C work of cable trays, cables and earthing etc

K) All electrical and control & instrumentation items except those specified elsewhere in these specifications.

L) Supply of primer and paints for final painting

M) Pneumatic copper tubing and fittings thereof.

N) Application of spray insulation of steam turbine.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I
WEIGHT DETAILS

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
A.	**STEAM TURBINE:**		
1.	HP TURBINE	5060x3100x2900	56100
2.	HP INLET ASSY.	450X450X200	45
3.	HP EXHAUST ASSY.	1625X1335X675	1190
4.	HPT RELATED PARTS	1000X1000X500	190
5.	FRONT BEARING PEDESTAL	2950X2600X1600	12280
6.	PARTS OF FRONT BEARING	1800X1700X1000	600
7.	PARTS OF FRONT BEARING PEDESTAL	SUITABLE PACKAGE	115
8.	VALVE SUPPORT FOR HP OVERHAUL	1000X1000X400	800
9.	COMPENENTS OF ASSY. FIXTURE FOR HPT	3800X2500X1200	6864
10.	COMPENENTS OF ASSY. FIXTURE FOR HPT	3800X2100X900	1800
11.	COMPENENTS OF ASSY. FIXTURE FOR HPT	3300X2100X1210	3352
12.	COMPENENTS OF ASSY. FIXTURE FOR HPT	5010X4000X120	3356
13.	HYDRAULIC TURNING GEAR	1400X1400X1200	1000
14.	STEAM BLOWING & TEST DEVICE	2900X2100X1140	3160
15.	GLAND STEAM VALVE WITH ACT.	1750X1400X850	500
16.	ESV & CV CASING WITH VALVES	2850X2600X1900	2X8515
17.	ESV SERVO MOTOR WITH L.S.V MTG.	2100X1350X1250	2X1662
18.	LIMIT SWITCH MTG. TEST VALVES	2100X1350X1250	2X1900
19.	CONTROL VALVES SERVO MOTORS	2000X1500X1500	2X1900
20.	IP TURBINE	5750x3800x4070	58175
21.	I.P. TURBINE PARTS	700X700X500	285
22.	I.P. INLET PIPE ASSY	3700X2200X1900	7130
23.	INSPECTION SHAFT FOR IPC	3300X700X700	775
24.	HP-IP BEARING PEDESTAL ASSY.	4080X2005X2126	13275
25.	HP-IP BEARING PEDESTAL PARTS	1000X600X600	388
26.	HP-IP BEARING PEDESTAL PARTS	500X200X150	38
27.	AUX. OF IP TURBINE	1050X480X550	390
28.	AUX. OF IP TURBINE	1100X500X650	2X204
29.	SUSPENSION OF VALVE (IV)	3500X1500X700	2X2700
30.	ASSY DEVICE FOR VALVES	920X1000X450	213
31.	I.P. CONTROL VALVE SERVOMOTORS	2000X1300X1350	2X1880
32.	IV & CV CASING WITH VALVES	3790x3450x2565	2X18696
33.	FRAME FOR SUSPENSION (IV)	SUITABLE PACKAGE	2X765
34.	LOOSE ITEMS OF FRAME FOR SUSPENSION	600X450X250	300
35.	SOLE PLATE PEDESTAL ASSY.	3400X1200X800	2510

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
36.	BASE PLATE ASSEMBLY	4500X1400X1200	4500
37.	BASE PLATE ASSEMBLY	2300X1250X600	2560
38.	BASE PLATE LP CASING	2300X2075X981	2680
39.	LP ROTOR	6200x3010x2920	56572
40.	LP OUTER CASING PARTS	7060X1480X2760	2X8085
41.	LPC OUTER CASING PARTS	4570X3230X980	2X2500
42.	COMPONENTS OF LP CASING UPPER PART	3500X300X300	495
43.	LP OUTER CASING PATRS	3450 X 1000X1100	900
44.	ASSEMBLY DEVICES	900X700X550	180
45.	AUX. OF LP TURBINE	3000X1300X1000	2100
46.	AUX. OF LP TURBINE	2000X1000X1825	2X1142
47.	LP JOINT COVERING	2300X1800X940	1235
48.	ASSY. TOOLS	1900X1000X890	500
49.	CAP (SPRING SUPPORT)	825X500X400	2X400
50.	CAP (COMPEN.ASSY)	3240X1740X1340	2X3500
51.	CAP (OBLIQUE REDUCER ASSY)	1400X1400X1200	800
52.	CAP (MIDDLE BEND ASSY)	1550X1550X1300	670
53.	CAP (COMPLEN. ASSY)	3240X1740X1340	3512
54.	CAP (MAN-HOLE ASSY)	1500X1600X1100	2X750
55.	CAP (MITRE BEND ASSY)	1550X1550X1300	2X670
56.	CAP (PIPE ASSY)	2000X1100X1200	645
57.	CAP (MITRE BEND ASSY)	1550X1550X1300	670
58.	LONGITUDINAL GIRDER (LEFT & RIGHT)	6800X1820X1570	2X15182
59.	LP FRONT WALL (TS & GS)	6820X3750X910	2X10053
60.	LP SHAFT SEALING FRONT	1800X1700X740	2X2260
61.	LP SHAFT SEAL COMPENSATOR ASSY (TS)	1440X1420X520	2X1456
62.	LP CASING ASSY (FATRENERS)	1800X1700X740	2653
63.	LP CASING ASSY (PARTS)	3760X2060X860	4900
64.	LP CASING ASSY (PARTS)	450X450X250	4900
65.	EXTRACTION PIPE LINE (LPC)	1600X1000X750	520
66.	EXTRACTION PIPE LINE (LPC)	3100X1350X750	670
67.	EXTRACTION PIPE LINE (LPC)	2400X1350X850	1004
68.	EXTRACTION PIPE LINE (LPC)	3300X1100X700	2X725
69.	EXTRACTION PIPE LINE (LPC)	2700X1200X750	585
70.	EXTRACTION PIPE LINE (LPC)	1100X850X850	315
71.	EXTRACTION PIPE LINE (LPC)	2700X1750X1100	730
72.	EXTRACTION PIPE LINE (LPC)	1550X1450X900	538
73.	EXTRACTION PIPE LINE (LPC)	2000X600X600	345
74.	EXTRACTION PIPE LINE (LPC)	2600X2000X1400	1330

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
75.	INNER GUIDE PLATE OF DIFFUSER (TS & GS)	2600X2400X1000	2X2134
76.	DIFFUSER (TS & GS)	4880X1730X2340	2X3640
77.	LP- GEN. PEDESTAL ASSY	3220X2285X2075	10200
78.	IP- LP PEDESTAL ASSY	3700X1860X2100	14600
79.	LP INNER OUTER CASING (U/H)	6720X3150X2325	21750
80.	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2325	30907
81.	LP INNER CASING ASSY (FASTENERS)	1800X1700X740	1760
82.	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000	11722
83.	STEAM INLET PIPE (LPT)	2700X1300X900	840
84.	BEARING PEDESTAL PARTS	1000X700X700	850
85.	STUD HEATING DEVICE & BREACHNUT HEATING DEVICE	1500X1200X250	315
86.	CRH NRV WITH SERVOMOTOR	3100X3040X2410	5860
87.	STEAM BLOWING DEVICE CRH NRV	2000X1000X500	973
88.	GOVERNING CONTROL RACK ASSY	4700X1900X3300	4000
89.	LPBY PASS VALVE SUSPENSION	2900X1200X300	1000
90.	OIL FLUSHING & PRESSURE TEST DEVICE	750X400X550	130
91.	MAIN OIL TANK & NOZZLE ARGMNT.ASSY.	5180 x 3120 x 2650	9100
92.	MAIN OIL TANK & NOZZLE ARGMNT.ASSY.	3600 x 1100 x 800	550
93.	INJECTION FOR SUCTION PIPE NB300	3300X1750X1200	999
94.	INJECTION FOR SUCTION PIPE NB350	3300X800X800	588
95.	OIL STRIPPER	600X600X850	2X133
96.	OIL STRINERS	2050X1200X1410	568
97.	VARIABLE ORIFICES THROTTLE VALVE	1000X500X250	115
98.	LEAKAGE OIL TANK	1000X1000X3000	515
99.	WASTE OIL TANK	1000X1000X3000	515
100.	OIL STRAINERS	2050X1200X1410	470
101.	CHANGE OVER VALVE	500X400X200	49
102.	ATT. SOLENOID VALVES	600X300X300	90
103.	TURBINE INTRUMENT RACKS	2750X1000X800	858
104.	TURBINE INTRUMENT RACKS	2300X750X750	765
105.	HOUSING FOR MS STRINER	1700X1025X900	3000
106.	HOUSING FOR MS STRINER	1725X1025X730	3000
107.	STEAM STRINER ASSY DEVICE	SUITABLE PACKAGE	652
108.	OPEN HOUSING FOR HRH STEM STRINER	2200X1450X1100	2X3500
109.	MAIN STEAM STRAINER	1100X700X350	2X374

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
110.	HRH STRAINER	1600X1450X750	2X485
111.	STEAM STRAINER HOUSING BLANKING DEVICE ARRNMT.	1800X1650X1140	2945
112.	COMPENSATOR	600X600X900	50
B:	**GENERATOR :**		
14.	FOUNDATION ITEMS OF GEN.	3380X760X840	4345
15.	FOUNDATION ITEMS OF GEN.	2240X940X1220	2880
16.	STATOR	7520x4200x4770	218000
17.	ROTOR	10550x1560x1660	47742
18.	END SHIELD LOWER HALF (TE)	3800x1155x2100	6000
19.	END SHIELD LOWER HALF (EE)	3800x1155x2100	6000
20.	END SHIELD UPPER HALF (EE)	3800x1155x2100	5600
21.	END SHIELD UPPER HALF (TE)	3800x1155x2100	5600
22.	H.V. BUSHING	2000x950x600	950
23.	LOOSE ITEMS OF WOUND STATOR	1500X1200X1000	1000
24.	GENERATOR ACCESSORIES	2140X1240X1040	1546
25.	TERMINAL BUSHING BOX	1100X835X950	4075
26.	GAS BAFFLE RING, INSERT COVER ETC	3700X3500X1340	4364
27.	BEARING SHELLS	1100X835X950	953
28.	SEAL RINGS	600x600 x200	73
29.	DEVICE FOR ROTOR INSERTION	2240X940X1220	1036
30.	ERECTION DEVICES	2550X1180X1140	997
31.	ERTECTION ROPES	1800X1450X200	210
32.	DRY AIR BLOWER	1350X1250X800	190
33.	TERMINAL CONNECTORS	1840X660X400	506
34.	BRUSHLESS EXCITER SET	5670x2390x2870	22386
35.	EXCITER FRONT COVER	4310X2950X2950	4122
36.	RR. WHEEL COVER & SEALING WALL DE FOR EXCITER	1800X1600X1600	970
37.	EXCITER REAR COVER	4330 X 3050 X 2950	3909
38.	EXCITER BED PLATE ACCESSORIES	5500 X 1050 X 800	3212
39.	EXCITER ACCESSORIES	2400X1100X1400	642
40.	SEAL OIL STORAGE TANK	3500X1300X1280	1460
41.	H2 DISTRIBUTER	3480X1540X440	1150
42.	CO2 DISTRIBUTER	2770X1240X440	247
43.	SEAL OIL UNIT-I	3550X2900X3700	9160
44.	SEAL OIL UNIT-II	3610X2040X1850	3263
45.	COOLER RACK ASSY FOR EXCITER	3000X1800X1100	1551
46.	GAS UNIT	2550X1790X2560	1150
47.	LIQUID DETECTOR RACK	1700X900X1800	450

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
48.	LOOSE VALVES	2000X1000X1000	959
49.	LOOSE INSTRUMENTS	1000X1000X500	80
50.	CO2 VAPURISER	1520X640X840	225
51.	GEN. PIPING	6650 X1250 X1200	5374
52.	GEN. PIPING	6150X1500X1200	3368
53.	GEN. PIPING	1900X1500X600	1752
54.	CONSUMABLES FOR FOUNDATION ITEMS	7520X4200X4770	15
55.	CONSUMABLES	500X600X300	45
56.	LOOSE ITEMS	1000X600X400	30
57.	LOOSE ITEMS	1000X800X400	90
C:	**HEAT EXCHANGERS** **I) CONDENSER**		
1.	HOTWELL	11200x 1900x1200	6913
2.	BOTTOM PLATE	7150x3450x625	2x6793
3.	BOTTOM PLATE	7150x3850x625	8296
4.	MIDDLE BOTTOM	1900x700x300	271
5.	CONDENSER SUPPRT	1750X1000X1250	4X3450
6.	CONDENSER SUPPRT	1600X950X950	4660
7.	WATER CHAMBER (LHS)	5224X3610X360	2X6150
8.	WATER CHAMBER (RHS)	5224X3610X360	2X6150
9.	FRONT WATER BOX (G.S.)	5950X3610X2485	15867
10.	FRONT WATER BOX (T.S.)	5950X3610X2485	15867
11.	REAR WATER BOX (GEN. SIDE)	4760X3610X2025	9576
12.	REAR WATER BOX (TUR. SIDE)	4760X3610X2025	9576
13.	SIDE WALL (TUR. SIDE)	5246X2480X16	1105
14.	SIDE WALL (TUR. SIDE)	5246X2480X16	3X1645
15.	SIDE WALL (TUR. SIDE)	5246X1670X16	1080
16.	SIDE WALL (TUR. SIDE)	1000X350X250	200
17.	SIDE WALL (TUR. SIDE)	1000X200X150	550
18.	SIDE WALL (GEN.END)	5248X1705X16	1105
19.	SIDE WALL (GEN.END)	5248X2480X16	3X1645
20.	SIDE WALL (GEN.END)	5248X1670X16	1080
21.	SIDE WALL (GEN.END)	1000X350X250	200
22.	SIDE WALL (GEN.END)	5850X200X150	550
23.	SHELL INTERNAL DETAILS	3650X850X625	4X4780
24.	SHELL INTERNAL DETAILS	1000X750X350	600
25.	SHELL INTERNAL DETAILS	3700X850X350	4600
26.	AIR EXTRACTION PIPING	5460X990X410	1200
27.	SHELL INTERNAL DETAILS	4700X3426X348	7X4100

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
28.	SHELL INTERNAL DETAILS	5500X940X630	7560
29.	SHELL INTERNAL DETAILS	4440X260X100	350
30.	SHELL INTERNAL DETAILS	3000X1500X500	4655
31.	LOWER DOME WALL (T.S)	11000X3950X910	8767
32.	LOWER DOME WALL (T.S)	4000X800X100	700
33.	LOWER DOME WALL (T.S)	900X300X300	270
34.	LOWER DOME WALL (G.S)	11000X3950X910	7690
35.	LOWER DOME WALL (G.S)	4000X800X100	700
36.	DOME WALL (G.S)	900X300X300	270
37.	LOWER DOME WALL (F.W.B SIDE)	7502X4046X545	6012
38.	LOWER DOME WALL (F.W.B SIDE)	6238X934X1155	1444
39.	LOWER DOME WALL (F.W.B SIDE)	1325X1150X500	550
40.	LOWER DOME WALL (R.W.B SIDE)	7550X4000X1800	6727
41.	LOWER DOME WALL (R.W.B SIDE)	6236X1134X1160	1427
42.	LOWER DOME WALL (R.W.B SIDE) LOOSE ITEMS	1300X1065X305	215
43.	DOME INTERNAL STIFFENING	6016X200X200	4X726
44.	DOME INTERNAL STIFFENING	3400X200X200	2X382
45.	DOME INTERNAL STIFFENING	1760X1480X1230	4300
46.	DOME INTERNAL STIFFENING	2380X1310X1100	4295
47.	UPPER DOME WALL (T/GEN.SIDE.)	6800X460X310	2X1083
48.	UPPER DOME WALL (F/W/B.SIDE.)	5880X1930X380	3635
49.	UPPER DOME WALL LOOSE ITEMS	5400X350X32	475
50.	UPPER DOME WALL LOOSE ITEMS	670X250X450	410
51.	UPPER DOME WALL LOOSE ITEMS	5880X1930X448	3270
52.	WATER BOX REMOVAL DEVICE	2500X1000X750	2600
53.	WATER BOX REMOVAL DEVICE	2000X1500X500	2135
54.	FRAME	1840X840X230	2X650
55.	STEAM THROW DEVICE	1000X800X800	2X970
56.	CONDENSER LOOSE ITEMS	850X250X250	30
57.	CONDENSER LOOSE ITEMS	2900X956X406	380
58.	CONDENSER LOOSE ITEMS	1000X500X500	275
59.	CONDENSER LOOSE ITEMS	1000X800X800	1450
60.	CONDENSER LOOSE ITEMS	600X320X200	6
61.	CONDENSER LOOSE ITEMS	3300X250X200	200
62.	STAND PIPE No.1	2750X420X400	61
63.	CONDENSER STAND PIPE	3150X350X330	300
64.	STAND PIPE No.2	2750X420X390	62

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
65.	CONDENSER SPRING SUPPRTS-2X28 Nos.)	--	17545
66.	CONDENSER SS TUBES (OD 28.575 MMX 0.889 MM TH.-296 Nos. AND OD 28.575 MMX 0.7112 MM TH.-15368 Nos.)	SUITABLE BOXES	87000
C:	**HEAT EXCHANGERS ii) HEATERS & COOLERS**		
1.	HP HEATER 5	2250x2300x10500	30600
2.	HP HEATER 6	2250x2300x11850	39300
3.	LP HEATER 1	11520x1400x1550	11800
4.	LPH-1 SUPPORT	SUITABLE PACKAGE	2200
5.	LPH-1 SUPPORT STRUCTURE LOOSE	SUITABLE PACKAGE	1300
6.	LP HEATER 2	9600x1350x1735	9950
7.	LP HEATER 3	9600x1270x1835	9875
8.	DRAIN COOLER	4650x1000x1250	3500
9.	TURBINE OIL COOLERS –2 NOS.	4650x1650x1980	2x7600
10.	T O C LOOSE ITEMS	750X500X200	80
11.	T O C LOOSE ITEMS	800X600X600	60
12.	AIR COOLER	2700X850X550	892
13.	SEAL OIL STORAGE TANK	3500X1300X1280	1460
14.	HYDROGEN COOLERS - 4 NOS.	8150X830X700	4X2400
15.	HYDROGEN COOLER ITEMS	400X200X250	250
16.	EXCITER AIR COOLERS –2 NOS.	2700X850X550	2X892
17.	COOLER RACK ASSMBLY FOR EXCITER	3000X1800X1100	1551
18.	CONTROL FLUID COOLERS- 2 NOS.	2700X850X550	2X1500
19.	LOOSE ITEM CFC	6000X600X500	103
D:	**FST & DEAERATOR**		
1.	FST – SECTION-I	8800X4000X4400	17200
2	FST SECTION-II	8300X4000X4400	17200
3.	FST SECTION-III	8700X4000X4400	17200
4.	DEAERATOR HEADER	9300X2400X2900	15000
5.	DEAERATOR LOOSE ITEMS STAND PIPE, SAFETY RELIEF VALVES, SPOOL PIECE ETC	LOT	1200
6.	DEAERATOR PLATFORM CARBON STEEL SCTRUCTURALS IN SECTIONS	LOT	9000

E- BFP Package details

Sl. No.	Description	Qty	Total wt. In Kg.
1.	Boiler feed pump with tubing	3	14000
2.	Booster pump with base plate & tubing	3	9200
3.	Hydraulic Coupling	3	10000
4.	Motor tubing	3	42000
5.	BFP Base plate	3	4000
6.	Hydraulic Coupling stool	3	460
7.	Lube oil Cooler for H.C.	3	1700
8.	Working oil Cooler for H.C.	3	4200
9.	Hydraulic Coupling and accessories	3 sets	2200
10.	Re-circulation Valve	3	1800
11.	Suction Strainer for BFP	3	5000
12.	Local Gauge racks for BFP set	9	2400
			96960

F- Details of Condensate Extraction Pumps.

SN	Description	Qty.	Each Size in mm	Total wt. (Kg.)
1.	Condensate Extraction Pump Assembly	2	6700x1700x1800	2x4150
2.	Foundation Frame	2	1600x1600x300	2x580
3.	Canister	2	4600x1200x1300	2x1920
4.	Basket type suction strainer at	2	1600x1600x1700	2x1500

	CEP suction			
5.	Local Gauge Racks	4	1300x900x2000	4x300
6.	CEP Motor	2	2600x2600x2900	2x7000
			Total Wt.	**31510**

G- CW Pumps Package details

Sl. No.	**Description**	**Qty**	**Each Size in mm**	**Total wt. In Kg.**
1.	Bell Mount	3	2000x2000x1500	3x1600
2.	Pump Casing	3	2000x1000x1500	3x1600
3.	Impeller	3	1200x1200x1200	3x1200
4.	Element –I	3	1600x1600x1800	3x1000
5.	Element –II	3	2000x2000x1800	3x1500
6.	Element –III	3	2000x2000x1800	3x1500
7.	Element -IV	3	2000x2000x1800	3x1500
8.	Discharge Elbow	3	2500x2500x3000	3x4000
9.	Spool Piece	3	1200x1200x1500	3x800
10.	Suspension	3	3000x3000x1500	3x2500
11.	Motor Stool	3	1200x1200x1600	3x800
12.	FDW Pump	6	3000x3000x800	6x1200
13.	Shafts	3 sets	1000x1000x3500	3x2000
14.	Thrust Bearing	3	1000x1000x1000	3x1000
15.	Fasteners	3 sets	1000x1500x1500	3x1500

16.	C/Flanges	3	2000x2000x100	3x400
17.	Motor	3	3000x3000x4500	2x14000
			Total wt.	**75300**

H- R.E. Joints & Butterfly Valves packages:

Sl.NO	DESCRIPTION	Qty Nos.	PACKAGE SIZE	WT. IN KG.
1.	R. E. Joints- Inlet Assy.	2	5365x2800x3200	2x9300
2.	R. E. Joints- Outlet Assy.	2	2950x2800x3700	2x8500
3.	Hydraulically operative Butterfly valve (Type-1)	3	2000x2500x720	3x7296
4.	Hydraulically operative Butterfly valve (Type-2)	4	2200x2700x900	4x9388
5.	Electrically operative Butterfly valve (Type-3)	2	930x1160x405	2x1164
6.	Manually operative Butterfly valve (Type-4)	4	700x865x300	4x544
7.	Manually operative Butterfly valve (Type-5)	4	600x750x275	4x336
			Total weight	98798

I- TG-INTEGRAL PIPING

1.For Turbine (C.S. & A.S.) - 31.0 MT

2.For Turbine Fire Retardant Fluid (S.S.) - 15.0 MT

3. For Generator (CS & A.S.) for seal oil, Gas system etc. – 13.0 MT

J- Flash Tanks & Vessels

Sl. NO	DESCRIPTION	PACKAGE SIZE	WT. IN KG
1.	HP Drain Flash Tank – 1 No.	2600X3000X3950	4600
2.	LP Drain Flash Tank - 1 No.	2950X2200X2700	3400
3.	Flash Vessel – 1 No.	1400x1300x2300	1180
4.	Clean Oil Tank with fittings/ attachment – 1 No.	5000X4500X3000	11000
5.	Dirty Oil Tank with fittings/ attachment – 1 No.	5000X4500X3000	11000
6.	Oil unloading Tank with fittings/ attachment – 1 No.	2000X1000X500	650
7.	DM CW System Tank with fittings/ attachment – 1 No.	2000x2000x2500	2800
8.	Filtered Water Tank with fittings/ attachment – 1 No.	4000x4000x3500	10800
		Total Weight	45430

K- PEM Packages tentative weight: 65.00 MT

L- External / Re-generating Piping

Sl. No.	**PGMA**	**DESCRIPTION**	**WT. IN KG**	**IBR**
1	80-673	Lube oil piping system	3566	N
2	80-375	Unlisted SV Exhausts –TG Scope	1906	N
3	80-381	HP Heater Vents – TG Scope	1427	N
4	80-382	LP Heater Vents	80	N
5	80-385	Vent from Unlisted PPG/Equipment to Condenser	838	N

6	80-387	Condensate Pump vents	306	N
7	80-388	Condensate Air Evacuation Piping	2975	N
8	80-400	Condensate Suction	3088	N
9	80-401	CD from Pump to LPH-1/DC inlet TEE & Recir.	8442	N
10	80-402	CD from LPH-1/DC inlet TEE to TG TP	9918	N
11	80-407	Condensate For sealing of Vacuum	2124	N
12	80-408	Condensate Dump from Header	2200	N
13	80-411	Condensate / Make up to Condenser	2000	N
14	80-413	Unlisted Condensate	2888	N
15	80-440	Condenser Drains	270	N
16	80-442	Gland Steam Cooler Drains	304	N
17	80-443	LP Heater-1 to Condenser	2144	N
18	80-444	LP Heater-2/3/4/5 Drains & Drip Pump Incl.	2670	N
19	80-447	HP Heater Drains	4696	N
20	80-463	TG Aux. Cooling water piping	63295	N
21	80-901	Sub-delivery valves for Light up	1233	N
22	80-925	H & S for Steam Blowing –Non Steam lines	1200	N
23	PG -22	HP Bypass valve with Oil system	39000	
24	80-913 80-918 80-919 and other valves under Job No. 7513	Root valves, Extraction line QCNRVs	76200	

		TOTAL WEIGHT	232770	

M - Insulation materials: 200 MT

NOTE :

1.

The list is tentative and has been given to enable the contractor to study the nature of work to be done in this contract. There may be variation in size, weight, quantity etc. and no claim, whatsoever, will be entertained on account of this by BHEL.

2

Some of the packages may be sent in parts to suit the site condition / transportation, the same is to be assembled at site without any extra cost, likewise the package may be assembled together and send as a single assy. Contractor may have to dismantle and erect or, erect as single assembly as per the instruction of BHEL Engineers without any extra cost.

Summary -

Sl. No.	EQUIPMENT / PACKAGE	APPROX. WT. (in MT)
A.	Steam Turbine & Aux.	591.50
B.	Turbo Generator & Aux.	377.68
C.	Heat Exchangers (Condenser, Heaters & Coolers etc.)	520.317
D.	FST & Deaerators etc.	76.8
E.	Boiler Feed Pumps & Aux.	96.96
F.	Condensate Extraction Pumps & Aux.	31.51
G.	CW Pums & Axu.	117.9
H.	R.E. Joints & Butterfly Valves	100.89
I.	TG Integral Piping	59
J.	Flash Tanks & Vessels	45.43
K.	Bought out items (BHEL PEM scope)	65
L.	External/re-generative piping system	232.77
M.	Insulation Materials	200
	TOTAL WT.	**2515.75**

Say 2516.00 MT

NOTE:

The weight indicated above is approximate and there may be a variation in weight of equipment / package. No claim, whatsoever, will be entertained by BHEL on account of

variation in weight & quantities in respect of TG Equipments, TG Integral piping along with other equipments & PEM Supplied items.

PROPOSED PAINTING SCHEME FOR TG AREA

S N	AREA / DESCRIPTION	COLOUR	IS SPECIFICATION
1	A) HANGER SUPPORTS, B) PLATFORMS C) STAIR SIDE CHANNEL D) TG STRUCTURE, E) ELECTRIC HOIST & CHAIN PULLEY BLOCK STRUCTURE, F) FLOOR BEAMS. G) GALLERIES H) MANUAL DOORS	SMOKE GREY	SYNTHETIC ENAMEL AS PER IS:2932
2	A) FLOOR GRILLS, B) HANGERS, HANGER RODS C) SUSPENSION RODS, D) STAIR CASE STEP TREADS.	BLACK	SYNTHETIC ENAMEL AS PER IS:2932
3	A) TG LUB OIL PIPING	GOLDEN BROWN	SYNTHETIC ENAMEL AS PER IS:2932
4	A) COOLING WATER PIPING B) AUX COOLING WATER PIPING C) LP PIPING DRAINS D) CONDENSATE PIPING	SEA GREEN	SYNTHETIC ENAMEL AS PER IS:2932
5	A) HAND RAILS AND POSTS B) CHUTE PIPE C) LADDER D) ELECTRICAL AND MECHANICAL HOISTS E) MONORAIL BEAMS	GOLDEN YELLOW	SYNTHETIC ENAMEL AS PER IS:2932
6	TOE GUARD PLATE	POST OFFICE RED	SYNTHETIC ENAMEL AS PER IS:2932
7	A) SILENCERS FOR SAFETY VALVES B) INSTRUMENT TAPPING POINTS ON STEAM LINES	HEAT RESISTENT ALUMINIUM	IS13183 Gr-I
8	STEAM PIPING (BAND - EACH 5MTR)	POST OFFICE RED	SYNTHETIC ENAMEL AS PER IS:2932
9	EQUIPMENT(PUMPS, OIL COOLERS, EXHAUST FANS, HT & LT MOTORS, BFP HYD COUPLING, VALVES, ACTUATORS ETC) AND PANELS.	EXISTING MFG UNIT COLOUR	SYNTHETIC ENAMEL AS PER IS:2932
10	PANELS (TOUCH UP PAINTING)	EXISTING MFG UNIT COLOUR	SYNTHETIC ENAMEL AS PER IS:2933
11	A) CONDENSER AIR EVACUATION PIPING B) INSTRUMENT AIR PIPING C) SERVICE AIR PIPING	SKY BLUE	SYNTHETIC ENAMEL AS PER IS:2932
12	FIRE FIGHTING	FIRE RED	SYNTHETIC ENAMEL AS PER IS:2932
13	LP TURBINE	BOTTLE GREEN	SYNTHETIC ENAMEL AS PER IS:2932

14	GENERATOR	ORANGE	SYNTHETIC ENAMEL AS PER IS:2932
15	EXCITER	ORANGE	SYNTHETIC ENAMEL AS PER IS:2932
16	TG LUB OIL TANK AND PIPING	GOLDEN BROWN	SYNTHETIC ENAMEL AS PER IS:2932
17	CONDENSER	BOTTLE GREEN	SYNTHETIC ENAMEL AS PER IS:2932
18	LEGEND IN BLOCK LETTER OVER GOLDEN YELLOW BACKGROUND	BLACK	SYNTHETIC ENAMEL AS PER IS:2932

NOTE:

- Painting scheme is enclosed for information purpose only. However, for execution only the latest document shall be applicable and no claim whatsoever shall be entertained in case of any variance between such documents.

11 GENERAL

11.0.1
The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship for fabrication, engineering and construction management. The Bidder should ensure timely completion of work. The Bidder must have adequate quantity of tools, construction aids, equipments etc, in his possession. He must also have on his rolls adequate, trained, qualified and experienced supervisory staff and skilled personnel.

11.0.2
The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Bidder and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

11.0.3
All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the Bidder.

11.0.4
The Bidder shall at his cost perform any services, tests etc, although not specified but nevertheless required for the completion of work.

11.0.5
Contractor shall erect all the equipments as per sequence prescribed by BHEL at site. The sequence of erection, methodology will be decided by the BHEL engineers depending upon the availability of material, work fronts etc. No claims for extra payment from the Contractor will be entertained on the grounds of deviation from the methods and sequence of erection adopted in erection of similar TG sets or for any reasons whatsoever.

11.0.6
All the necessary certificates and licenses required to carryout this work are to be arranged by the Contractor expeditiously at his cost.

11.0.7
The work to be carried out under the scope of these specifications covers the complete work of collection from stores/storage yard, handling, transporting, unloading at erection site, pre-assembly, erection, alignment, hot alignment, bolting, fastening, welding, radiography, leveling, cold pulling, adjusting, Non-destructive testing, Post weld heat treatment, hydraulic test, chemical cleaning, passivation, steam blowing, oil flushing, water flushing, air flushing, pre-commissioning tests, trial running of auxiliaries covered under these specifications, commissioning and all other activities till handing over of the unit. The work shall conform to dimensions and tolerances specified in the various drawings, documents etc. That will be provided during the course of installation. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall

dismantle and re-do the work duly replacing the defective materials at his cost failing which the work will be got done by BHEL at the cost and risk of the contractor. Contractor may please note that the loading of materials at storage yard/Stores in contractor's Trailer / Carriers while collecting materials will be done by material handling agency deployed by BHEL.

11.0.8
The terminal points as decided by BHEL shall be final and binding on the Contractor.

11.0.9
The indicative schedule of weight of major equipments given in relevant appendices is meant for providing a general idea to the Contractor about the magnitude of the work involved.

11.0.10
During the course of execution of this work, certain rework/ modification/ rectification/ repairs/ fabrication etc will be necessary on account of feed back from various thermal power stations on units already commissioned and/or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework/ modification/ rectification/ fabrication/ repairs etc promptly and expeditiously. Daily log sheets indicating the details of work carried out, man hours; consumables used etc, shall be maintained by the Contractor and got signed by BHEL engineer every day. Claims of contractor, if any, for such works will be dealt as per relevant clauses of General Conditions of Contract.

11.0.11
All tools and tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables etc required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause.

11.0.12
The contractor shall make adequate security arrangements including employment of security personnel and ensure protection from theft, fire, pilferage, damage and loss of materials/equipments issued to him for the work. Special care will have to be taken to guard against pilferage / theft of copper tubing, brass fittings, brass valves and other costly materials.

11.0.13
All equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc, shall be used for handling of the equipments without the specific permission of the engineer.

11.0.14
Contractor shall ensure proper housekeeping and remove all scrap materials periodically from various work area covered in the scope and deposit the same at the place earmarked for this purpose. In case of contractor's failure to do the same, BHEL reserves the right to remove scrap at contractor's cost and risk.

11.0.15
Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.

11.0.16
Contractor shall mobilize sufficient quantity of sleepers for stacking of materials in his custody.

11.0.17
Performance testing of equipment and first fill and one year topping requirement of consumables/ chemicals will also form part of the work to be carried out by the contractor.

11.0.18
The Contractor's scope of work is further described in the following clauses:

11.1 COLLECTION AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES

11.1.1
Contractor shall take delivery of the components, equipments, lubricants, chemicals, special consumables, steel etc from the storage yard/stores/sheds of BHEL/ client. The Contractor should note that the transport of equipments to erection site, assembly yards etc should be done by the prescribed route, without disturbing the other works and contractors and in the most professional manner. Special equipments such as laboratory equipments, measuring and controls equipments, special electrodes, valves, shims, packing materials for joints and seals, lubricants, actuators etc, shall be stored, when taken over by the Contractor, in appropriate manner as per BHEL's instructions.

11.1.2
The contractor shall return all parts, materials, consumables etc. remaining extra over the normal requirement with proper identification tags to BHEL stores. In case of any misuse or use over actual requirement, BHEL reserves the right to recover the cost of parts/materials used in excess or misused, with departmental charges.

11.1.3
Transportation of lube oil, Chemicals, Gas cylinders etc from stores, is included in the scope of this contract. The contractor shall have to return all the empty and excess drums to the customer/BHEL stores. Similarly, transport of chemicals for various pre-commissioning activities/ processes mentioned in clauses herein from BHEL/customer's stores and charging of chemicals into the system for carrying out various pre-commissioning activities and processes mentioned herein and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of contractor. After completion of oil flushing operation, the used oil shall be filled in empty drums and which in turn shall be returned to BHEL/customer's stores.

11.2 TEST TAPPING POINTS

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

11.2.1
All packing and forwarding material shall be returned as soon as the material is unpacked. The location for storage of such materials shall be as indicated by BHEL Engineer.

11.2.2
All Measuring and Monitoring Devices (MMD) used for the work in scope of these tender specifications shall be calibrated by the accredited agencies that are approved by BHEL or calibration tractability is established upto National Physical Laboratory.

11.2.3
Contractor shall furnish the consumption details of chemicals, lubricants, TIG welding filler wire, welding electrodes and other consumables on monthly basis.

11.3 GENERAL

11.3.1
During the course of erection, platforms and floor grills are to be cut at certain places to route steam, oil, water and air piping, cable trays, etc or for accommodating erection, rigging etc, the cutting of platforms and grills should be minimum and as approved by BHEL Engineer. After completion of work, the platform/grills cut shall be made good neatly as instructed by BHEL engineer.

11.3.2
Erection and welding of stainless steel fittings including supply of necessary stainless steel welding electrodes is within the scope of the work/specification.

11.3.3
No temporary supports should be welded on to the piping.

11.3.4
Contractor shall carry out preservation painting on all items taken from stores. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. This facility shall be provided by the contractor till the commissioning and handing over of the equipment to the customer. Preservative and touch up painting on equipments covered under this specification stored at stores/storage yard shall also be carried out by the contractor.

11.3.5
Adjustment of spring hangers for piping shall be done by the contractor during initial erection. After initial commissioning trials, it is possible that the spring hangers have to be adjusted repeatedly till the correct spring compression is achieved. Contractor shall do the same to the satisfaction of BHEL engineer. The marking of cold and hot positions on the hangers shall be done by the contractor.

11.3.6
The contractor shall return to BHEL the excess materials left over after completion of work, materials issued for temporary pipelines for HT, chemical cleaning, flushing, blowing etc. and materials issued on returnable basis in neatly dressed condition. Necessary grinding, edge cutting (square facing), edge preparation (vee), painting etc. to the condition similar to the one at the time of issue shall be in scope of work.

11.3.7
Wherever the equipments are erected by the contractor and connected piping is done by other agency, contractor shall weld / tighten the incoming pipes to either the equipment or the counter flange provided on the equipment.

11.4 HANDLING OF HEAVIER EQUIPMENTS

Heavy and voluminous Equipments/consignments like HP Turbine module (wt. About 57 MT), IP Turbine module (wt. About 59 MT), LP Rotor (wt. About 57 MT), LP turbine (Inner outer & Inner Inner) Lower half casing (Wt about 31 MT), , LP turbine (Inner outer) Upper half casing (Wt about 22 MT), Generator rotor (wt. About 48 MT), Generator Exciter (Wt. About 23 MT), HP Heaters (wt. About 30 MT & 40 MT), Deaerator/FST Sections (each wt. About 18 MT) etc. along with other Equipments shall be handled carefully. Contractor shall have to arrange his own Tools & Tackles including suitable capacity lifting Crane, Trailer and any other arrangement required to handle right from collection of materials from BHEL/Customer store yards/stores, transportation to site of works and erection & their placement on respective elevation/foundation. BHEL Shall not provide any T&P other than Customer's 130/30 MT capacity EOT Crane in TG hall for erection of TG equipments.

12 PREPARATION OF FOUNDATION

12.1
Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by the customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations upto 25mm for achieving proper levels will be within the scope of work/specification.

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

12.3
The complete work of secondary grouting of equipments is included in the scope of work/specification. Contractor shall arrange all manpower, T&P, form work and shuttering materials, all grouting materials such as ordinary Portland cement, sand, stone chips etc & quick-setting-non-shrink-free-flow special grout mix of required specification (like conbextra-gp-2 or equivalent).

12.3.1
The quick-setting-non-shrink-free-flow special grout mix shall be purchased only from the following BHEL approved vendors:

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

In order to ensure the quality, the major grouting of equipments using any of above grout mixes shall essential be done as per the recommendations of supplier with regard to grout preparation and use of machinery etc under the supervision of the respective supplier. Contract shall consult BHEL engineer before deciding upon the vendor for the above.

12.3.2
Cleaning of the foundation surfaces, pocket holes, anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods will be within the scope of this work.

12.4

BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional

packer plates and shims if required will have to be prepared by the contractor out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

12.5
The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipments under scope wherever required. The support and sole plates matching and concrete surface bedding is also covered in the scope of work. The fine dressing of concrete shall be with Prussian blue-match checks.

12.6
Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

13 EQUIPMENTS INSTALLATION –

13.1.1 COMMON REQUIREMENTS

13.1.1
Filling of lubricants for steam turbine, turbo-generator and other rotating auxiliaries for purpose of oil flushing, initial fill up and subsequent topping up during various stages of work is in the scope of the contractor.

13.1.2
All works such as cleaning, leveling, aligning, hot alignment, trial assembly, dismantling of certain equipments/components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, grinding, straightening, chamfering, filling, machining, chipping, drilling, reaming, scraping, lapping, shaping, fitting-up, drilling of holes, making dowel pins, minor rectification of foundation bolts etc. are incidental to the erection/commissioning and any other work/activity which is necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

13.1.3
Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, ESV & IV, control valves, LP bypass, HP Overload Bypass valves, Cold Re-heat Non Return Valves with power cylinders and other valves, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/pickings/lubricants for replacement will be provided by BHEL free of cost.

13.1.4
All equipment shall be preserved and protected periodically before and after erection as per advice of BHEL engineer. The journals of steam turbine rotors, generator rotor, HT motors and other rotating machines shall be thoroughly cleaned, greased/painted with preservative agents periodically as instructed by BHEL engineer.

13.1.5
Trial run of all motors including checking direction of rotation in uncoupled condition, check alignment and re-couple the motor to driven equipment.

13.1.6
After initial trial of rotating equipments, control and power cabling for motors and other equipments/instrumentation may have to be disconnected for checking alignment and resetting/realignment/hot alignment. Contractor will have to provide services for disconnection and reconnection of control and power cables.

13.1.7
All racks or assembled units like Governing Rack, LP Bypass Rack & HP Bypass system, Cold Re-heat Non Return Valve, Seal Oil Unit, Gas Unit, Seal Oil Valve Rack, Gas Cylinder Racks etc supplied from manufacturing units will be tested in BHEL/ Customer stores or at site. This may

require transportation, filling of oil, water etc in these racks for carrying out testing of these racks. Defects noticed during testing of these racks will have to be rectified by the contractor free of charges. Further, any pipeline / flanges / fittings not found assembled properly, the same have to be rectified / corrected by the contractor free of charges.

13.2 DEAERATOR INSTALLATION

13.2.1
Contractor shall arrange T&P as required. Contractor shall also arrange suitable crane for lifting and placement of De-aerator and FST from area/place near to TG building to place them at suitable location / elevation of equipment foundation depending accessibility and approachability of crane. Contractor shall arrange all other T&P as required for all other works as part of scope of work. The fuel and operator for this crane shall be provided by contractor as part of scope of work. For effective utilization of crane, contractor shall plan his activities so as to carry out the work in minimum possible duration. In case of any accessibility and approachability limitations of crane to place the FST and deaerator on required foundation, the contractor shall make necessary temporary platform / approach including providing the materials as per requirement as part of scope of work.

13.2.2
Erection of permanent approach platform and ladders etc for de-aerator and FST, GSC, flash tanks, lubes oil / control oil tanks, HP/LP by pass valves, ESVS/ IVS, hot / electric monorail hoists, local platforms for various inaccessible valves and equipment etc are in the scope of work. The structural steel and other members will be supplied in random length/size & will have to be cut to required size and profile as incidental to work.

13.2.3
Hot/monorail hoist including monorail beam / crane to be erected commissioned for various areas indicated below -

(a) Pumps (Pumps which are in the scope of this work).
(b) Butterfly valves.
(c) Control fluid room.
(d) Central lube oil system room
(e) Other equipment covered under TG package

14 PIPING INSTALLATION

14.1
The scope of work in piping system (air, Gas, Water, Oil, Steam, Governing oil/Control oil etc.) will include cutting to required length, edge preparation, laying, fixing and welding of the elbows/fittings/valves etc, fixing supports/hangers/shock absorbers/ guides and restraints etc and carrying out all other activities/works to complete the erection and also carrying out all pre-commissioning/ commissioning operations mentioned in these specifications as per engineer's instructions and/or as per approved drawings. Weld joints and NDT requirement for all TG Integral piping, and other piping's as applicable under tender specification shall be as per drawings/schemes and suiting to site requirement. The necessary drawings/documents for these weld joints will be provided at site during execution of work.

14.2
Carrying out of piping as per the specifications between equipments constituting terminal points, whether the terminal equipments fall within the scope of the work/specification or not, is within the scope of the work/ specification. The contractor shall complete terminal joints at either ends, with due NDE & PWHT if applicable, for all the piping schemes covered in the scope of work.

14.3
Fit up and welding/bolting/fastening of piping to the terminal points (such as stubs, valves, flanges on terminal points/equipments, stubs on headers, battery limits etc) forming part of the scope of work/specification and stress relieving and radiography of joints so made are also within the scope of work. Permanent fasteners and gaskets will be supplied by BHEL.

14.4
Interconnection/ Hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work has to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

14.5
All drains / vents / relief / escapes / safety valve piping to various tanks/ sewage / drain canal / flash box / condenser / sump / atmosphere etc. from the stubs on the piping and equipments erected by contractor is completely covered in the scope of this tender specification.

14.6
The following items of work shall be incidental and forming part of piping fabrication and erection:

(1) To locate cause of vibrations in equipments/auxiliaries/pipelines and carrying out necessary corrections in case the same is attributed to the contractor.

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

14.7
Pipelines will be field routed as per schemes/ suggestive layout or as per the instructions of BHEL engineer. Pipes & tubes will be supplied in random lengths and running lengths. The contractor shall have to lay the piping after carrying out the necessary fabrication, edge preparation, routing etc to suit site requirement in best professional manner.

14.8
As far as possible, pre-assembly shall be done. The pipe laying shall be carried out from the available terminal point/points or any other area between the terminal points. The erection can be carried out on temporary supports to obtain proper alignment and welding. After fixing the permanent supports, all the temporary supports shall be removed. The alignment, distances and loading of the supports shall be checked and the required settings to be ensured as per requirement.

15 CONDENSER INSTALLATION

15.1
The condenser will be dispatched in loose parts mainly comprising of bottom plates, dome valves, front and rear water chamber, front and rear water boxes, side walls, hot well, spring elements, support plates, air extraction pipes, baffles, stiffening rods and pipes etc. the condenser is to be assembled at site in position by welding the different parts. Condenser tubing and tube expansion (roller expansion) is to be done at site by the contractor, after taking due care to clean all the tube holes. After final alignment and leveling of turbine exhaust and condenser, the same has to be welded to the exhaust position of LP exhaust as per the sequential welding procedure. Condenser tube material is stainless steel.

15.2
Before insertion of tubes, the contractor shall clean the holes in the tube plates and tube support plates to remove paint, corrosion spots, oxide scales etc. Usage of suitable cleaning agent may also be required which has to be supplied by the contractor.

15.3
The tubes shall be expanded using an Automatic Electronic Torque Controlled Tube Expanding unit or Pneumatic Tube Expander. Tube expansion shall be checked with dial bore gauge. The total set up including tube expanders and tube cutting tools etc. for carrying out the complete condenser tube expansion works shall be provided by the contractor.

15.4
The contractor shall carry out the condenser neck welding with LP cylinder exhaust hood only after final installation of LP casing. Neck welding shall be subjected to specified non-destructive testing.

15.5
The hydrostatic testing of steam space and hydraulic testing of water space up to the terminal point after assembly of water boxes are also included in the scope.

15.6
Work of painting of condenser surfaces in various area and at various stages of work are specified elsewhere in these specifications.

16.1 GENERATOR INSTALLATION

16.1.1 GENERATOR STATOR

The Generator stator, weighing approximately 218 MT may be transported from Manufacturing Unit to site by special wagon consisting of 8 bogies (four on either side) with facilities to swivel or by special hydraulic trailer. The contractor shall have to unload the generator stator from the Wagon / Trailor at a suitable place outside Machine Hall. The Stator shall be moved from the place of unloading and placed within the reach of EOT crane by the contractor in consultation with BHEL Engineer. For any demurrage Charges on account of delay in Handling, Unloading from Trailor shall be the responsibility of Contractor.

16.1.2

The Generator Stator shall be lifted and placed by the contractor with the help of Two numbers of Customer EOT Crane (Each of Capacity 130 MT) in tandem operation and Lifting Beam in TG hall building. The Lifting beam/ slings and EOT cranes will be provided by BHEL/Customer free of hire charges. Contractor shall have to collect the Lifting Beam/Slings from BHEL/Customer stores/storage yard, transport to site of work, assemble and provide necessary assistance to make EOT Cranes tandem operation through for safe lifting of stator and return the lifting beam/slings to BHEL/Customer storage yard/stores as per BHEL Engineers instruction after completion of work.

The assembly of the special wagon for return after unloading of stator is in the scope of this work.

17 HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS

17.1
Contractor shall carry out the following tests required to complete the erection and commissioning of the TG Set:

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

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

17.2
Contractor shall lay all necessary temporary piping, welding, supports, install pumps, valves, pressure gauges, electric cables and switches etc, required for the Hydro test, Air leak test, Chemical cleaning, Steam blowing etc.. After the test is over, all the temporary piping, pumps, etc will be removed. It may also specifically be noted that servicing, erection and dismantling of piping and equipments for conducting above tests will be done by the contractor. No separate payment shall be made for this purpose.

17.3
All the above tests shall be repeated till all the equipments, piping and systems satisfy the technical and statutory requirements. All related works form part of the scope.

17.4
Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration/ venting /drain points with valves as per BHEL engineer's instruction, for performing hydro test of piping is within the scope of work**.** Required valves, fasteners, blank flanges, blanks or steel for blank flanges shall be provided by contractor. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL engineers' instruction.

17.5
Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

17.6

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

The contractor shall carry out any other tests as desired by BHEL engineers on erected equipment covered in the scope of this contract during testing and commissioning to demonstrate the satisfactory completion of any part or whole of work performed by the contractor.

18 PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

18.1
Commissioning of the TG equipments with associated Aux. and other Equipments with auxiliaries shall involve the following tests and activities of the equipments erected:

(a) Trial run of Boiler Feed Pumps, CEP, Vacuum Pumps, Booster Pump, CW Pump, ACW Pump etc and other pumps/equipments like Misc pumps etc and other various rotating machineries / pumps as per tender specification.

(b) Trial run of motors/ drives for various auxiliaries.

(c) Hydraulic Test, Chemical Cleaning, Oil flushing of lube oil system, Jacking oil/Lifting oil, HP oil supply system, Governing oil system/Control oil system, LP Bypass system, Air cleaning/blowing of pipelines, closed systems, Tanks and Vessels.

(d) Flushing of all pipelines by air/oil/water/Chemicals/steam as the case may be.

(e) Servicing of all valves, Hydraulic Power cylinders, HP Valves (ESV), HP Overload Bypass valves, IP Valves, LP Bypass valves, CRHNRV and fittings.

(f) Manual/mechanical cleaning of Oil tanks, Suction Strainers / Filter elements of CEP, BFP, Booster Pump, Vacuum Pumps, Misc. Pumps, and other various equipments & tanks /vessels erected by the contractor. This may have to be repeated several times during the commissioning process.

(g) Chemical cleaning of piping systems, as per requirement. Contractor shall carry out disassembly and reassembly of vulnerable components like spray nozzles, gauges, instruments etc. as instructed by BHEL during this process.

(h) Putting turbine on barring gear.

(i) Rolling and synchronization.

(j) Full load operation.

(k) Trial operation

(l) Assistance in PG Test.

The above activities/tests/trial runs may have to be repeated till satisfactory results are obtained and also to meet the technical and statutory requirements.

18.2

Contractor shall lay temporary pipelines with fittings and accessories etc. as instructed by BHEL engineer for the purpose of pre-commissioning and commissioning activities like Hydraulic testing, chemical cleaning, oil flushing, steam blowing etc. of piping and other equipments as part of the scope of work. Temporary installations shall be dismantled by contractor and returned to BHEL stores as specified elsewhere in this technical specification.

18.3
The contractor shall provide necessary assistance to facilitate/enable electrical and instrumentation testing and commissioning of equipments under this scope of work, to BHEL and their Testing & Commissioning agency.

18.4
The contractor shall carry out any other test as desired by BHEL engineer on erected equipments covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or parts of work performed by the contractor.

18.5
In case any malfunctioning and / or defect is found during tests / trial runs such as loose components, undue noise or vibrations, strain on connected equipments etc. The contractor shall immediately attend to these defects/ malfunctioning and take necessary corrective measures. If any readjustment and realignments are necessary, the same shall be done as per BHEL engineer's instructions, free of cost.

18.6
Cleaning of oil tank by sand blasting or other methods as per instructions of BHEL engineer before and after oil flushing is responsibility of contractor.

18.7
The contractor shall associate for initial and subsequent fillings of gas in generator gas system as and when required till unit is handed over to Customer.

18.8
The contractor shall carry out leak test of generator air cooling system to the satisfaction of BHEL engineer.

18.9
Replacing/changing mechanical/other seals of equipment, pumps etc. during commissioning stage is within the scope of work.

18.10
During the stages of commissioning, and till Unit is handed over, if any part of TG and auxiliaries need repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim if any, for such repair/rectification/rework/

replacement etc for reasons not attributable to the contractor will be governed by relevant clauses of 'General Conditions of Contract'. The parts to be replaced shall however, be provided by BHEL free of cost.

18.11
During this period, though BHEL's and customer's engineers will also be associated in the work, the contractor's responsibility will be to make available resources in his scope till such time the commissioned units are taken over by the customer.

18.12
In case any malfunctioning and/or defects are found during tests, trial run such as loose component, undue noise or vibration, strain on connected equipment etc., The contractor shall immediately attend to these defects/ malfunctions and take necessary corrective measures. If any readjustment or realignment is necessary, same shall be done as per BHEL engineer's instruction.

18.13
The pre-commissioning activities will start prior to Lube oil, HP Oil supply System, Governing/ Control oil flushing etc. of the TG and various trials, commissioning operations shall continue till the TG is handed over to customer. Simultaneous commissioning checks, activities will be in progress in various areas like trial run of various equipment, checking of equipment erected, making ready for trial runs, filling up of lubricants, chemicals etc. All these works need specialized gangs including electricians, Instrument Technicians, Fitters, in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted. The mobilization of these commissioning gangs shall be sufficient so that planned commissioning activities are taken up in time and also completed as per schedule and the work is to be undertaken round the clock if required.

18.14
Contractor shall cut open works if needed as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over, without any extra payment.

18.15
After the start of commercial operation of machine, commissioning activities will continue. It shall be the responsibility of contractor to provide following manpower along with supervisor as part of commissioning assistance for a period of three months.

1)	Supervisor	2 Nos.
2)	Pipe fitter/Millwright fitter	2 Nos.
3)	Welder	2 Nos.
4)	Rigger	2 Nos.
5)	Electrician/instrument technician	1 No. each
6)	Unskilled worker	6 Nos.

18.16
The above figures shows only minimum required over and above labour required for completing pending erection and commissioning works and clearing of punch lists. Contractor has to provide number of personnel and other resources as per work demand.

18.17
It shall be specifically noted that above employees of the contractor may have to work round the clock along with BHEL commissioning engineers.

18.18
During commissioning, opening of valves, changing of gaskets, checking, realigning of rotating and other equipment, attending to leakages in piping, tanks etc and adjustments of erected equipment may arise. Valves shall be serviced and lubricated to the satisfaction of BHEL engineer during the erection and commissioning as per BHEL engineer's instructions.

18.19
It is the responsibility of the contractor to provide for necessary resources till the completion of work under these specifications, even in case erection, testing and commissioning of the TG and other equipments are delayed due to reasons not attributable to the contractor.

19.1 WELDING AND HEAT TREATMENT

19.1.1
Removal of welding slag and burrs by hand files, with brushes and/or flexible grinders will be carried out simultaneously.

19.1.2
On all steam, oil, instrument, gas, air (Instrument air/services air) piping, Cooling water Piping, DM water piping etc. both TIG welding and subsequent arc welding or total TIG welding process is to be adopted as instructed by BHEL engineer.

19.1.3
All weld joints on piping shall be ground / filed / dressed on completion of welding and before NDE as per instructions BHEL engineer.

19.1.4
The Contractor shall procure all electrodes and filler wires of approved quality / brand as per the standards and specifications of BHEL and instruction of BHEL Engineer.

19.1.5
Contractor should purchase the electrodes as per the recommendations of BHEL engineer, welding manual, welding schedule and other relevant documents. The electrodes shall be purchased only from BHEL approved manufacturers.

19.1.6
The purchase of electrodes shall be accompanied by proper test certificate and these certificates should be submitted regularly for the scrutiny of BHEL engineer.

19.1.7
All electrodes shall be stored in a clean dry area. The storage room shall be of permanent nature and damp proof, and the room shall be exclusively meant for storage of welding electrodes and filler wires. Excepting for a vent in the top, it is not preferred to have any other opening like windows or ventilators. The temperature inside the room has to be kept in the range of 8-10^0 c above atmospheric temperature and humidity should be less than 50&. This is to be accomplished by using electric heaters or infrared lamps. The storage room must be provided with hygrometer and thermometer. Temperature and humidity are to be monitored regularly. 15-20 holders, welding cables, connecting cables to equipments and other welding accessories including temporary electrical connection from construction power point to individual equipment like winches, hoisting equipment, welding generators, transformers, heat treatment equipment and other construction equipment shall be arranged by contractor.

19.1.8
All racks and other items used for storage of electrodes shall be of steel and not of wood.

19.1.9

All electrodes soon after purchase shall be offered for inspection to the BHEL engineer. Contractor shall be strictly prohibited from using electrodes not inspected/approved by BHEL engineer.

19.1.10
All welding consumables shall be issued to the welders only by authorized person who is controlled by contractor's welding engineer. The necessary baking requirements are to be ensured by Contractor's welding engineer.

19.1.11
All welders shall be tested and approved by BHEL engineer/customer before they are actually engaged on work though they may possess the requisite certificate. BHEL reserves the right to reject any welder without assigning any reasons. Statutory requirements like IBR approval for welders are to be complied with before starting of the work. If required, the welders may have to undergo Procedure Qualification test also. The decision of BHEL Engineer will be final in this regard.

19.1.12
All charges for testing of contractor's welders including destructive and non-destructive tests conducted by BHEL at site shall have to be borne by the contractor. However for initial testing of welders the test plates will be provided by BHEL. However, if deployed welders fails in initial testing due to lack of experience OR frequent testing of new welders, due to non-availability/non-deployment of earlier qualified/tested welders, it shall be the responsibility of Contractor to provide necessary test plates at his cost for above testing.

19.1.13
BHEL engineer is entitled to stop any welder from his work if his work is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by him, which, in the opinion of BHEL engineers, will adversely affect the quality of welding though the welder has earlier passed the tests prescribed. The fact that the welders have passed the test does not relieve the contractor from his contractual obligations to check the performance of the welders. Contractor shall submit a monthly performance record of all welders.

19.1.14
All welded joints shall be subject to acceptance by BHEL engineer whose decision will be final and binding.

19.1.15
Pre-heating and stress relieving before and after welding are part of erection work and shall be performed by the contractor in accordance with instructions of BHEL engineer. Contractor has to arrange for the recorders along with accessories and suitable technicians for heat treatment purpose. The temperature recorders and thermocouples shall be duly calibrated. During preheat and stress relieving operations the temperature shall be measured as per the instructions of BHEL engineers by thermocouples and recorded graphs for the heat treatment works carried out shall be the property of BHEL.

19.1.16
For the purpose of stress relieving, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations are as per the standards of BHEL. Thermocouples have to be attached using battery operated portable thermocouple attachment unit and not by manual arc welding. Contractor shall arrange sufficient number of thermocouple attachment units.

19.1.17
Wherever necessary, contractor should provide temperature indicator/temperature recorder as required by BHEL engineer for measuring preheat temperature for welding or for controlling temperature of metal for hot correction etc. Decision of BHEL engineer on method and of checking preheat temperature or controlling temperature for hot correction and welding shall be final and binding on contractor.

19.1.18
Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The contractor shall make all necessary arrangements including labour required for the same as per directions of BHEL.

19.1.19
Heat treatment requirements shall be as per the Welding Schedules of BHEL

19.1.20
For weld joints of heavy structural items like beams, I-sections, if heat treatment is required, the same shall be carried out as part of the work.

19.1.21
Checking effectiveness of stress relieving by hardness tests (either by Poldi Hardness Tester or other approved test methods as per BHEL engineer's instruction) including necessary testing equipments is within the scope of the work/specification.

19.1.22
TIG welding process is to be used for all root pass welds in pipes. Subsequent welding after root pass can be carried out by manual metal arc welding with basic coated electrodes. For the pipe of thickness less than 6mm, the entire welding has to be carried out by TIG welding. However, BHEL site engineer will have the option of changing the method adopted. For manual arc welding shall be done as per weaving technique and the width of weaving shall not exceed 1.5 times of the dia of the electrodes.

19.1.23
Two pieces to be joined shall be individually checked for the weld edge preparation and profile dimensions and with respect to the template. Dye penetrant check shall be carried out on edge prepared surfaces at random. The percentage shall depend on piping system as specified by BHEL engineer.

19.1.24

Joint fit up will be a stage for inspection.

19.1.25
All joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

19.2 RADIOGRAPHY

19.2.1
Radiographic inspection of welds shall be arranged by the contractor including all consumables like isotope camera, x-ray film, chemicals etc. Scaffolding and approaches for taking radiographs.

The contractor shall provide the necessary skilled technician and labours for taking the radiographs. While taking radiographs, the contractor has to use proper penetrameter/ image quality indicators as instructed by the BHEL engineer. All the processed and accepted films will be the property of BHEL. In this regard, the contractor has to adhere to the safety rules/regulations laid by BARC authorities from time to time. It may please be noted that invariably the radiographic work will be carried after the normal working hours.

19.2.2
Contractor shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. The defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance/rejection of the joints will be final and binding on the contractor.

19.2.3
Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if defect persists after first repair, as per radiograph, carrying out repairs and radiography shall be repeated till joint is made acceptable in case, the joint is not repairable, the same shall have to be cut and repaired at contractor's cost. Decision of BHEL engineer in all these matters is final and binding on the contractor.

19.2.4
100% radiography of weld joints of certain piping has to be carried out as per BHEL standards/drawings/specification.

19.2.5
It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. Necessary trained personnel shall be deployed for this purpose.

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

20.1
Contractor shall lay and erect temporary pipelines with fittings and accessories and also erect/commission the chemical cleaning/ circulating pumps after servicing as per requirements, tanks and other installations, as a system as instructed by BHEL for the purpose of chemical cleaning, steam blowing, steam washing, steam flushing, water flushing, water washing, oil flushing of piping and shall provide all other arrangements as per requirement as part of scope of work.

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

20.2
After the chemical cleaning/ flushing have been successfully completed, dismantling of all temporary installations as instructed by BHEL is within the scope of work under this specification. The dismantled materials shall be dressed and returned to BHEL as stated elsewhere in this tender spec.

20.3
Preservation of the cleaned surfaces will be the responsibility of contractor under the guidance of BHEL engineer.

20.4
Hydraulic test of temporary piping is to be carried out as per the instructions of BHEL Engineer. Carrying out repairs, if any, is in the scope of work/specification.

20.5
For chemical cleaning of the piping system, contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected is in the scope of contractor or not. Decision of BHEL Engineer in this regard will be final and binding on the contractor.

20.6
During the initial stages of work, trenches for draining water may not be available after alkali flushing or mass flushing for discharging and emptying. Necessary low point drains and temporary piping for this will have to be provided by contractor from materials provided by BHEL.

20.7

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

20.8
Radiographic examination of weld joints on temporary pipes as required by the Engineer In-charge should be carried out.

20.9
Contractor shall also carry out the repairs or attend leaks etc., in the temporary piping and equipments for the above operations / activities while carrying out the above activities / operations.

20.10
For chemical cleaning of system which consist of equipment/piping erected by the contractor and also equipment/piping erected by other contractors of BHEL/customer's contractor has to arrange for workers and supervisory staff as required supplementing/complimenting the labour and supervisory staff mobilized by other agencies for chemical cleaning of the portion of equipment erected by them in the system. Decision on the strength of gangs and supervisory staff for deployment of labour and allocation of work for them at site by BHEL engineer is final and binding on the contractor.

20.11
Contractors quoted rate shall be inclusive of fabrication, cost of consumables, erection, dismantling of temporary piping and servicing of the equipments and valves and handing over to BHEL. No separate payment on this account shall be entertained.

20.12
After acid cleaning/pickling of lubricating system (including oil piping of lube oil system, HP Oil supply system, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems, LP Bypass systems etc as per instructions of BHEL Engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machineries, cooler etc before and after oil flushing is the responsibility of the contractor.

20.13
For full welding of structures, tanks and piping etc, only welding generators shall be used. The use of welding transformers will be subject to the approval of BHEL Engineer.

20.14
Erection and commissioning of connecting piping – permanent and temporary for oil purification equipments and all operations for cleaning, oil flushing, dismantling of temporary piping during

pre and post-commissioning of equipment up to full load shall be the responsibility of contractor as part of scope of work.

21 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

21.1
The contractor shall provide all (except those indicated in BHEL scope) required tools and plants, monitoring and measuring devices (MMD) and handling & transportation equipments for the scope of work covered under these specifications. Contractor has to provide suitable cranes for material handling at BHEL/client's stores/storage yard. BHEL's crane will not be available for this purpose. Please refer relevant appendix for the list of T&P being provided by BHEL free of charges on sharing basis.

21.2
All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification. Indicative list of major T&P to be arranged by contractor has been furnished in relevant appendix. Contractor shall also mobilize all other T&P necessary for timely and satisfactory completion of the work in scope.

21.4
Contractor shall provide all required suitable cranes and trailers for materials handling during collection from BHEL/ client's stores/ storage yard, transportation to site of work and at work site for all equipments and consignments including heavy and voluminous equipments/ components/ consignments like HP turbine module, LP turbine inner–outer casing, LP turbine inner casing, LP rotor, generator rotor, brushless exciter, HP heaters, etc. BHEL/customer shall not provide any T&P other than mentioned in relevant appendix for the purpose identified. The contractor shall make suitable arrangements/arrange crane well in advance for lifting and placement to final position of sections at required elevation/ location with utmost care.

21.5
Contractor shall provide the complete operating crew like operator, helpers for handling trailing cable for EOT It may be specifically noted that the EOT crane shall be shared by many other agencies working within the TG hall. The contractor shall have to extend the services of the EOT crane operation to all such other agencies as instructed by BHEL; the operation cost (for crew) will be shared proportionately amongst the beneficiary agencies on mutually agreed terms and rate.

21.6
Contractor has to provide spanners of all sizes for carrying out the complete erection / commissioning works. No spanners will be provided by BHEL to the contractor.

21.7

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

21.8
All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification.

21.9
Timely deployment of adequate quantity of T&P is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned program and to achieve the milestones.

21.11
Complete set of hydraulic jacks of 50 tones and 100 tones capacity shall be arranged by the contractor for use during erection and commissioning of turbine. Also, the contractor shall arrange hydraulic jacks of 100 tones and 63 tones capacity along with long high pressure hoses of suitable length for generator erection and alignment. These jacks shall be of internationally reputed make, highly reliable and maintained in excellent working condition. They shall be tested for safe working before deploying in actual work. These jacks shall not be permitted for use anywhere other than steam turbine/ generator area.

21.12
All jack bolts that are required during erection for carrying out roll-check etc will have to be arranged by the contractor. No jack bolts will be provided by BHEL.

21.13
Contractor shall maintain and operate his tools and plants in such a way that major breakdowns are avoided. In the event of major breakdown, contractor shall make alternative arrangements expeditiously so that the progress of work is not hampered.

21.14
In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make the alternative arrangement at the risk and cost of the contractor.

21.15
The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. Contractor shall obtain prior approval of BHEL for all the T&P before deploying in actual work. The movement of cranes and other equipment should be such that no damage / breakage occur to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility.

21.16

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

21.17
The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of measuring & monitoring devices (MMD). Test / calibration certificates shall be furnished to BHEL. MMD shall be calibrated only at accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL. All calibration shall be traceable to national or international standards.

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

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

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

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

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

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

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

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

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

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

10) Condenser internal components/parts/surfaces have to be surface protected with steam washable paint as per BHEL standards.

23 LINING AND INSULATION

23.1

Application of thermal insulation/ spray insulation, finishing, cladding and outer casing etc of the following:

1 TG integral piping and tanks & vessels
2. Deaerator, feed water storage tank
3. Other equipments including bois, though not listed above but required for completion
4. ST-TG auxiliaries including, but not limited, to heat exchangers, pumps, tanks and vessels and other equipments
5. TG integral piping including condensate and extraction system piping

23.2

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

23.3

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

23.4

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

23.5

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

23.6

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

23.7

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

23.7

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

23.8

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

23.9

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

23.10

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

23.11

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

23.12

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

23.13

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

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

23.14

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

23.15

Wastage allowances for the material issued are envisaged as follows:

A	Pourable & castable insulation	-	2%
B	Insulation bricks and motor	-	2%
C	Wool mattresses	-	2%
D	Cladding sheets	-	2%

The wastage allowance will be applicable on the net issued quantity i.e. Total quantity issued reduced by the quantity returned to stores as unused/fresh item. Contractor shall reconcile the material issues periodically as prescribed by BHEL site. Payment for the done will be regulated as per relevant section.

23.16

The following works are also included in the scope of this contract:

- Cutting of cladding sheets as per the profile of the equipment and painting on inner surface two coats of bituminous paint. Paint shall be arranged by contractor.

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

23.17

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

23.18

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

23.19

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

24 FINAL PAINTING

24.1

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

24.2 Touch-up painting on damaged areas –

a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer has to be applied by brush immediately after the surface preparation.
Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.
Painting scheme is enclosed for information at relevant annexure. However, for execution only the latest document shall be applicable and no claim whatsoever shall be entertained in case of any variance between such documents. Similarly, documents as provided progressively during the execution of work for all other products/ equipments etc shall be applicable.

24.3

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

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

24.4

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

24.5

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

24.6

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

24.7

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

24.8

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

24.9

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

24.10

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

24.11

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

24.12

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

24.13

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

24.14

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

24.15

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

24.16 BHEL will provide paint & primer for final painting.