TENDER SPECIFICATION

Sl No	Tender Specification Number	Unit Number & Project
1	**BHE/PW/PUR/SKT-STG U-3/960**	250 MW STG Set of **Unit 3**
2	**BHE/PW/PUR/SKT-STG U-4/961**	250 MW STG Sets of **Unit 4**

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, COMMISSIONING, FINAL PAINTING AND HANDING OVER OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT AND UNLOADING FROM WAGON/ TRAILER, PLACEMENT IN POSITION AND LIFTING BY STRAND JACK ARRAGEMENT), CONDENSER, STG INTEGRAL PIPING, EXTERNAL/REGENERATIVE ETC. WITH ASSOCIATED EQUIPMENTS/TANKS/VESSELS, FST, HP & LP HEATERS ,DEAERATOR WITH ASSOCIATED PLATFORM, POWER CYCLE PUMPS & ASSOCIATED AUXILIARIES, R.E. JOINTS & B.F. VALVES ETC., LP BYPASS SYSTEM WITH ASSOCIATED AUX., BOUGHT OUT ITEMS AND PEM PACKAGES OF EACH UNITS OF 250 MW

AT

2 x 250 MW SIKKA THERMAL POWER STATION

GUJARAT STATE ELECTRICITY COORPORATION LIMITED

DIST- JAMNAGAR

GUJARAT

VOLUME – I – REV 01 DATED 15/02/2012

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

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

Sl No	Tender Specification Number	Unit Number & Project
1	**BHE/PW/PUR/SKT-STG U-3/960**	250 MW STG Set of **Unit 3**
2	**BHE/PW/PUR/SKT-STG U-4/961**	250 MW STG Sets of **Unit 4**

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, COMMISSIONING, FINAL PAINTING AND HANDING OVER OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT AND UNLOADING FROM WAGON/ TRAILER, PLACEMENT IN POSITION AND LIFTING BY STRAND JACK ARRAGEMENT), CONDENSER, STG INTEGRAL PIPING, EXTERNAL/REGENERATIVE ETC. WITH ASSOCIATED EQUIPMENTS/TANKS/VESSELS, FST, HP & LP HEATERS ,DEAERATOR WITH ASSOCIATED PLATFORM, POWER CYCLE PUMPS & ASSOCIATED AUXILIARIES, R.E. JOINTS & B.F. VALVES ETC., LP BYPASS SYSTEM WITH ASSOCIATED AUX., BOUGHT OUT ITEMS AND PEM PACKAGES OF EACH UNITS OF 250 MW

AT

2 x 250 MW SIKKA THERMAL POWER STATION
GUJARAT STATE ELECTRICITY COORPORATION LIMITED
DIST- JAMNAGAR
GUJARAT

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION . Refer Notice Inviting Tender

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING VOLUME-I REV01 DTD 15/02/2012 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:

960
&
961

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/SKT- STG/960-961 Date: 12/01/2012

NOTICE INVITING TENDER (NIT)

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

==========

To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	○ **BHE/PW/PUR/SKT-STG U-3/960 (For Unit # 3)** ○ **BHE/PW/PUR/SKT-STG U-4/961 (for Unit # 4)**	
ii	**Broad Scope of job**	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, COMMISSIONING, FINAL PAINTING AND HANDING OVER OF **STEAM TURBINE, TURBO-GENERATOR** (INCLUDING ITS RECEIPT AND UNLOADING FROM WAGON/ TRAILER, PLACEMENT IN POSITION AND LIFTING BY STRAND JACK ARRAGEMENT), CONDENSER, STG INTEGRAL PIPING, EXTERNAL/REGENERATIVE ETC. WITH ASSOCIATED EQUIPMENTS/TANKS/VESSELS, FST, HP & LP HEATERS ,DEAERATOR WITH ASSOCIATED PLATFORM, POWER CYCLE PUMPS & ASSOCIATED AUXILIARIES, R.E. JOINTS & B.F. VALVES ETC., LP BYPASS SYSTEM WITH ASSOCIATED AUX., BOUGHT OUT ITEMS AND PEM PACKAGES OF EACH UNITS OF **250 MW AT UNIT 3 AND UNIT 4 OF 2 x 250 MW SIKKA THERMAL POWER STATION** GUJARAT STATE ELECTRICITY COORPORATION LIMITED DIST- JAMNAGAR GUJARAT **(UNIT # 3 and UNIT # 4 shall be awarded to 2 separate agencies)**	
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**	***1.***	*Applicable*

	Documents	***Sale from BHEL PS Regional office at :Nagpur*** ***Start :12/01/2012*** ***Closes: 09/02/2012 , Time :16.00 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 21/02/2012 , Time :15.00Hrs*** ***Place : BHEL PS Regional office at :Nagpur*** Tenders being submitted through representative shall be handed over to any of the following BHEL officials after making entry/registration at the reception: RK Ranade/ Sr Manager (Purchase) Pratish Gee Varghese/Engineer(Purchase)	*Applicable*
vi	**OPENING OF TENDER**	***1 hours after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	*Rs 2,00,000/- (Rupees Two Lakhs Only)*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Date: Atleast 5 days before the due date of offer submission* *Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	*Date: Not applicable.*	*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	*Applicable* Shri D. P. Bagchi, IAS (Retd.) Y-165, Regency Park - II, DLF City, Phase IV, Gurgaon - 122 009	*Applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ

at Nagpur issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at NAgpur, Sundays and second/ last Saturdays

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

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

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

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

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

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

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

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

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

	DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING:**	
i	o Envelopes I o Envelopes II o Envelopes III	

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

7.0 No Deviation with respect to tender clauses and no additional clauses/ suggestions/ in Techno-commercial bid/ Price bid shall normally be considered by BHEL. Bidders are requested to positively comply with the same.

8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9.0 Assessment of Capacity of Bidders:

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

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

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

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

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

i). Ratings by Power Sector Region:
- a) PS ER's Rating 'R**e**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- b) PS WR's Rating 'R**w**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- c) PS SR's Rating 'R**s**r' = $(X_1 + X_2 + .. + X_n)$ divided by n
- d) PS NR's Rating 'Rnr' = $(X_1 + X_2 + .. + X_n)$ divided by n
- e) **Over all Power Sector Region Rating 'R_{BHEL}'**= (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 Auxilliaries) or Synchronisation (for all other jobs including Civil) shall be considered.

10.0 Since the job shall be executed at site**,** bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of above.

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

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

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

documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

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

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

16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation/ techno-commercial bids, approval/ acceptance of customer (as applicable), etc. and date of opening of price bids shall be intimated to only such bidders.

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

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

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

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

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

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

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

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

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

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

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

26.0 Order of Precedence

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

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

For BHARAT HEAVY ELECTRICALS LTD

AGM (Purchase)

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03. Annexure-3: Integrity Pact.
04. Annexure-4: Important Information
05. 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 BETWEEN STORES AND SITE OF WORK, ERECTION, TESTING, COMMISSIONING, FINAL PAINTING AND HANDING OVER OF **STEAM TURBINE, TURBO-GENERATOR** (INCLUDING ITS RECEIPT AND UNLOADING FROM WAGON/ TRAILER, PLACEMENT IN POSITION AND LIFTING BY STRAND JACK ARRAGEMENT), CONDENSER, STG INTEGRAL PIPING, EXTERNAL/REGENERATIVE ETC. WITH ASSOCIATED EQUIPMENTS/TANKS/VESSELS, FST, HP & LP HEATERS ,DEAERATOR WITH ASSOCIATED PLATFORM, POWER CYCLE PUMPS & ASSOCIATED AUXILIARIES, R.E. JOINTS & B.F. VALVES ETC., LP BYPASS SYSTEM WITH ASSOCIATED AUX., BOUGHT OUT ITEMS AND PEM PACKAGES OF EACH UNITS OF **250 MW AT UNIT 3 AND UNIT 4 OF 2 x 250 MW SIKKA THERMAL POWER STATION** GUJARAT STATE ELECTRICITY COORPORATION LIMITED DIST- JAMNAGAR GUJARAT **(UNIT # 3 and UNIT # 4 shall be awarded to 2 separate agencies)**
TENDER NO	○ **BHE/PW/PUR/SKT-STG U-3/960 (For Unit # 3)** ○ **BHE/PW/PUR/SKT-STG U-4/961 (For Unit # 4)**

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)	**APPLICABLE**	
B	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	**Applicable**	
C	**C) <u>Bidder must have, achieved any one of the following in last seven years as on the latest date of offer Submission</u>.** 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) Tie-up with an agency who has experience of STG of 60 MW or above (E & C upto synchronization or beyond).		
D 1	**<u>Financial TURNOVER</u>** Bidders must have achieved an average annual financial turnover		

	(Audited) of **Rs. 174 Lakhs** or more over last three Financial Years (FY) i.e, 2008-2009, 2009-2010, 2010-11.		
2	NETWORTH Net worth of bidder based on latest Audited Accounts as furnished for 'D.1' 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	**Tie-Up Criteria**	**APPLICABLE AS PER PQR SL N. C.3**	

Explanatory Notes for 'PQR'

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

1. 'Executed' means the vendor should have achieved the criteria specified in the Common QRs even if the Contract has not been completed or closed.
2. For the purpose of PQR, 3.5 TPH shall be considered equivalent to one MW where ever rating of BOILER is mentioned in TPH. Similarly where ever rating of Gas Turbine is mentioned in terms of frame Size, ISO rating of the same in terms of MW shall be considered for evaluation.
3. **Explanatory Notes for PQR 'C.3.b'**
   - **a.** BOILER Agency shall be called as 'Prime Bidder' and the agency satisfying C.3.b shall be called as 'Tie-up Partner'
   - **b.** Prime bidder and Tie-up Partner shall meet their respective technical Pre qualifying Criteria.
   - **c.** Prime bidder shall meet all other Pre-Qualifying Criteria of the Tender
   - **d.** Prime Bidder shall be responsible for overall execution of the Contract.
   - **e.** Tie-up partner shall provide Technical Supervision and support to the Prime Bidder for execution of job.
   - **f.** Tie-up Partner shall submit Security Deposit (SD) equivalent of 2% of Total contract value in addition to the SD to be submitted by the Prime Bidder for the Contract Value.
   - **g.** Prime bidder and the Tie-up partner are required to enter into a Tie-up Agreement with a validity period of Six months initially (During submission of tender). Thereafter both the agencies shall extend the validity of the agreement for the entire contract period, if the work is awarded.
   - **h.** In case Tie-up partner backs out, another Tie-up partner meeting the QR shall be engaged by the Prime Bidder.

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

1. Net Worth = Paid up share capital + Reserves (Share Capital OR Partnership Capital OR Proprietor Capital as the case may be)
2. Profit shall be NET Profit (PAT + Non Cash Expenditure viz depreciation).
3. In case audited financial statement have not been submitted for all the three years as indicated in 'D1' above, then applicable audited statement submitted by the bidder against the requisite three year, will be averaged for three years.

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

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	Applicable	Applicable
10	Declaration by Authorized 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~~	Applicable	YES/NO
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

INTEGRITY PACT

Between

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

And

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

Preamble

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

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

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

Section 1 - Commitments of the Principal

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

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or

accept, for itself or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

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

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

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

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

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

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

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

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

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

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

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

Section 4 – Compensation for Damages

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

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

Section 5 – Previous Transgression

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

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

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

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

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

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

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

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

Section – 8 Independent External Monitor(s)

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

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

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

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

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

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

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

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC/PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

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

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

Section 9 – Pact Duration

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

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

Section 10 – Other Provisions

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

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

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

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

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

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

ANNEXURE 4:

IMPORTANT INFORMATION

1) This Document consists of Tender Specifications and BOQ of E & C of 2 units of 250 MW STG Sets

1. Entire scope of 2 units of 250 MW STG Sets have been divided into 2 jobs viz Unit # 3 and Unit # 4
2. Tender specification (Volume I) is common for both the units.
3. **Both the UNITS shall be awarded to separate agencies.**
4. **Price / Rates for E & C of 1 unit of 250 MW STG set has been called in Volume II price bid specification.**
5. Bidders are required to submit their rates/price for 1 Unit of 250 MW STG Set only in Volume II Price bid.
6. L-1 bidder shall be considered for award of UNIT # 3.
7. For award of UNIT # 4, next bidder in the order of their price competitiveness (i.e. L-2, then L-3 and hence forth) shall be given an option to match their Per unit rate/price, with the Awarded per unit rate/price of UNIT # 3. In case none of the bidders agree to match the Awarded per unit rate of UNIT # 3, then BHEL may consider awarding the UNIT # 4 to L-1 bidder or opt any other suitable method to finalize UNIT # 4.
8. In case after award of job, the agency fails to display satisfactory performance in execution of job and BHEL feels it necessary to make alternate arrangement to execute balance work or any portion of work on risk purchase basis or otherwise, then BHEL reserves the right to exercise the method mentioned in Sl No 7 to finalize another/additional agency.

2) 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)

3) 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.**

4) 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).

960
&
961

TECHNICAL CONDITIONS OF CONTRACT (TCC) REV 01 DATED 15/02/2012

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

6	Generator & Handling Heavier equipments	Chapter-XVI	2
7	Hydrostatic Testing Preservation & other tests	Chapter-XVII	2
8	Pre Commissioning Tests, Commissioning, Post Commissioning	Chapter-XVIII	4
9	Welding, Heat Treatment, Radiography	Chapter-XIX	4
10	Acid cleaning/alkali flushing/steam blowing/oil flushing	Chapter-XX	2
11	Tools and tackles, measuring and monitoring devices	Chapter-XXI	3
12	Preservative Painting	Chapter-XXII	1
13	Lining and Insulation	Chapter-XXIII	3
14	Final painting	Chapter-XXIV	2

3 Nos Drawings are uploaded as a part of Corrigendum 02:

	Project Information
1.1	**INTROUCTION** Sikka Thermal Power Station is presently having two sets (units) of 120 MW units in operating condition. The plant owner M/s Gujarat State Electricity Corporation Limited (GSECL) has undertaken expansion of this power plant by installing two units of 250 MW each (name plate rating) in the same premises. Though both the new units are of 250 MW name plate rating, they are guaranteed to produce an output of 270 MW each. The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on BHEL/ Owner. All relevant site data/information as may be necessary shall have to be obtained /collected by the Bidder.
1.2	**LOCATION AND APPROACH** In Sikka, Jamnagar district, Latitude 22^{O} 26' N & Longitude 69^{O} 49' E. The site is surrounded by villages Mungai, Sikka, Gagva & Nanikkhavri of Jamnagar district of Gujarat state. **Access by Road:** It is connected to State Highway (SH-25) by a 5 km long road through Sikka village. **Access by Railways:** Jamnagar – Okha broad-gauge section is passing at a distance of 12 km form Sikka. **Nearest Airport**: Jamnagar **Nearest Seaport:** Okha & Navalakhinare located 140 Km & 130 Km respectively from the site.
1.3	**Other Salient Information:** 1. Owner — M/s GSECL 2. Owner's Consultant — M/s TCE, Bangalore 3. Project Title — 2x250 MW Sikka TPS Extension Units # 3 & 4 4. Location — 12 km from Sikka, District – Jamnagar, Gujarat 5. Nearest Railway Stn. — Jamnagar
1.4	**CLIMATIC CONDITIONS** 1.Ambient Air Temperature a. Maximum — 42 Deg. C

	b. Minimum	8 Deg. C	
	2. Relative Humidity		
	c. Maximum	100%	
	d. Minimum	21%	
	3.Rainfall		
	e. Average annual	650 mm	
	f. Maximum	900 mm	
	g. Minimum	400 mm	
	4.Wind Data		
	h. Basic wind speed at 10m height		50 m/sec
	i. Wind pressure		As per IS: 875 Part III
	5.Seismic Zone		Zone IV as per IS: 1893-2002

THE BIDDER IS ADVISED TO VISIT AND EXAMINE THE SITE OF WORKS AND ITS SURROUNDINGS AND OBTAIN FOR HIMSELF ON HIS OWN RESPONSIBILITY ALL INFORMATION THAT MAY BE NECESSARY FOR PREPARING THE BID AND ENTERING INTO THE CONTRACT.ALL COSTS FOR ASSOCIATED WITH SITE VISITS SHALL BE BORNE BY THE BIDDER.

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 each units of GSECL Sikka 2 x250 MW unit#3 & 4
:-

1. Steam Turbines & Turbo Generators along with associated equipment.
2. Condensate system comprising of Surface condenser, Gland steam Condenser, Vacuum Pumps for each Steam Turbine Unit.
3. Regenerative cycle auxiliaries comprising of CEP, LP Heaters, MDBFP, HP Heaters along with associated piping for Steam Turbine.
4. Hot well make up Pump and associated piping & control valves.
5. Central Lube oil storage & transfer system.
6. Thermal insulation refractory & cladding of piping & equipments.
7. Condenser On load Tube cleaning system.
8. Provision of Wet Steam Washing System.
9. Special grouts like Pagal VI for grouting for TG.
10. Special embedment and foundation bolts, O & M platform required for BHEL supplied equipment. Other embedment for piping etc. shall be in EPIL\s scope.
11. Empty H2 & CO2 cylinder.
12. Generator Hydrogen gas purity analyser including all accessories like piping, valves, flanges etc.
13. Acoustic Enclosure for STG.
14. Painting of all erected equipments and structures.
15. TG Integral piping.
16. Operating platform around the , gsc, flash tanks, lube oil / control oil tanks, HP/LP by pass valves, ESVS / IVS, local platforms for various inaccessible valves and equipment etc.
17. Etc.

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

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	**Electricity For construction purposes 3 Phase** of Voltage 415/440 V			FREE
a	Single point source	Yes		at one point near the erection site
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**			FREE
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	

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		Yes	Bidder to make his own arrangement
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	**WATER SUPPLY**			
3.3.1	**For construction purposes: (to be specified whether chargeable or free)**			FREE
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	.
3.3.2	**Water supply for bidder's office, stores, canteen etc**			FREE
a	Making the water available at single point	Yes		

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

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
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	
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**	

MAJOR TOOLS AND PLANTS & MMDs TO BE DEPLOYED BY THE CONTRACTOR FOR EACH UNIT

S.N.	DESCRIPITION	CAPACITY	QUANTITY
1	STRAND JACK SYSTEM WITH ACCESSORIES	AS PER REQUIREMENT	1 No. (FOR GENERATOR STATOR HANDLING & LIFTING ONLY)
2	TYRE MOUNTED HYDRAULIC CRANES	14 MT	2 NOs
3	TRAILER WITH HORSE	30 TON	1 NO
4	TRAILER TROLLEY	20 TON	1 NO
5	WELDING GENERATOR SETS (ELECTRIC AS WELL AS DIESEL)		AS PER REQUIREMENT
6	3- PHASE COMPLETE SET UP FOR DRAWAL OF POWER		-DO-
7	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURSE AND FILM VIEWER		-DO-
8	TIG WELDING SET		-DO-
9	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS		-DO-
10	ELECTRICAL BAKING OVEN - BIG		-DO-
11	ELECTRODE BAKING OVEN - PORTABLE		-DO-
12	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS		-DO-
13	VACUUM CLEANER (INDUSTRIAL)		-DO-
14	PIPE CUTTING AND BEVELLING MACHINE		-DO-
15	PIPE BENDING M/C	ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE	-DO-
16	AIR COMPRESSOR	120 CFM	01 NO
17	STEP DOWN TRANSFORMER	230V/24V	AS PER REQUIREMENT
18	CONDENSER TUBE EXPANDER SET		DO
19	ELECTRICALLY OPERATED WINCHES	3T/5T	DO
20	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)		DO
21	**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. END SHIELDS)	63 MT	04 NOS.
	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.			
22	TORQUE WRENCH	0 TO 200 N-M	01 NO.
23	TORQUE WRENCH	UPTO 2000 N-M	01 NO.
24	SLINGS FOR LP TURBINE ROTOR		02SET
25	SLINGS FOR HP TURBINE MODULE		02SET
26	SLINGS FOR GENERATOR ROTOR		02SET
27	BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FOUNDATION BOLTS)		AS PER REQUIREMENT
28	LONG FEELER GAUGE SET		AS PER REQUIREMENT
29	SPANNERS / EYE BOLTS (OF ALL SIZES)		AS PER REQUIREMENT
30	HYDRAULIC TEST PUMPS AND FILL PUMPS		AS PER REQUIREMENT

B: MEASURING AND MONITORING DEVICES (MMD):

To be finalized at site as per requirement.

NOTE:

1.

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.

A:

SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
01	EOT CRANE IN TG HALL	1 No. (ON SHARING BASIS WITH OTHER AGENCY)	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 one month 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:

Milestones	Unit 3	Unit 4
Condenser Erection Start	30- Mar-12	30- June -12
Turbine Erection Start	15-April -12	15-July -12
Start of Turbine Oil flushing	10- Jan-13	10- April-13
TG on Barring Gear	28-Feb-13	28-May-13
Synchronization with coal	31-Mar-13	31-June-13
Completion of Trial Run	31-July-13	31-Oct-13

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

DURATION

The total contract period for completion of entire work for each unit shall be **16 (Sixteen)** months from the start of erection as specified earlier.

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 STG

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS	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%**	**15%**	**13%**	**11%**	**7%**	**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	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	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 (15%)**	--		--	--			--	
3.1	PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES	--		5%				--	
3.2	LIFTING, LEVELLING AND ALIGNMENT OF STATOR (including erection and commissioning of Strand & Jack 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	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									
4.5	ERECTION, TESTING, GROUTING ETC. OF DMCW (BOILER & TG) PUMPS	--	--	--	13%			--	
4.6	ERECTION, TESTING, GROUTING ETC. OF CONDENSATE EXTRACTION PUMPS	--	--	--	10%			--	
	Subtotal for pumps and Auxilliaries				**85%**				
5	**HEATERS (05%)**								
5.1	ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS	--	--	--		50%		--	
5.2	ERECTION, TESTING & COMMISSIONING OF GLAND STEAM CONDENSER, DRAIN COOLERS	--	--	--		35%		--	
	Subtotal FOR HEATERS AND DEAERATORS	**--**	**--**	**--**		**85%**		**--**	
6	**MISCELLANEOUS ITEMS (13%)**								
6.1	DEBRIS FILTERS, RE JOINTS, ME BELLOWS, DIRTY, CLEAN OIL TANKS, ENCLOSURES, CO2/H2 CYLIDER RACKS ETC						20%		
6.2	ACW PUMPS, RELATED ITEMS/ BOILER FILL PUMPS	--	--	--			10%		
6.3	ERECTION, TESTING & COMMISSIONING OF CONTROL FLUID TANK, C.F. COOLERS, C.F. PUMPS, PURIFICATION UNIT ETC.	--	--	--			9%		
6.4	ERECTION, TESTING & COMMISSIONING OF FLASH TANKS & FLASH VESSELS	--	--	--			8%		
6.5	ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE	--	--	--			10%		

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	PIPING (8) ON PER MT BASIS
6.6	ERECTION, TESTING & COMMISSIONING OF CONDENSER ON LOAD TUBE CLEANING PACKAGE/ CONDENSATE TRANSFER PUMPS	--	--	--			12%		
6.7	ERECTION, TESTING & COMMISSIONING OF SELF CLEANING STRAINER PACKAGE	--	--	--			8%		
6.8	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%**
II	**STAGE/MILESTONE PAYMENTS (15%)**								
1	Boiler Light Up	0%	0%	0%	0%	0%	0%	0%	0%

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	PIPING (8) ON PER MT BASIS
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'.
- In case strand jack system for stator lifting is also included in scope of contractor, then 10% of the lumpsum value quoted/ derived per unit of STG package will be paid upon lifting and placement of stator in position of respective unit, using the strand jack system.

  In such a case, 90% of lumpsum value quoted/ derived per unit of STG package shall be considered for progressive payments as per terms of payment for the respective unit of STG package

8.0 TAXES, DUTIES, LEVIES (Rev 01 dated 15/03/2011)

8.1.1

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

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

8.1.2 Service Tax & Cess on Service Tax

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

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

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

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

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

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

8.1.4 Modalities of Tax Incidence on BHEL

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

8.1.5 New Taxes/Levies

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

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

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

8.1.6 Submission of Periodical Reports

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

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

BHEL at site will inform formats for these reports.

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

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

In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts shall be ensured by the contractor and contractor shall

obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-

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

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

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

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

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
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.

9.6
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.

9.7
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.

9.8

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.

9.9

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.

9.10

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.

9.11

PRIMERS & PAINTS

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

9.12

WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES

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

9.13

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.

9.14

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.

9.15

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

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

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

F) 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.

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

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

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

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

K) Supply of primer and paints for final painting

L) Pneumatic copper tubing and fittings thereof.

1	STEAM TURBINE & AUX.(Hardwar Supply)		
SN	**DESCRIPTION**	**PACKAGE SIZE IN MM**	**Gr.WEIGHT(KG)**
1	SOLE PLATE PEDESTAL ANCHOR	3400X1200X800	2510
2	BASE PLATE ASSEMBLY	4500X1400X1200	4500
3	BASE PLATE ASSEMBLY	2300X1250X600	2560
4	BASE PLATE L.P.CASING	2300X2075X981	2680
5	LP OUTER CASING PARTS	7060X1480X2760	8085
6	LP OUTER CASING PARTS	7060X1480X2760	8085
7	LPC OUTER CASING PARTS	4570X3230X980	2500
8	LPC OUTER CASING PARTS	4570X3230X980	2500
9	COMPONENTS OF LP CASING UPPERPART	3500X300X300	495
10	L.P OUTER CASING PARTS	3450X1000X1100	900
11	ASSEMBLY DEVICES	900X700X550	180
12	INSPECTION SHAFT FOR IPC	3300X700X700	775
13	VALVE SUPPORT FOR HP OVERHAUL	1000X1000X400	800
14	COMPONENTS OF ASSY.FIXTURE FOR HPT	3800X2500X1200	6864
15	COMPONENTS OF ASSEMBLY FIXTURE OF HPT	2200X1200X850	1800
16	COMPONENTS OF ASSY.FIXTURE FOR HPT	3300X1800X1210	3352
17	COMPONENTS OF ASSEMBLY FIXTURE FOR H.P.TURBINE	5010X4000X120	3356
18	HP-IP BREARING PEDESTAL ASSLY.	4080X2005X2126	13275

19	HP/IP BRG.PED.PARTS	1000X600X600	438
20	HP/IP BRG.PED.PARTS	500X200X150	37
21	AUXILIARIES OF LP TURBINE	3000X1300X1000	2100
22	AUXILIARIES OF LP TURBINE	2000X1000X1825	1142
23	AUXILIARIES OF LP TURBINE	2000X1000X1825	1142
24	LP JOINT COVERING	2300X1800X940	1041
25	ASSEMBLY TOOLS	1900X1000X890	560
26	CAP(SPRING SUPPORT)	825X500X400	400
27	CAP(SPRING SUPPORT)	825X500X400	400
28	CAP (COMPEN.ASSY)	3240X1740X1340	3316
29	CAP (COMPEN.ASSY)	3240X1740X1340	3512
30	CAP(OBLIQUE REDUCER ASSLY)	1400X1400X1200	590
31	CAP (MITRE BEND ASSY)	1550X1550X1300	670
32	CAP (COMPEN.ASSY)	3240X1740X1340	3512
33	CAP (MAN-HOLE ASSLY)	1500X1600X1100	750
34	CAP (MAN-HOLE ASSLY)	1500X1600X1100	750
35	CAP(MITRE BEND ASSY)	1550X1550X1300	670
36	CAP (MITRE BEND ASSY)	1550X1550X1300	670
37	CAP (PIPE ASSLY)	2000X1100X1200	645
38	CAP (MITRE BEND ASSY)	1550X1550X1300	670
39	LONGITUDINAL GIRDER (LEFT)	6800X1820X1570	15182
40	LONGITUDINAL GIRDER (RIGHT)	6800X1820X1570	15182
41	LP FRONT WALL (TS)	6820X3750X910	10053
42	LP FRONT WALL (GS)	6820X3750X910	10053
43	LP SHAFT SEALING FRONT	1800X1700X740	2260

44	LP SHAFT SEAL COMPENSATORASSLY.(TS)	1440X1420X520	1456
45	LP SHAFT SEALING (REAR)	1800X1700X740	2260
46	LP SHAFT SEAL COMPENSATORASSLY.(GS)	1440X1420X520	1456
47	LP CASING ASSEMBLY (FASTENERS)	1800X1700X740	2653
48	LP CASING ASSEMBLY (PARTS)	3760X2060X860	4900
49	LP CASING ASSEMBLY (PARTS)	450X450X250	340
50	EXTRACTION PIPE LINE (LPC)	1600X1000X750	520
51	EXTRACTION PIPE LINE (LPC)	2700X1350X750	670
52	EXTRACTION PIPE LINE (LPC)	2000X1200X600	1004
53	EXTRACTION PIPE LINE (LPC)	2900X1100X700	650
54	EXTRACTION PIPE LINE (LPC)	2900X1100X700	650
56	EXTRACTION PIPE LINE (LPC)	2700X1200X750	575
57	EXTRACTION PIPE LINE (LPC)	1100X850X850	307
58	EXTRACTION PIPE LINE (LPC)	2700X1750X1100	689
59	EXTRACTION PIPE LINE (LPC)	1550X1450X900	530
60	EXTRACTION PIPE LINE(LPC)	2000X600X600	366
61	L.P. EXTRACTION PIPE SHEATHING	2600X2000X1400	1290
62	INNER GUIDE PLATE OF DIFFUSER(TS)	2600X2400X1000	2118
63	INNER GUIDE PLATE OF DIFFUSER(GS)	2600X2400X1000	2118

64	DIFFUSER (TS)	4880X1730X2340	3640
65	DIFFUSER (GS)	4880X1730X2340	3640
66	AUXILIARIES OF I.P. TURBINE	1050X480X550	390
67	AUXILIARIES OF I.P. TURBINE	1100X500X650	204
68	AUXILIARIES OF I.P. TURBINE	1100X500X650	204
69	LP-GEN. PEDESTAL ASSEMBLY	3220X2285X2075	10200
70	IP-LP PEDESTAL ASSEMBLY	3700X1860X2100	14600
71	LP INNER OUTER CASING (U/H)	6720X3150X2325	21750
72	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2350	30907
73	LP INNER CASING ASSY.FASTENERS	1800X1700X740	1760
74	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000	11722
75	STEAM INLET PIPE (LPT)STEAM INLET PIPE (LPT)	2700X1300X900	840
76	L.P. ROTOR	7210X3300X3350	62049
77	BEARING PEDESTAL ARRANGT.PARTS	1800X900X800	1100
78	STUD HEATING DEVICE AND BREECH NUT HEATING DEVICE.	1500X1200X250	315
79	GROMMET SLINGS	1500X1500X350	280
80	IP TURBINE	4860X3753X3210	81679
81	HP TURBINE	5060X3100X2900	56100
82	HP INLET ASSEMBLY	450X450X200	45
83	H.P.EXHAUST ASSEMBLY	1625X1335X675	1378
84	HPT RELATED PARTS	1000X1000X500	190
85	HP FRONT BEARING PEDESTAL	3500X3000X2050	11939

86	HP FRONT BRG. PEDESTAL PARTS	1800X1700X1000	844
87	I.P TURBINE PARTS	700X700X500	285
88	RATING, COLLABORATION AND MONOGRAM PLATES	850X550X150	50
89	OIL FLUSHING AND PRESSURE TEST DEVICE	750X400X550	130
90	SUPPORT FOR IV VALVE	1500X1000X750	410
91	STEAM BLOWING & HYD. TEST DEV.	2900X2100X1140	2730
95	TOOLS AND PACKING DEVICES	1750X1200X980	684
96	ASSEMBLY DEVICE FOR VALVES	920X1000X450	213
97	ESV & CV CASING WITH VALVESESV& CV CASING WITH VALVES	3000X3000X1900	9800
98	ESV & CV CASING WITH VALVES	3000X3000X1900	9800
105	IV & CV CASING WITH VALVES.IV & CV CASING WITH VALVES.	4500X3500X2600	21500
106	IV & CV CASING WITH VALVES.IV & CV CASING WITH VALVES.	4500X3500X2600	21500
110	IV & CV CASING WITH VALVES.IV & CV CASING WITH VALVES.	4500X3500X2600	21500
111	PARTS OF IV & CV CASING	1500X1000X200	100
112	PARTS OF IV & CV CASING	1500X1000X200	100
113	INJECTOR FOR SUC. PIPE NB350	3300X1750X1210	1029
114	MAIN OIL TANK & NOZZLE ARRGT.ASSY.	5180X3260X2650	9100

115	MAIN OIL TANK & NOZZLE ARRANGEMENT	4200X1100X800	550
118	OIL STRIPPER	600X600X850	133
119	OIL STRAINERS	2050X1200X1410	568
120	VARIABLE ORIFICES THROTTLE VALVES & FLUSHING PARTS	1000X500X250	115
121	HOUSING FOR MS STRAINER	1700X1025X900	2200
122	HOUSING FOR M.S STRAINER	1725X1250X730	2200
123	STEAM STRAINER ASSEMBLY DEVICE MS & HRH	2140X1400X500	652
124	HOUSING FOR HRH STEAM STRAINER	2200X1450X1100	3500
125	HOUSING FOR HRH STEAM STRAINER	2200X1450X1100	3500
126	STEAM STRAINER (MS)	1100X700X350	374
127	STEAM SRAINER (HRH)	1600X1450X750	485
128	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000X900X800	490
129	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING	1600X1200X1000	1090
130	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000X900X800	490
131	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING	1600X1200X1000	1090
132	STEAM STRAINER HOUSING GASKETS	700X700X300	50
133	COMPENSATOR	600X600X900	50

134	LEAKAGE OIL TANK	1000X1000X3000	515
135	WASTE OIL TANK	1000X1000X3000	515
136	INJECTOR FOR SUC. PIPE NB 400	3500X750X750	922
137	TURBINE INSTRUMENTS RACKS	2750X1000X800	2690
138	TURBINE INSTRUMENTS RACKS	2300X750X750	765
139	IMPULSE PIPES (CARBON STEEL)	6900X650X650	1585
140	PRESS.TRANSMITTERS,SWITCHES&GAUGES	2800X1250X1250	825
141	TRANSMITTERS & J.B.OF BEARINGS	500X300X200	110
142	IMPULSE PIPES (ALLOY STEEL)	6900X300X300	400
TOTAL(kg)			**584585**

2	**TURBO GENERATOR & AUXILIARIES (HARDWAR SUPPLY)**		
SN	**DESCRIPTION**	**PACKAGE SIZE IN MM**	**Gr.WEIGHT(KG)**
1	FOUNDATION ITEMS OF GENERATOR	3550X715X880	4656
2	FOUNDATION ITEMS OF GENERATOR	2240X940X1220	2880
3	CONSUMABLES FOR FOUNDATION	500X500X200	15
4	GENERATOR STATOR	7520X4200X4770	218000
5	GENERATOR ROTOR	10550X1560X1660	47742
6	END SHIELD (TE) LOWER HALF	3640X1140X2000	6020
7	END SHIELD (EE) LOWER HALF	3640X1140X2000	6020
8	H.V.BUSHING	2000X950X600	590
9	LOOSE ITEMS OF WOUND STATOR	1500X1200X1000	1010
10	GENERATOR ACCESSORIES	1800X1000X550	1546

11	GENERATOR ACCESSORIES(TERMINAL BUSHING BOX)	3500X1800X1250	4075
12	GAS BAFFLE RING, INSERT COVERETC.	3700X3500X1340	4364
13	BEARING SHELLS	1100X835X950	953
14	END SHIELD (EE) UPPER HALF	3640X1140X2000	5620
15	END SHIELD (TE) UPPER HALF	3640X1140X2000	5620
16	SEAL RINGS	600X600X200	73
17	DEVICE FOR ROTOR INSERTIONINTO STATOR	2240X940X1220	1036
18	ERECTION DEVICES	2250X1180X1140	997
19	WIRE ROPES	1800X1450X200	201
20	DRY AIR BLOWER	1350X1250X800	190
21	TERMINAL CONNECTORS	1840X660X400	506
22	CONSUMABLES	500X600X300	45
23	SEAL OIL UNIT	6000X2500X3000	9160
24	SEAL OIL STORAGE TANK	3500X1300X1280	1460
25	GAS UNIT	2550X1790X2560	1150
26	HYDROGEN DISTRIBUTOR	3480X1540X440	333
27	CO2 DISTRIBUTOR	2770X1240X440	247
28	SEAL OIL UNIT-II	3610X2040X2350	3263
29	LIQUID DETECTOR RACK	1700X900X1800	450
30	LOOSE VALVES	2000X1000X1000	959
31	LOOSE INSTRUMENTS	500X500X300	80
32	CO2 VAPOURISER	1520X640X840	225
33	SLIP RING SHAFT ASSEMBLY	2540X1110X1200	2155
34	SLIP RING COVER & SEALING WALL	2540X2390X2750	3484
35	ACCESSORIES OF SLIP RING SHAFT	2600X2300X500	1435
36	BED PLATE, BEARING & BRUSH GEAR	2300X1550X1765	
37	GENERATOR PIPING	6500X1200X1000	6374
38	GENERATOR PIPING	6500X1000X800	1926

39	GENERATOR PIPING	1900X1500X800	1615
TOTAL			**346475**

3	**CONDENSER & AUX.(HARDWAR SUPPLY)**		
SN	**DESCRIPTION**	**PACKAGE SIZE IN MM**	**Gr.WEIGHT(KG)**
1	CONDENSER (HOTWELL)	11200X1900X1200	6913
2	BOTTOM PLATE	7150X3450X625	6793
3	BOTTOM PLATE	7150X3450X625	6793
4	BOTTOM PLATE	7150X3850X625	8296
5	BOTTOM PLATE	1900X700X300	271
6	CONDENSER SUPPORT	1750X1000X1250	3650
7	CONDENSER SUPPORT	1750X1000X1250	3650
8	CONDENSER SUPPORT	1750X1000X1250	3650
9	CONDENSER SUPPORT	1750X1000X1250	3650
10	LOOSE ITEM(COND. SUPPORT)	1600X950X950	4775
11	WATER CHAMBER (LHS)	5224X3610X360	6150
12	FRONT WATER BOX (GEN SIDE)	5950X3610X2485	15044
13	WATER CHAMBER(RHS)	5224X3610X360	6150
14	FRONT WATER BOX (TUR SIDE)	5950X3610X2485	15044
15	WATER CHAMBER (RHS)	5224X3610X360	6150
16	REAR WATER BOX (GEN SIDE)	4760X3610X2025	9122
17	WATER CHAMBER (LHS)	5224X3610X360	6150
18	REAR WATER BOX (TUR SIDE)	4760X3610X2025	9122
19	SIDE WALL(TUR.END)	5248X2480X80	7120
20	LOOSE ITEMS (SIDE WALL - TUR.END)	5850X350X250	782
21	SIDE WALL(GEN.END)	5248X2480X80	7120
22	LOOSE ITEMS (SIDE WALL - GEN.END)	5850X350X250	782

23	SHELL INTERNAL DETAILS	3650X850X625	4780
24	SHELL INTERNAL DETAILS	3650X850X625	4780
25	SHELL INTERNAL DETAILS	3650X850X625	4780
26	SHELL INTERNAL DETAILS	3650X850X625	4780
27	SHELL INTERNAL DETAILS	1000X750X350	600
28	SHELL INTERNAL DETAILS	3700X850X350	4600
29	AIR EXTRACTION PIPING	5460X990X410	1200
30	SHELL INTERNAL DETAILS	4700X3426X348	5400
31	SHELL INTERNAL DETAILS	4700X3426X348	5400
32	SHELL INTERNAL DETAILS	4700X3426X348	5400
33	SHELL INTERNAL DETAILS	4700X3426X348	5400
34	SHELL INTERNAL DETAILS	4700X3426X348	5400
35	SHELL INTERNAL DETAILS	4700X3426X348	5400
36	SHELL INTERNAL DETAILS	4700X3426X348	5400
37	LOOSE ITEMS (SHELL INTERNAL)	5500X940X630	7560
38	LOOSE ITEMS (SHELL INTERNAL)	4440X260X100	350
39	LOOSE ITEMS (SHELL INTERNAL)	3000X1500X500	4655
40	LOWER DOME WALL (TUR.END)	11000X3950X910	8767
41	LOWER DOME WALL (TUR.END)	4000X800X100	700
42	LOWER DOME WALL (TUR.END)	900X300X300	270
43	LOWER DOME WALL (GEN.SIDE)	11000X3950X910	7698
44	LOWER DOME WALL (GEN.END)	4000X800X100	700
45	DOME WALL (GEN.END)	900X300X300	270
46	LOWER DOME WALL (F.W/B SIDE)	7502X4046X545	6012
47	LOWER DOME WALL (F.W/B SIDE)	6238X934X1155	1444
48	LOWER DOME WALL (F.W/B SIDE)	1325X1150X500	550
49	LOWER DOME WALL (R.W/B SIDE)	7550X4000X1900	6727

50	DOME WALL (R.W/B SIDE)	6236X1134X1160	1427
51	LOWER DOME WALL (R.W/B SIDE)LOOSE ITEMS	1300X1065X305	215
52	DOME INTERNAL STIFFENING	6016X200X200	726
53	DOME INTERNAL STIFFENING	6016X200X200	726
54	DOME INTERNAL STIFFENING	6016X200X200	726
55	DOME INTERNAL STIFFENING	6016X200X200	726
56	DOME INTERNAL STIFFENING	3400X200X200	382
57	DOME INTERNAL STIFFENING	3400X200X200	382
58	DOME INTERNAL STIFFENING	1760X1480X1230	4300
59	DOME INTERNAL STIFFENING	2380X1310X1100	4295
60	UPPER DOME WALL,(TUR/GEN.SIDE)	6800X460X310	1083
61	UPPER DOME WALL,(TUR/GEN.SIDE)	6800X460X310	1083
62	UPPER DOME WALL,(F/W/BSIDE)	5880X1930X380	3635
63	UPPER DOME WALL (LOOSE ITEMS)	5400X350X32	475
64	UPPER DOME WALL (LOOSE ITEMS)	670X250X450	410
65	UPPER DOME WALL(RWB SIDE)	5880X1930X448	3270
66	W/BOX REMOVAL DEVICE	2500X1000X750	2600
67	W/B REMOVAL DEVICE (CONDENSER)	2000X1500X500	2135
68	FRAME	1850X840X230	650
69	FRAME	1840X840X230	650
70	STEAM THROW DEVICE	1450X900X700	1041
71	STEAM THROW DEVICE	1450X900X700	1041

72	CONDENSER (LOOSE ITEMS)	2100X650X700	600
73	CONDENSER (LOOSE ITEMS)	2900X956X406	380
74	CONDENSER LOOSE ITEMS	1000X500X500	275
75	FASTENERS (CONDENSER)	1000X800X800	1450
76	CONDENSER LOOSE ITEMS	600X320X200	6
77	CONDENSER LOOSE ITEMS	3300X250X200	200
78	TOOLS & TACKLES (CONDENSOR)	1000X500X500	600
79	STAND PIPE NO.1	2750X420X400	60
80	CONDENSER STAND PIPE	3150X350X330	300
81	STAND PIPE NO.2	2750X420X390	62
82	CONDENSER INSTRUMENTRATION	1500X1100X1000	670
83	CONDENSER INSTRUMENTATION	1000X750X500	145
84	CONDENSER INSTRUMENTATION	1400X800X700	74
85	GLAND STEAM CONDENSER	1015X1180X1400	825
86	STAND PIPE/LOOSE ITEMS (GSC)	2100X500X400	200
87	LOOSE ITEMS OF GSC (FRAGILE)	600X800X400	100
88	LOOSE ITEMS GSC(NON FRAGILE)	1500X650X450	320
TOTAL(kg)			**284445**

4	ACG (HARDWAR SUPPLY)			
SL	**PKG.NO**	**DESCRIPTION**	**PKG.SIZE(MM)**	**GR.WT IN KG.**

1	10001/0	STARTER CABINET FOR DC S. OIL MOTOR	1230 X 1060 X 2550	675
2	10002/0	GENERATOR INSTRUMENTATION CABINET	1230 X 1060 X 2550	675
3	10003/0	LOOSE INST.	800 X800 X400	54
5	10005/0	STARTER CABINET FOR DC JOP MOTOR	1230 X 1060 X 2550	675
6	10006/0	STARTER CABINET FOR DC EOP MOTOR	1230 X 1060 X 2550	675
		TOTAL (Kg)		**2754**

5	**LP HEATERS & COOLERS(HYDERABAD SUPPLY)**		
SN	**DESCRIPTION**	**PACKAGE SIZE IN MM**	**Gr.WEIGHT(KG)**
1	DRAIN COOLER	4650X1000X1250	3500
2	LOOSE ITEMS(DRAIN COOLER)	800X500X300	101
3	DRAIN COOLER	500X300X300	24
4	DRAIN COOLER	400X400X60	6
5	LP HEATER NO. 1	11520X1400X1550	11880
7	LP HEATER NO.1 STAND PIPE	2700X500X400	150
8	LP HEATER NO.1 STAND PIPE	2200X700X500	50
9	LOOSE ITEMS LP HEATER NO. 1	700X500X500	150
11	LP HEATER NO. 2	9600X1350X1735	9950
12	LP HEATER NO. 2, INSTRUMENTS	700X500X400	130
13	LP HEATER NO. 2, LOOSE ITEMS	2700X500X400	140
14	LP HEATER NO.2, STAND PIPES	2200X700X500	100
15	LOOSE ITEMS, LP HEATER NO.2	2600X500X350	200
16	LP HEATER NO. 3	9600X1270X1835	9875
17	L.P. HEATER-3 & STAND PIPES(LOOSE ITEMS)	2700X500X400	140
18	LP HEATER NO. 3, INSTRUMENTS	1600X500X400	250

19	LP HEATER NO. 3, STAND PIPES	2200X700X500	100
20	LP HEATER NO. 3,INSTRUMENTS	500X300X300	125
21	TUBRINE OIL COOLER	5050X1650X1980	8200
22	TUBRINE OIL COOLER	5050X1650X1980	8200
23	TOC (LOOSE ITEMS)	750X500X200	80
24	TOC (LOOSE ITEMS)	800X600X600	60
25	EXCITER AIR COOLER	2850X650X600	892
26	EXCITER AIR COOLER	2850X650X600	892
TOTAL			**55195**

6	**BFP (HYDERABAD SUPPLY)**				
SN	**DESCRIPTION**	**PACKAGE SIZE IN MM**	**UNIT Wt.**	**QTY. (NOS.) for each unit**	**Gr.WEIGHT(KG)**
1	BFP SKID (PUMP ASSLY. + BASE PLATE + TUBING + SEAL COOLERS)	2250 X 1000 X1050	5,770	3	17310
2	BP SKID (PUMP ASSLY. + BASE PLATE+ TUBING)	1650 X 1200 X 950	2,511	3	7533
3	GRILLAGE	10200 X 2500 X 900	5,030	3	15090
4	HYDRAULIC COUPLING (DD)	1800 X 1700 X 1800	3,560	3	10680
5	HYD. COUPLING W. O. COOLER (DD)	3700 X 1500 X 500	1,475	3	4425
6	HYD. COUPLING L. O. COOLER (DD)	3100 X 1300 X 450	775	3	2325
7	HYD. COUPLING LOOSE ITEMS	-----	710	3	2130

8	SUCTION STRAINER AT BP SUCTION DD)	900 X 800 X 1400	600	3	1800
9	BFP RECIRCULATION VALVE (DD)	1800 X 550 X 1400	250	3	750
10	LOCAL GAUGE BOARDS WITH INSTRUMENTS (DD)	2200 X 300 X 1800	500	3	1500
*11	LOOSE ITEMS	-----	2,200	3	6600
TOTAL (KG)					**70143**

7	**CEP (HYDERABAD SUPPLY)**				
S.N.	**DESCRIPTION OF EQUIPMENT**	**DIMENSIONS(MM)**	**UNIT WT.(KG)**	**TOTAL NOS FOR EACH UNIT**	**Gr.WEIGHT(KG)**
1	CEP ASSEMBLY	Φ 1100 X 3250	1,700	3	5100
2	CANISTER	Φ 900 X 3100	260	3	780
3	CEP FOUNDATION RING	1100 X 1100 X 150	185	3	555
4	CEP SUCTION STRAINER	900 X 800 X 1400	600	3	1800
5	LOCAL GAUGE BOARD WITH INSTRUMENTS (DD)	2000 X 300 X 1800	400 (PER UNIT)	1	400
6	LOOSE ITEMS	-----	210	3	630
TOTAL					**9265**

8	HP HEATER(HYDERABAD SUPPLY)			
S.NO	**DESCRIPTION**	**DIMENSIONS**	**QTY**	**Gr.WEIGHT (MT)**
1	HP Heater No. 5	2400 (H) X 2200 (W) X 10700 (L)	1Nos.	17.25
2	HP Heater No. 6	2400 (H) X 2200 (W) X 12100 (L)	1Nos.	20.75
TOTAL (MT)				**38**

9	FLASH TANKS (BHOPAL SUPPLY)				
S.No	**DESCRIPTION**	**QTY/SETS**	**SIZE (MM)**	**Unit Wt(Kg.)**	**Gr.Wt.(Kg)**
1	HP Flash Tank	1	4100 (L) X 3000(W) X 2900(H)	4600	4600
2	LP Flash Tank	1	2900(L) X 2200(W) X 2100(H)	3400	3400
3	Unit F/T	1	2500(L) X 1500(W) X 1400(H)	1000	1000
	TOTAL (Kg))				**9000**

10	MISC. TANKS(BHOPAL SUPPLY)					
S.No	**DESCRIPTION**	**QTY/SETS**	**SIZE (MM)**	**Unit Wt(Kg.)**	**Gr.Wt.(Kg)**	**REMARK**
1	Clean Oil Tanks	1	5400 (L) X 4900(W) X 3400(H)	10200	10200	for both units
2	Dirty Oil Tank	1	5400 (L) X 4900(W) X 3400(H)	10200	10200	for both units
3	Oil Unloading Tank	1	2250 (L) X1200 (W) X 900 (H)	550	550	for both units

4	O/H CST	2	13550 (L) X 3800 (W) X 4200(H)	21000	42000	for both units
5	SW Tank	1	6100(L) X 2500(W) X 2900(H)	7500	7500	for both units
	PW Tank	1	4100(L) X 2000 (W) X 2600(H)	3600	3600	for both units
	TOTAL (Kg) FOR BOTH UNIT				**74050**	
	TOTAL (Kg) FOR EACH UNIT				**37025**	

11	**RE JOINTS(BHOPAL SUPPLY)**				
S.No	**DESCRIPTION**	**QTY/ SETS**	**SIZE (MM)**		**Gr.Wt.(MT)**
1	RE Joint INLET	1	2800 (H) X 3200 (W) X 5315 (L)		9.05
2	RE Joint OUTLET	1	2800 (H) X 2950 (W) X 3705 (L)		8.30
	TOTAL (MT)				

12	**H.T. MOTORS(BHOPAL SUPPLY)**				
S.No	**DESCRIPTION**	**QTY/SETS**	**SIZE (MM)**	**Unit Wt(Kg.)**	**Gr.Wt.(Kg)**
1	BFP	3	4000 X 3000 X 3000	15000	45000
2	CEP	3	2000 X 1600 X 2500	6000	18000
	TOTAL (Kg)				**63000**

13	**BUTTER FLY VALVE (BHOPAL SUPPLY)**				
S.No	**DESCRIPTION**	**QTY/SETS**	**SIZE (MM)**	**Unit Wt(Kg.)**	**Gr.Wt.(Kg)**

1	Dia 1800 (RL)	7	2800 (L) X 2000 (W) X 750 (H)	5760	40320
2	Dia 1200 (RL)	1	2100 (L) X 1600(W) X 400(H)	2670	2670
3	Dia 700 (RL)	2	1600(L) X 1100(W) X 400(H)	790	1580
4	Dia 600 (RL)	1	1500(L) X 900(W) X 600(H)	600	600
5	Dia 600 (RL)	1	1500(L) X 1100(W) X 400(H)	575	575
6	Dia 500 (RL)	4	1300(L) X 800(W) X 350(H)	380	1520
7	Dia 450 (RL)	1	1300(L) X 800(W) X 350(H)	265	265
8	Dia 450 (RL)	3	1300(L) X 800(W) X 350(H)	275	825
9	Dia 400 (RL)	4	1100(L) X 600(W) X 300(H)	270	1080
10	Dia 400	3	1100(L) X 600(W) X 300(H)	390	1170
	TOTAL (Kg)				**50605**

14	**BOUGHT OUT ITEM (PEM SUPPLY)**				
SL.NO.	**ITEM DESCRIPTION**	**Qty**	**Approx. Dimensions (LXBXH)**	**TOTAL WT. KG.**	**Remark**
1	CONTROL VALVES				21 nos. per unit
2	FLOW ELEMENTS				11 nos. per unit
3	**CHAIN PULLEY BLOCK / HOIST:**				
a)	ELECTRIC HOIST				Total 10 Hoist each 2000Kg/Hoist
b)	CHAIN PULLEY BLOCK				
4	CHEMICAL DOZING SYSTEM				
a)	Hydrazine Dosing system	2	6m X 2m X 3.5m	4500	for one (1) number skid

					only
b)	Ammonia Dosing system	2	6.3m x 2m x 3.5m	5500	for one (1) number skid only
c)	NaoH Dosing system	2	2.0m x 1.5m x 1.5m	1500	for one (1) number skid only
d)	Phosphate Dosing system	2	6.5m x 2m x 3.5m	5500	for one (1) number skid only
e)	Bulk Ammonia Dosing system	1	5m x 3m x 2m	3000	for one (1) number skid only
5	LUBE OIL TRANSFER PUMPS			750	
6	AIR TRAPS				Qty very small
9	ME BELLOWS			4500	
10	STEAM TRAPS				Qty very small
11	**VALVES:**				
a)	AIR RELEASE VALVE			637	
b)	BALL VALVES				Qty very small
c)	GM Valve			432.35	
d)	Power Cycle Valves			2315	
e)	CS/Gate/Globe/NRV			36.2	
f)	Cast Iron Valve			4662.5	
g)	BUTTER FLY VALVES(WATER SERVICE)			6977	
12	AUX PRDS			1500	
13	COLTCS	4	3m x2.5 m 2.5m	14000	
15	DESUPERHEATER FOR WET STEAM WASHING			45	
	Plate Heat Exchangers	5	3 m x 2.5m 1.5m	27500	
	Sump pumps	3	1 m x1m	1500	
16	MISC. PUMPS	11	2.5m x 1.5m	17500	

18	SELF CLEANING STRAINER	2	3m x 0.6m	10000	
	TOTAL(KG)			**112355**	

15	**BOUGHT OUT ITEM (HARDWAR SUPPLY)**	
S.N	**ITEM ID**	**Description**
1	BG001	EMPTY H2 CYLINDER
2	BG002	EMPTY CO2 CYLINDER
3	BG004	PORTABLE GAS ANALYSER
4	BG005	MOISTURE MEASURING SYSTEM
5	BG007	VAPOUR EXHAUSTER
6	BG008	MOTORISED TEMPERATURE CONTROL VALVE WITH ACTUATOR NB250 VAR-02
7	BG009	H2 GAS ANALYSER CABINET
8	BG011	REFRIGERATION GAS DRYER
9	BG018	STARTING RESISTOR FOR DC S.O MOTOR
10	BG020	SOUND ABSORBING COVER
11	BH009	WELDED TITANIUM TUBES GR.2 (FOR CONDENSOR)
12	BH010	CONDENSOR AIR EVACUATION PACKAGE (VACUUM PUMP)
13	BH012	AIR EXHAUSTER WITH MOTOR (GSC AIR EXHAUSTER)
14	BT002	JACKING OIL PUMPS
15	BT003	AOP & EOP
16	BT004	DUPLEX FILTER (LUB.OIL)
17	BT005	DUPLEX FILTER (JACKING OIL)
18	BT006	BUTTERFLY VALVES
19	BT007	THREE WAY TEMP. CONTROL VALVE
20	BT008	DOUBLE THREE WAY VALVES
21	BT009	NRV WITH ALUMINIUM FLAP
22	BT010	PRESSURE LIMIT VALVE
23	BT011	OIL PURIFICATION UNIT (OIL CENTRIFUGE)
24	BT012	OIL VAPOUR EXHAUSTER
25	BT013	LEAD DIAPHRAGM
26	BT014	SPRAY NOZZLES
27	BT015	DIRT CATCHERS
28	BT016	DAMPER

29	BT017	VARIABLE LOAD SPRING CAGES
30	BT023	TURBINE OIL
31	BT025	OIL PURIFICATION SYSTEM (CENTRAL)
32	BT026	GROUP CABLES
33	BT029	FLOW NOZZLES FOR PG TEST
34	BT043	CONTROL FLUID (FRF)
35	BT046	LP BYPASS STOP & CONTROL VALVE WITH EHA AND WATER INJECTION VALVE
36	BT065	GEAR PUMP (LUB. OIL RECIRCULATION)
37	BT074	VACUUM BREAKER VALVE WITH PNEUMATIC ACTUATOR
38	BT075	SEAL STEAM SUPPLY & LEAKAGE STEAM CONTROL VALVE WITH PNEUMATIC ACTUATOR
39	BT080	EHA FOR TURBINE VALVES ALONGWITH HPSU
Approx. Weight (MT)		**271 MT**

16.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

17	**EXTERNAL/RE-GENERATIVE & OTHER PIPING SYSTEM (PC CHENNAI SUPPLY)**		
PG	**MA**	**Brief Description**	**Design Wt (MT)**

80	311	HRH FROM INTERCEPTOR VALVE TO TURBINE	12.00
80	330	EXTRACTION STEAM TO LP HEATER-1	6.80
80	331	EXTRACTION STEAM TO LP HEATER-2	3.40
80	332	EXTRACTION STEAM TO LP HEATER-3	4.60
80	375	UNLISTED SV EXHAUSTS - TG SCOPE	4.60
80	381	HP HEATER VENTS - TG SCOPE	0.90
80	382	LP HEATER VENTS	1.50
80	385	VENT FROM UNLISTED PPG/EQPT TO COND	2.30
80	387	CONDENSATE PUMP VENT	1.10
80	388	CONDENSER AIR EVACUATION PIPING	3.30
80	398	TURBINE WASHING STEAM	3.70
80	400	CONDENSATE SUCTION	3.20
80	401	CD FROM PUMP TO LPH1/DC INLET TEE AND RE	10.00
80	402	CD FROM LPH1/DC INLET TEE TO TG TP	6.30
80	407	CONDENSATE FOR SEALING OF VACUUM	1.30
80	408	CONDENSATE DUMP FROM HEADER	2.20
80	411	CONDENSATE/MAKE-UP TO CONDENSER	2.00
80	413	UNLISTED CONDENSATE	1.10
80	440	CONDENSER DRAINS	0.20
80	442	GLAND STEAM COOLER DRAINS	0.30
80	444	LP HEATER-2/3/4/5 DRAINS AND DRIP PUMP I	3.00
80	447	HP HEATER DRAINS	9.20
80	449	TG CYCLE PIPING DRAINS AND VENTS	7.30
80	673	LUBE OIL PIPING SYSTEM	4.30
80	901	Sd Valves&Specialities-Boiler Lightup	1.00
		Total	**95.60**

18	**INSULATION (PEM SUPPLY)**	
SL.NO.	**ITEM DESCRIPTION**	**TOTAL WT. MT**
1	Thermal insulation	260
	TOTAL (MT)	**260**

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

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 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 assembly. Contractor may have to dismantle and erect or erect as single assembly as per the instruction of BHEL engineers without any extra cost.

SUMMARY WEIGHT DETAILS FOR EACH UNIT		
S.No.	**EQUIPMENT / PACKAGE**	**APPROX. WT(MT)**
1	STEAM TURBINE & AUX	584.5
2	TURBO GENERATOR & AUX	346.475
3	CONDENSOR & AUX	284.445
4	ACG	2.754

5	LP HEATERS AND COOLERS	55.195
6	BFP	70.143
7	CEP	9.265
8	HP HEATERS	38
9	FLASH TANKS	9
10	MISC TANKS	37
11	RE JOINTS	17.35
12	HT MOTORS	63
13	BUTTERFLY VALVES	50.44
14	BOUGHT OUT ITEMS (BHEL PEM SCOPE)	112.3
15	BOUGHT OUT ITEMS FROM HARDWAR	271
16	TG INTEGRAL PIPING (HARDWAR)	59
17	EXTERNAL/RE-GENERATIVE & OTHER PIPING SYSTEM	95.6
18	INSULATION	260
	TOTAL	**2365.467**
	TOTAL (MT) APPROX.	**2365**

SHALL BE FURNISHED DURING EXECUTION OF WORK IN CONSULTATION WITH CUSTOMER. NO EXTRA CLAIMS IN THIS REGARD SHALL BE INTERTAINED FROM BIDDERS.

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 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.

11.3.8 APPROACH AND OPERATING PLATFORMS

ERECTION OF PERMANENT APPROACH PLATFORM AND LADDERS ETC FOR GSC, FLASH TANKS, LUBE 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.

12 PREPARATION OF FOUNDATION

12.1
Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by the BHEL/customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations 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. BHEL has arrangement with above suppliers for supervision services and the supervision charges for the same will be borne by BHEL. However, the contractor shall ensure readiness of equipment for grouting in all respect before such a service is requisitioned and the duration is not prolonged unduly. Any overstay required due to contractor shall be charged to the contractor with BHEL's departmental charges. Contract shall consult BHEL engineer before deciding upon the vendor for the above.

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

12.4

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

12.5

The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipments 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 – COMMON REQUIREMENTS

13.1
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.

13.2
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.

13.3
Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, ESV & IV, control valves, LP bypass, 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.

13.4
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.

13.5
Trial run of all motors including checking direction of rotation in uncoupled condition, check alignment and re-couple the motor to driven equipment.

13.6
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.

13.7
All racks or assembled units like Governing Rack, LP Bypass Rack 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.

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 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 strand jack arrangements by the contractor in consultation with BHEL Engineer.

16.2.2

THE GENERATOR STATOR SHALL BE LIFTED AND PLACED BY THE CONTRACTOR WITH THE HELP OF STRAND & JACK AS PER THE SCHEME ENVISAGED BY BHEL ON TO THE GENERATOR FOUNDATION.

Generator Stator shall be lifted by Strand & Jacks / Lift & Shift arrangement method. The Scope of contractor shall take complete responsibility and carry out the liaison and follow up with transporters, filling of ditches/levelling etc. for marching of wagon to unload at suitable location/point of lifting near the TG building, Shifting of same providing required arrangements to suitable locations / point of lifting etc. (as per requirement), arranging the Strand & Jacks/Lift & Shift arrangements, making resting Foundations /Footings to suit the installation of his Strand & Jacks arrangements (as required) & their assembly /installation with expert supervision till lifting & placement of stator to required / designed foundation / elevation. Contractor's responsibility shall also to carry out all related civil works/ footings / foundations with providing of all materials for his strand & jacks / Lift & shift arrangements as scope of work.

16.2.3

THE ASSEMBLY OF THE SPECIAL WAGON FOR RETURN AFTER UNLOADING OF STATOR IS IN THE SCOPE OF THIS WORK.

For lifting and placement of stator, it may require holding the some of structures / casting of certain foundations. Contractor shall visit site and study & discuss with BHEL Engineer at site and submit his plan (which shall not affect the project schedule) for deployment of these arrangements at site for lifting of these equipments along with Technical Bid. Contractor shall deploy these Strand and Jacks arrangements & other resources well in advance to suit the site requirement so as to lift & place these equipments on required foundations in minimum possible time. Some of the renowned agencies such as (1) **M/s. Fagioli PSE India Pvt. Ltd.(203,Krishna Bhavan, Govandi Station Road, Deonar, Mumbai-400088,Tel.No. 022-25564388, Fax No. 022-25562565),** (2) **M/s. Freight Wings (P) Ltd.(309, Rex Chambers, Walchand Hirachand Marg. Ballard Estate, Mumbai-400001,Tel. No.022-22631714/22619988)**, (3) **M/s. Dorman Long Technology Ltd.(233, Bharat Industrial Estate, Lal Bahadur Shashtry Marg, Bhandup-West, Mumbai-400078, Tel No. 022-25961960, Cell No. 09820192807**), (4) **M/s. Basu & Basu Engineers (Pvt.) Ltd.(Kolkata, Tel. No. 033-24642967/24664069, Fax No. 033-24664621**) who are in this field in the

country, known to BHEL, can be contacted (if required) by contractor or any other similar agencies known to contractor.

The lifting and placement of stator shall be required to be done and put on foundation within one week time after availability of material and other essential inputs, and clear the holds for further civil & structural works.

Lifting of these equipments by Jacks and Sleeper method is not permitted.

16.2 HANDLING OF HEAVIER EQUIPMENTS

Contractor shall provide all required suitable cranes and trailers for loading of materials during collection of from BHEL/ client's stores/ storage yard, transportation to site of work and at work site including unloading at site of works for all equipments and consignments including heavy and voluminous equipments/ components/ consignments like HP turbine module, IP turbine module, LP turbine inner–outer casing, LP turbine inner casing, LP rotor, generator rotor, brushless exciter, HP heaters, etc.

BHEL shall not provide any T&P other than those specified for the specific work as per relevant Appendix and other relevant clauses of tender specification.

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, 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 **per Unit**.

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 $8\text{-}10^0$ 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 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 tonnes and 100 tonnes capacity shall be arranged by the contractor for use during erection and commissioning of turbine. Also, the contractor shall arrange hydraulic jacks of 100 tonnes and 63 tonnes 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.**

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. Other equipments including bois, though not listed above but required for completion

3. ST-TG auxiliaries including, but not limited, to heat exchangers, pumps, tanks and vessels and other equipments

4. 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 aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for alunimium 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 WORK OF PRESERVATION AND PAINTING OF CONDENSER SURFACES IN VARIOUS AREAS AND AT VARIOUS STAGES OF WORK

A. STEAM SIDE PAINTING

TWO COATS OF STEAM WASHABLE PAINTS SHALL BE APPLIED ON STEAM SIDE OF LP TURBINE AND **CONDENSER SHELL INTERNALS**, AS ADVISED BY BHEL. THE STEAM WASHABLE PAINTS, PRIMER AND THINNER WILL BE SUPPLIED BY BHEL FREE. HOWEVER, ARRANGEMENTS FOR SURFACE PREPARATION AND PAINT APPLICATION, CONSUMABLES LIKE SURFACE CLEANING AGENTS, PAINT BRUSH, BRUSH CLEANSER, LABOUR AND NECESSARY TOOLS AND PLANTS ARE IN THE SCOPE OF CONTRACTOR.

ALL SITE WELD JOINTS FALLING IN STEAM SIDE SHALL **ALSO** BE PAINTED WITH TWO COATS OF STEAM WASHABLE PAINT.

B. WATER SIDE PAINTING

THE WATER BOXES SHALL BE SANDBLASTED TO REMOVE ALL TRACES OF PRIMER APPLIED AT THE WORKS. THEREAFTER TWO COATS OF EPOXIDE PRIMING PAINT OR AS PER PAINTING SCHEME APPROVED BY GSECL FOLLOWED BY TWO/THREE COATS OF HIGH BUILD BLACK COAL TAR EPOXY (E.G., "APCODUR CP684" OF ASIAN PAINTS **OR EQUIVALENT FROM ANY OTHER BHEL/GSECL APPROVED MANUFACTURER**). CONTRACTOR SHALL SUBMIT MANUFACTURER'S BATCH TEST CERTIFICATE / TEST CERTIFICATE FROM BHEL/GSECL 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.

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. **CARE SHALL BE TAKEN TO PLUG THE EXPANDED TUBE ENDS TO PREVENT ENTRY OF PAINT INTO THE TUBES. THE CONTRATOR SHALL ARRANGE FOR THE PLUGS IF NOT PROVIDED ALONGWITH THE TUBES.**

THE WATER SIDE PAINTING ON WATER BOXES, WATER CHAMBERS AND TUBE PLATES SHALL BE DONE PRIOR TO THE WATER SIDE HYDRAULIC TEST OF THE CONDENSER.

24.2

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

24.3 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.

24.4

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.

24.5

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.

24.6

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.

24.7

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.

24.8

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.

24.9

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.

24.10

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

24.11

This work requires working at higher altitudes from ground level to as high as 70 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.

24.12

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.

24.13

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.

24.14

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. 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 including air equipments.

24.15

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

24.16

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