

# **TENDER SPECIFICATION**

**NO: BHE/PW/PUR/DVRIT-STG/962**

FOR

**COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD;  
TRANSPORTATION TO SITE; ERECTION, TESTING & COMMISSIONING, TRIAL  
OPERATION AND HANDING OVER OF TURBINE AND GENERATOR SET AND ITS  
AUXILIARIES, HP/LP HEATER AND DEAERATOR, INSULATION, HANGERS & SUPPORTS  
AND FINAL PAINTING ETC FOR UNIT 1 OF**

**1X600 MW VPL (VISA POWER LIMITED) PROJECT  
NEAR VILLAGE DEVERI & DUMARPALI DISTRICT RAIGARH IN  
CHHATTISGARH STATE**

**VOLUME – I**

**CONSISTING OF:**

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



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

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## Tender Specification Issue Details

**Tender Specification No: BHE/PW/PUR/DVRIT-STG/962**

FOR

**COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD;  
TRANSPORTATION TO SITE; ERECTION, TESTING & COMMISSIONING, TRIAL  
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**1X600 MW VPL (VISA POWER LIMITED) PROJECT  
NEAR VILLAGE DEVERI & DUMARPALI DISTRICT RAIGARH IN  
CHHATTISGARH STATE**

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR                      Refer Notice Inviting Tender  
TENDER SUBMISSION:

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

M/s. ....

.....

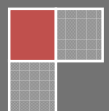
PLEASE NOTE:  
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)  
Place: Nagpur  
Date:

# NOTICE INVITING TENDER

Bharat Heavy Electricals Limited



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

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To

Dear Sir/Madam

**Sub: NOTICE INVITING TENDER**

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

**1.0 Salient Features of NIT**

SL NO	ISSUE	DESCRIPTION
i	<b>TENDER NUMBER</b>	<b>BHE/PW/PUR/DVRIT-STG/962</b>
ii	<b>Broad Scope of job</b>	COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE; ERECTION, TESTING & ASSISTANCE FOR COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF TURBINE AND GENERATOR SET AND ITS AUXILIARIES, HP/LP HEATER AND DEAERATOR, INSULATION, HANGERS & SUPPORTS AND FINAL PAINTING ETC. FOR <b>UNIT-1 OF 1X600 MW VPL</b> (VISA POWER LIMITED) PROJECT NEAR VILLAGES DEVERI & DUMARPALI DISTRICT RAIGARH IN CHHATTISGARH STATE
iii	<b>DETAILS OF TENDER DOCUMENT</b>	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> <span style="float:right">Applicable</span>
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> <span style="float:right">Applicable</span>
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> <span style="float:right">Applicable</span>
d	Volume-ID	<i>Forms and Procedures</i> <span style="float:right">Applicable</span>
e	Volume-II	<i>Price Schedule (Absolute value).</i> <span style="float:right">Applicable</span>
iv	<b>Issue of Tender Documents</b>	<ol style="list-style-type: none"> <li><b><u>Sale from BHEL PS Regional office at :Nagpur</u></b> <b>Start : 12/01/ 2012</b> <b>Closes: 01/02/2012 , Time :16.00 Hrs</b></li> <li><b>From BHEL website (<a href="http://www.bhel.com">www.bhel.com</a>)</b> Tender documents can however be downloaded from website till due date of submission</li> </ol> <span style="float:right">Applicable</span>

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v	<b>DUE DATE &amp; TIME OF OFFER SUBMISSION</b>	<b>Date : 02/02/ 2012 , Time :15.00Hrs</b> <b>Place : <u>BHEL PS Regional office at :Nagpur</u></b> 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	<b>OPENING OF TENDER</b>	<b>1 hours after the latest due date and time of Offer submission</b> 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	<b>EMD AMOUNT</b>	Rs 2,00,000/- (Rupees Two Lakhs Only)	Applicable
viii	<b>COST OF TENDER</b>	Rs 2000/-.	Applicable
ix	<b>LAST DATE FOR SEEKING CLARIFICATION</b>	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	<b>SCHEDULE OF Pre Bid Discussion (PBD)</b>	Date: Not applicable.	Not applicable.
xi	<b>INTEGRITY PACT &amp; DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)</b>	Not Applicable	Not Applicable
xii	<b>Latest updates</b>	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage ( <a href="http://www.bhel.com">www.bhel.com</a> -->Tender Notifications →View Corrigendums) <b>and not in the newspapers</b> . 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

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- 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
	<b>Part-I A</b>	
	<p><b>ENVELOPE – I superscribed as :</b> PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p><b>CONTAINING THE FOLLOWING:-</b></p>	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	<p>Duly filled-in 'No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above.</p> <p><b>Note:</b></p> <p>a. In case of any deviation, the same should be submitted separately for technical &amp; 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.</p> <p>b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.</p> <p>i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL</p> <p>ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender</p>	
iii.	<p>Supporting documents/ annexure/ schedules/ drawing etc. as required in line with Pre-Qualification criteria.</p> <p>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.</p>	
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 : <u>Technical</u> Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms	

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	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.	

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

	<b>PART-II</b>	
	<b>PRICE BID</b> consisting of the following shall be enclosed	
	<p><b>ENVELOPE-III</b> superscribed as: PART-II (PRICE BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p><b>CONTAINING THE FOLLOWING</b></p>	
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)	

	<b>OUTER COVER</b>	
	<p><b>ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE)</b> superscribed as: TECHNO-COMMERCIAL BID, PRICE BID &amp; EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION:</p> <p><b>CONTAINING THE FOLLOWING:</b></p>	
i	o Envelopes I	

	<ul style="list-style-type: none"> <li>○ Envelopes II</li> <li>○ Envelopes III</li> </ul>	
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**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:**

**Bidder's capacity for executing the job under tender shall be assessed as per the following:**

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

i). Number of Similar Jobs

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

ii) Weightage "A" assigned to bidders based on Average Number of jobs "P":

- a) If 'P' = 0-1, "A" will be equal to '3'
- b) If 'P' = 2-3, "A" will be equal to '2'
- c) If 'P' = 4-5, "A" will be equal to '1'
- d) If 'P' is Above 5, "A" will be equal to '0'

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

i). Ratings by Power Sector Region:

- a) PS ER's Rating 'Rer' =  $(X_1 + X_2 + \dots + X_n)$  divided by n
- b) PS WR's Rating 'Rwr' =  $(X_1 + X_2 + \dots + X_n)$  divided by n
- c) PS SR's Rating 'Rsr' =  $(X_1 + X_2 + \dots + X_n)$  divided by n
- d) PS NR's Rating 'Rnr' =  $(X_1 + X_2 + \dots + X_n)$  divided by n
- e) **Over all Power Sector Region Rating 'R<sub>BHEL</sub>' = (Rer+ Rwr+ Rsr+ Rnr) divided by 4**

(where "X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>,...X<sub>n</sub>" is the net weighted score obtained by the bidder as per the "Evaluation of Contractor Performance (Quarterly)" against the various contracts 'n' under execution in the respective Region).

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

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

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

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

**IV. Explanatory note:**

- a) Similar work means Boiler or Turbine or Civil or Electrical or CI, etc irrespective of rating of Plant
- b) Quarter shall be as per the quarter defined in the "Evaluation of Contractor performance (Quarterly)". For contracts where annexed Quarterly Evaluation performance was not part of the contract, 'Quarterly Performance Reports' previous to the last quarter reckoned from the date of latest due date of submission, given by the respective project site against the contract will be the basis for evaluation.
- c) Vendors who are not executing any jobs presently in the Region and first timers to the Region, may be considered subject to satisfying all other tender conditions.
- d) 'Under execution' shall mean works in progress upto Boiler Steam Blowing (for Boiler and Auxiliaries) or 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 be 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

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

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

For BHARAT HEAVY ELECTRICALS LTD

AGM / Purchase

**Enclosure**

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

**ANNEXURE - 1**

**PRE QUALIFYING CRITERIA**

<b>JOB</b>	COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE; ERECTION, TESTING & ASSISTANCE FOR COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF TURBINE AND GENERATOR SET AND ITS AUXILIARIES, HP/LP HEATER AND DEAERATOR, INSULATION, HANGERS & SUPPORTS AND FINAL PAINTING ETC. FOR <b>UNIT-1 OF 1X600 MW VPL</b> (VISA POWER LIMITED) PROJECT NEAR VILLAGES DEVERI & DUMARPALI DISTRICT RAIGARH IN CHHATTISGARH STATE
<b>TENDER NO</b>	<b>BHE/PW/PUR/DVRIT-STG/962</b>

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)	<b>NOT APPLICABLE</b>	
B	Assessment of Capacity of Bidder to execute the work as per Sl no 9 of NIT (if applicable)	<b>APPLICABLE</b>	
C	<b><u>Technical</u></b> Bidder must have, Executed Erection, Testing and Commissioning (Up to Synchronization of the Unit or beyond) of One set of Steam Turbine Generator (STG) of 190 MW or higher rating in last seven years as on the latest date of offer Submission..	<b>APPLICABLE</b>	
D 1	<b><u>Financial TURNOVER</u></b> Bidders must have achieved an average annual financial turnover (Audited) of <b>Rs 210 Lakhs</b> or more over last three Financial Years (FY) i.e. 2008-2009, 2009-2010, 2010-2011	<b>APPLICABLE</b>	
2	<b>NETWORTH</b> Net worth of bidder based on latest Audited Accounts as furnished for 'D.1' above should be positive	<b>APPLICABLE</b>	
3	<b>PROFIT</b> 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.	<b>APPLICABLE</b>	
E	Approval of Customer (if applicable) Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	<b>APPLICABLE</b>	
F	Consortium criteria (if applicable)	<b>NOT APPLICABLE</b>	

**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.

**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.

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

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

DATE:

**AUTHORISED SIGNATORY**  
(With Name, Designation and Company seal)

ANNEXURE 3

**IMPORTANT INFORMATION**

**1. PRICE VARIATION COMPENSATION**

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

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

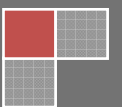
**2. INTEREST BEARING RECOVERABLE ADVANCE**

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

- Bank Guarantee towards 'Interest Bearing Advance' shall be atleast 110% of the advance so as to enable recovery of not only principle amount but also the interest portion, if so required.
  - 'Interest Bearing Recoverable Advance' shall not be paid in less than two installments. Contractor shall establish the utilization of advance drawn before the release of next installment.
3. The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site ( [www.bhel.com](http://www.bhel.com) ---> Tender Notification -> List of Banned Firms )

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS  
LIMITED



# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## CONTENTS

SI No	DESCRIPTION	Chapter	No. OF PAGES
<b>Volume-IA</b>	<b>Part-I: Contract specific details</b>		
1	Project Information	Chapter-I	2
2	Scope of Works	Chapter-II	1
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	7
4	T&Ps and MMDs to be deployed by Contractor	Chapter-IV	2
5	T&Ps to be deployed by BHEL free of hire charges on sharing basis	Chapter-V	1
6	Time Schedule	Chapter-VI	2
7	Terms of Payment	Chapter-VII	6
8	Taxes and other Duties	Chapter-VIII	3
9	Specific Inclusion	Chapter-IX	3
10	Specific Exclusion	Chapter-X	1
11	Annexures		
	Tentative list of packages, weight details, dimensions etc of equipment/ system	Annexure I A	19
	Weight Details( for both Units)	Annexure I B	1
	Proposed painting scheme for TG area	Annexure II	1
<b>Volume-IA</b>	<b>Part-II : Technical Specifications</b>		
1	General	Chapter-XI	5
2	Civil Works, Foundation, Grouting	Chapter-XII	2
3	Equipments Installation	Chapter-XIII	2
4	Piping Installation	Chapter-XIV	2

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

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5	Condenser Installation	Chapter-XV	1
6	Generator, Deaerator Installation & 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	Painting	Chapter-XXII	1
13	Lining and Insulation	Chapter-XXIII	3
14	Final painting	Chapter-XXIV	2

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## CONTENTS

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<b>1.0</b>	<b>Project Information</b>
<b>1.1</b>	<b>INTRODUCTION</b>  <b>VISA POWER LTD (VPL)</b> is going to install 2X600MW Coal Based Thermal Power Plant near village Deveri & Dumarpali District Raigarh in Chhattisgarh state, India. BHEL have been awarded BTG Package comprising of Design, Engineering, Manufacturing, Testing at works, Supply, Transportation, Storage and Handling at site, Erection, Testing, Commissioning, and Performance Guarantee Testing alongwith comprehensive MCE insurance (Transit, Storage, Erection, Testing and Commissioning) of Both Units and handing over of the project within 42 months from zero date / 09.08.2010.  <b>Site information</b>  a) Location : Near Village Deveri & Dumarpali Dist : Raigarh State : Chhattisgarh b) Longitude : 21°57' 15.74" N c) Latitude : 83°16' 52.89" E d) Nearest Railway Station : Bhupdeopur (5 Kms from project site on howrah – Mumbai railway line) Raigarh (23 Kms from project site) e) Nearest Village : Deveri & Dumarpali Dist : Raigarh State : Chhattisgarh f) Nearest Seaport : Paradip (525 Kms) g) Nearest Airport : Raipur 250 km (Chhattisgarh) h) Access Road : The Site is well connected with the National Highway no. 200 (around 2 Kms away)

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## CONTENTS

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<b>1.2</b>	<b><u>CLIMATIC CONDITIONS</u></b>  <b>1. <u>Seismic data</u></b>  a. Seismic Intensity : As per IS: 1893-2002 b. Zone : III c. Importance Factor : 1.75  <b>2. Ambient Air Temperature</b> Design ambient dry bulb temperature : 35° C  <b>3. Relative Humidity</b> : 62%(Average)  <b>4. Cooling water temperature</b> : 33° C  <b>5. Wind data</b> Basic wind speed : 0.28 m/s – 2 m/s
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**The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.**

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter - II: Scope of Works

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### 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 and handing over of the following:-

1. Steam Turbine (**2 Nos. LP**) along with auxiliary systems :-
  - a. Turbine Gland Sealing system
  - b. Turbine Lube Oil and Control Oil system
  - c. Water Spray System
  - d. Steam Washing System
2. Generator set coupled to steam turbines and complete with auxiliary systems:-
  - a. Seal Oil System
  - b. Hydrogen Cooling System
  - c. Stator Cooling System
  - d. Carbon dioxide Purging System
3. Water cooled, horizontal surface condenser with integral accessories
4. Turbine Oil Purification System including Turbine Oil Storage, Dirty & Clean Oil Pumps, etc.
5. HP & LP Feed Water Heater
6. Deaerator
8. Boiler Feed Pumps
10. Condensate Extraction Pumps
11. Steel Storage Tanks/Vessels such as Main oil Tank, Dirty Oil tank etc
12. Bought Out Items.
13. ~~LP Piping ( Main circulation water piping, TG ACW Piping, DMCW Piping, Service Water Piping etc.)~~
14. Turbine integral and other miscellaneous piping
15. Insulation of TG equipments.
16. Painting of all erected equipments and structures

Of 2X600 MW DBPL Raigarh Project, Dist: Janjgir-Champa, State: Chhattisgarh

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – III: Facilities in the scope of Contractor/BHEL**

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Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	<b>PART I ESTABLISHMENT</b>			
3.1.1	<b>FOR CONSTRUCTION PURPOSE:</b>			
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	<b>FOR LIVING PURPOSES OF THE BIDDER</b>			

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – III: Facilities in the scope of Contractor/BHEL**

Sl.No	Description <b>PART I</b>	Scope / to be taken care by		Remarks
		BHEL	Bidder	
a	Open space for labour colony (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	<b>ELECTRICITY</b>			
3.2.1	<b>Electricity For construction purposes</b> of Voltage 415/440 V			FREE
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	<b>Electricity for the office, stores, canteen etc of the bidder</b>			Chargable

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – III: Facilities in the scope of Contractor/BHEL**

Sl.No	Description <b>PART I</b>	Scope / to be taken care by		Remarks
		BHEL	Bidder	
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	<b>Electricity for living accommodation of the bidder's staff, engineers, supervisors etc</b>			
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	<b>WATER SUPPLY</b>			
3.3.1	<b>For construction purposes:</b>			FREE
a	Making the water available at single point	Yes		In case of inadequate supply /

TECHNICAL CONDITIONS OF CONTRACT (TCC)  
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl.No	Description <b>PART I</b>	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	non-availability of construction water from customer, contractor shall have to arrange construction water at his own expenses.
3.3.2	<b><u>Water supply for bidder's office, stores, canteen etc</u></b>			Chargable
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	<b><u>Water supply for Living Purpose</u></b>			
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	<b>LIGHTING</b>			

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – III: Facilities in the scope of Contractor/BHEL**

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

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-STG/962  
 Technical Conditions of Contract –Volume I A (Part I: Contract Specific Details)

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – III: Facilities in the scope of Contractor/BHEL**

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

Sl. No	Description <b>PART II</b> <b>3.9.0 ERECTION FACILITIES</b>	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	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		<b>YES</b>	"
d	Shipping lists etc for reference and planning the activities	Yes		"
e	Preparation of site erection schedules and other input requirements		Yes	"

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – III: Facilities in the scope of Contractor/BHEL**

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Sl. No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	<b>PART II</b> <b>3.9.0 ERECTION FACILITIES</b>			
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	"
g	Weekly erection schedules based on Sl No. e		Yes	"
h	Daily erection / work plan based on Sl No. g		Yes	"
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	

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – IV: T&Ps and MMEs to be deployed by Contractor**

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

<b>S.N.</b>	<b>DESCRIPTION</b>	<b>CAPACITY</b>	<b>QUANTITY</b>
1	TYRE MOUNTED HYDRAULIC CRANES	14 MT	2 NOs
2	TRAILER WITH HORSE	30 TON	1 NO
3	TRAILER TROLLEY	20 TON	1 NO
4	WELDING GENERATOR SETS (ELECTRIC AS WELL AS DIESEL )		AS PER REQUIREMENT
5	3-PHASE COMPLETE SET UP FOR DRAWAL OF POWER		-DO-
6	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER		-DO-
7	TIG WELDING SET		-DO-
8	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS		-DO-
9	ELECTRICAL BAKING OVEN - BIG		-DO-
10	ELECTRODE BAKING OVEN - PORTABLE		-DO-
11	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS		-DO-
12	VACUUM CLEANER (INDUSTRIAL)		-DO-
13	PIPE CUTTING AND BEVELLING MACHINE		-DO-
14	PIPE BENDING M/C	ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE	-DO-
15	AIR COMPRESSOR	120 CFM	01 NO
16	STEP DOWN TRANSFORMER	230V/24V	AS PER REQUIREMENT
17	CONDENSER TUBE EXPANDER SET		DO
18	ELECTRICALLY OPERATED WINCHES	3T/5T	DO
19	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)		DO
20	<b>HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :</b>		
	A) - JACKS (WITH HAND OPERATED PUMPS)	100 MT	06 NOS.
	B) - JACKS (WITH HAND OPERATED PUMPS)	50 MT	06 NOS.
	<b>GANG OPERATED JACKS CONSISTING OF THE FOLLOWING :</b>		
	A) - JACKS (HAVING BROAD BASE ONE INCH LIFT)	100 MT	06 NOS.
	B) - JACKS (WITH 4-6 INCH LIFT , FOR GEN. END SHIELDS)	63 MT	04 NOS.
	C) - LONG HIGH PRESSURE HOSES (FOR		12 NOS.

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-STG/962

Technical Conditions of Contract –Volume I A (Part I: Contract Specific Details)

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

GENERATOR ALIGNMENT)			
ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.			
21	TORQUE WRENCH	0 TO 200 N-M	02 NO.
22	TORQUE WRENCH	UPTO 2000 N-M	02 NO.
23	SLINGS FOR LP TURBINE ROTOR		01SET
24	SLINGS FOR HP TURBINE MODULE		01SET
25	SLINGS FOR GENERATOR ROTOR		01SET
26	BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FOUNDATION BOLTS)		AS PER REQUIREMENT
27	LONG FEELER GAUGE SET		AS PER REQUIREMENT
28	SPANNERS / EYE BOLTS ( OF ALL SIZES )		AS PER REQUIREMENT
29	HYDRAULIC TEST PUMPS AND FILL PUMPS		AS PER REQUIREMENT

### **B: MEASURING AND MONITORING DEVICES (MMD):**

To be finalized at site as per requirement.

#### **NOTE:**

This above list 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)  
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

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BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-STG/962  
Technical Conditions of Contract –Volume I A (Part I: Contract Specific Details)

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – V: T&Ps to be deployed by BHEL free of hire charges**  
**on sharing basis**

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SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
01	EOT CRANE IN TG HALL	1	FOR HANDLING AND ERECTION WITHIN TG HALL ON SHARING BASIS AS AVAILABLE AND SUBJECT TO THEIR ACCESSIBILITY AND APPROACHABILITY.
02	CRAWLER CRANE 120/250 T	1	FOR ERECTION OF DEAERATOR & FST
03	PORTAL GANTRY CRANE WITH ACCESSORIES (360 MT CAPACITY)/ STRAND JACK SYSTEM	AS PER AVAILABILITY	FOR GENERATOR STATOR HANDLING & LIFTING ONLY

**NOTE:**

1. **Operator** for EOT crane and portal 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&Ps will be provided on sharing basis only. Contractor has to plan his activities well in advance and inform BHEL engineer in charge/ construction manager the date of actual use.
- ~~4. In case BHEL cranes, at S.No 1 & 2, are not available due to any reason, contractor shall make his own arrangements and carry out the job without any financial implication to BHEL.~~
5. Contractor shall provide all necessary tools & tackles, crane, trailers etc for transportation of portal gantry crane/strand jack components/parts from BHEL stores/ storage yard, assembly/erection at site, testing, commissioning, dismantling after completion of works and returning to BHEL stores/storage yard as per instruction of BHEL engineer.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VI: Time Schedule

### 6.1 MOBILIZATION, TIME SCHEDULE & CONTRACT PERIOD

#### 6.1.1

#### INITIAL MOBILIZATION

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

#### 6.1.2

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

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

#### 6.1.3

#### COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

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

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

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

S.No	ACTIVITY	UNIT-1
1	CONDENSOR ERECTION START	1 <sup>st</sup> MONTH
2	TURBINE BOX UP	12 <sup>th</sup> MONTH
3	COMPLETION OF OIL FLUSHING	14 <sup>th</sup> MONTH
4	BARRING GEAR	15 <sup>th</sup> MONTH
5	SYNCHRONISATION	16 <sup>st</sup> MONTH

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VI: Time Schedule

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6	TRIAL OPERATION COMPLETION	21 <sup>th</sup> MONTH
7	PG TEST	22 <sup>nd</sup> MONTH

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

### 6.1.4

#### **DURATION**

The total contract period for completion of entire work shall be **26 (Twenty Six)** 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

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:

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATER S AND DEAERA TORS (5)	MISCE LLANE OUS ITEMS (6)	INTEG RAL PPG (7)	PIPING (8) ON PER MT BASIS
	<b>Overall weightage for each area out of lumpsum value quoted for STG</b>	<b>20%</b>	<b>18%</b>	<b>15%</b>	<b>13%</b>	<b>11%</b>	<b>7%</b>	<b>16%</b>	<b>NOT APPLICABLE</b>
<b>Sl. No.</b>	<b>Activity/Work Description</b>	<b>%</b>							
<b>I</b>	<b>PRO RATA PAYMENTS (85%)</b>								
<b>1</b>	<b>CONDENSER (weightage 20% )</b>								
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%		--	--			--	

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATER S AND DEAERA TORS (5)	MISCE LLANE OUS ITEMS (6)	INTEG RAL PPG (7)	PIPING (8) ON PER MT BASIS
1.11	ERECTION, COMMISSIONING, LOAD TESTING OF CONDENSER WATER BOX HANDLING SYSTEM	3%		--	--			--	
	<b>Subtotal for condenser</b>	<b>85%</b>							
<b>2</b>	<b>TURBINE (18 %)</b>							--	
2.1	PREPARATION OF FOUNDATION, PLACEMENT, ALIGNMENT AND GROUTING OF BASE PLATES OF LPC -2 NOS. AND BEARING PEDESTALS	--	7%		--			--	
2.2	PLACEMENT AND ALIGNMENT OF LP OUTER CASING-2 NOS. BOTTOM PORTION AND CENTRE GUIDE KEYS	--	5%		--			--	
2.3	PLACEMENT OF LP ROTOR-2NOS. AND ALIGNMENT WITH INNER CASING AND CHECKING OF BLADE CLEARANCE	--	9%		--			--	
2.4	ASSEMBLY, ALIGNMENT & WELDING OF LP OUTER CASING UPPER HALF-2 NOS.	--	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-2 NOS. 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%						

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATER S AND DEAERA TORS (5)	MISCE LLANE OUS ITEMS (6)	INTEG RAL PPG (7)	PIPING (8) ON PER MT BASIS
2.11	ASSEMBLY OF GOVERNING SYSTEM/EQUIPMENT		5%						
2.12	INSTALLATION OF ESVS, IVS, MS STRAINERS (INTERNALS), HRH STRAINERS (INTERNALS)	--	9%		--			--	
2.13	ERECTION, ALIGNMENT AND WELDING OF CROSS AROUND PIPING	--	5%		--			--	
2.14	FINAL BOX-UP OF LP TURBINE-2NOS LPC	--	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%		--			--	
	<b>Subtotal for Steam Turbine</b>		<b>85%</b>						
<b>3</b>	<b>TURBO GENERATOR (15%)</b>	--		--	--			--	
3.1	PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES	--		5%				--	
3.2	LIFTING, LEVELLING AND ALIGNMENT OF STATOR (including erection and dismantling of portal crane if used for stator lifting)			23%				--	
3.3	FIXING OF END SHIELDS ON TO FOUNDATION BEAMS	--	--	6%				--	
3.4	ROTOR INSERTION	--	--	6%				--	
3.5	BOXING UP OF GENERATOR AND ASSEMBLY OF HYDROGEN SEALS	--	--	11%				--	
3.6	ALIGNMENT OF GENERATOR ROTOR WITH LP TURBINE ROTOR, RUN-OUT CHECKS AND REAMING, HONING OF COUPLING HOLES AND FIXING OF COUPLING BOLTS	--	--	9%				--	

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATER S AND DEAERA TORS (5)	MISCE LLANE OUS ITEMS (6)	INTEG RAL PPG (7)	PIPING (8) ON PER MT BASIS
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%				--	
	<b>Subtotal for Generator</b>			<b>85%</b>					
<b>4</b>	<b>PUMPS AND AUXILIARIES (13 %)</b>	--	--		--			--	
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 ONE MOTOR DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				14%				
4.3	ERECTION / TESTING and commissioning of TWO NOS TURBINE DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				30%				
4.5	ERECTION, TESTING, GROUTING ETC. OF DMCW (BOILER & TG) PUMPS	--	--	--	13%			--	
4.6	ERECTION, TESTING, GROUTING ETC. OF CONDENSATE EXTRACTION PUMPS	--	--	--	10%			--	
	<b>Subtotal for pumps and Auxiliaries</b>				<b>85%</b>				
<b>5</b>	<b>HEATERS AND DEAERATORS (11%)</b>								
5.1	ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS	--	--	--		27%		--	

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		<b>CND (1)</b>	<b>TUR (2)</b>	<b>GEN (3)</b>	<b>PMP &amp; AUX/ EQ (4)</b>	<b>HEATER S AND DEAERA TORS (5)</b>	<b>MISCE LLANE OUS ITEMS (6)</b>	<b>INTEG RAL PPG (7)</b>	<b>PIPING (8) ON PER MT BASIS</b>
5.2	ERECTION, TESTING & COMMISSIONING OF GLAND STEAM CONDENSER, DRAIN COOLERS	--	--	--		12%		--	
5.3	ERECTION, TESTING & COMMISSIONING OF DE-AERATOR, FEED STORAGE TANK AND ASSOCIATED APPROACH PLATFORM WITH LADDERS ETC.	--	--	--		46%		--	
	<b>Subtotal FOR HEATERS AND DEAERATORS</b>	<b>--</b>	<b>--</b>	<b>--</b>		<b>85%</b>		<b>--</b>	
6	<b>MISCELLANEOUS ITEMS (7%)</b>								
6.1	DEBRIS FILTERS, RE JOINTS, ME BELLOWS, DIRTY, CLEAN OIL TANKS, ENCLOSURES, CO2 & H2 CYLINDER RACKS ETC						25%		
6.2	ACW PUMPS, RELATED ITEMS	--	--	--			0%		
6.3	ERECTION, TESTING & COMMISSIONING OF CONTROL FLUID TANK, C.F. COOLERS, C.F. PUMPS, PURIFICATION UNIT ETC.	--	--	--			16%		
6.4	ERECTION, TESTING & COMMISSIONING OF FLASH TANKS & FLASH VESSELS	--	--	--			12%		
6.5	ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE	--	--	--			12%		
6.6	ERECTION, TESTING & COMMISSIONING OF CONDENSER ON LOAD TUBE CLEANING PACKAGE/ CONDENSATE TRANSFER PUMPS	--	--	--			20%		
6.7	ERECTION, TESTING & COMMISSIONING OF SELF CLEANING STRAINER PACKAGE	--	--	--			0%		
6.8	ERECTION, TESTING & COMMISSIONING OF MISC.HOISTS & CHAIN PULLEY BLOCKS.						0%		
	<b>Subtotal for MISCELLANEOUS ITEMS</b>						<b>85%</b>		

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATER S AND DEAERA TORS (5)	MISCE LLANE OUS ITEMS (6)	INTEG RAL PPG (7)	PIPING (8) ON PER MT BASIS
7	<b>INTEGRAL PIPING (16%)</b>	--	--	--				--	
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%	
	<b>Total for integral piping</b>							<b>85%</b>	
8	<b>OTHER PIPING</b>								
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%
	<b>Total for Prorata (85%)</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>
<b>II</b>	<b>STAGE/MILESTONE PAYMENTS (15%)</b>								
1	Boiler Light Up	0%	0%	0%	0%	0%	0%	0%	0%
2	ABO	0%	0%	0%	0%	0%	0%	0%	0%
3	Steam Blowing	0%	0%	0%	0%	0%	0%	0%	0%

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# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATER S AND DEAERA TORS (5)	MISCE LLANE OUS ITEMS (6)	INTEG RAL PPG (7)	PIPING (8) ON PER MT BASIS
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 Synchronization	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%
	<b>Total for Milestone/Stage payments (15%)</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>
	<b>Total of I &amp; II</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
									-

**Note:**

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VIII: Taxes and Other Duties

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### 8.1 TAXES, DUTIES, LEVIES

#### 8.1.1

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

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

#### 8.1.2 Service Tax & Cess on Service Tax

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

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

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

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

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

#### 8.1.3 VAT (Sales Tax /WCT)

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VIII: Taxes and Other Duties

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### 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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VIII: Taxes and Other Duties

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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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-IX : SPECIFIC INCLUSIONS

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### **SPECIFIC INCLUSIONS**

#### **9.1**

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

#### **9.2**

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

#### **9.3**

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

#### **9.4**

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

#### **9.5**

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

#### **9.6**

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

#### **9.7**

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

#### **9.8**

Most of the Misc. Pumps with drive motors, base frame, fittings etc will be supplied in loose parts/ dismantled condition as skid mount. These pumps along with drive and fittings shall be assembled at site. The Delivery of these 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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-IX : SPECIFIC INCLUSIONS

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

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

### 9.9

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

### 9.10

#### CONSUMABLES

The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those which are specifically indicated as BHEL scope.

TG special consumables like hylomar / golden hermetite / stag-b / molykote/ anabond compounds / rubber fixing compounds etc. will have to be arranged by the contractor.

### 9.11

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

### 9.12

#### PRIMERS & PAINTS

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

### 9.13

#### WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES

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

### 9.14

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-IX : SPECIFIC INCLUSIONS

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

### **9.15**

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

### **9.16**

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-X : SPECIFIC EXCLUSIONS

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### 10.0 EXCLUSIONS

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

- A) ~~Regenerative system piping is excluded from the scope. For details of piping included in scope of this tender specification, please refer 'annexure-I' enclosed herewith.~~**
- B) All cable connections, except those specified as scope of work.
- C) 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.
- D) Erection, testing and commissioning of electrical panels and starting resistors for DC JOP and DC EOP pumps
- E) Electrical testing of motors, turbo-generator. However erection of these items will be under the scope of this tender specification.
- F) Impulse piping and fittings from the tapping points of various equipments other than those specified as scope of work.
- G) Civil works to the extent not specifically provided for in this tender.
- H) 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.
- I) Supply of chemicals and lube oil for pre-commissioning and commissioning activities.
- J) Some sub-delivery items and electrical components such as push-buttons, junction boxes etc.
- K) E&C work of cable trays, cables and earthing etc.
- L) All electrical and control & instrumentation items except those specified elsewhere in these specifications.
- M) Supply of primer and paints for final painting.
- N) Pneumatic copper tubing and fittings thereof.

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

<b>HARIDWAR SUPPLY (UNIT 1)</b>				
<b>SL</b>	<b>PKG.NO</b>	<b>DESCRIPTION</b>	<b>PKG.SIZE(MM)</b>	<b>NET WT. IN KG.</b>
<b>A</b>	<b>STEAM TURBINE</b>			
1	75001/0	EMBEDMENT FOR ANCHOR POINTS	4400x1600x1000	4388
2	75003/0	COMPONENTS FOR BASE PLATEASSEMBLY	4900x1200x600	5920
3	75004/0	COMPONENTS OF BASE PLATE	2800x1700x600	3058
4	75101/0	BASE PLATE FOR LP CASING	1850x1400x500	8640
5	75102/1	LP OUTER CASING PARTS	7060x1480x2760	8070
6	75102/2	LP OUTER CASING PARTS	7060x1480x2760	8070
7	75103/1	LP OUTER CASING PARTS	7060x1480x2760	8070
8	75103/2	LP OUTER CASING PARTS	7060x1480x2760	8070
9	75104/1	LPC OUTER CASING PARTS	4570x3230x980	2455
10	75104/2	LPC OUTER CASING PARTS	4570x3230x980	2455
11	75105/1	LPC OUTER CASING PARTS	4570x3230x980	2455
12	75105/2	LPC OUTER CASING PARTS	4570x3230x980	2455
13	75106/1	COMPONENTS OF LP CASING UPPERPART	3500x300x300	405
14	75106/2	COMPONENTS OF LP CASING UPPERPART	3500x300x300	405
15	75106/3	L.P OUTER CASING PARTS	3450x1000x1100	478
16	75106/4	L.P OUTER CASING PARTS	3450x1000x1100	478
17	75107/1	LONGITUDINAL GIRDER (LEFT)	6800x1820x1570	15107
18	75107/2	LONGITUDINAL GIRDER (LEFT)	6800x1820x1570	15107
19	75108/1	LONGITUDINAL GIRDER (RIGHT)	6800x1820x1570	15107
20	75108/2	LONGITUDINAL GIRDER (RIGHT)	6800x1820x1570	15107
21	75109/1	LP FRONT WALL (TS)	6820x3750x910	9878
22	75109/2	LP FRONT WALL (TS)	6820x3750x910	9878
23	75110/1	LP FRONT WALL (GS)	6820x3750x910	9878
24	75110/2	LP FRONT WALL (GS)	6820x3750x910	9878
25	75111/1	LP SHAFT SEALING FRONT	1800x1700x740	1801
26	75111/2	LP SHAFT SEALING FRONT	1800x1700x740	1801
27	75112/1	LP SHAFT SEALING (REAR)	1800x1700x740	1801
28	75112/2	LP SHAFT SEALING (REAR)	1800x1700x740	1801
29	75113/1	LP SHAFT SEAL COMPENSATOR ASSLY (TS)	1440x1420x520	1351
30	75113/2	LP SHAFT SEAL COMPENSATOR ASSLY (TS)	1440x1420x520	1351

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**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

31	75114/1	LP SHAFT SEAL COMPENSATOR ASSLY (TS)	1440x1420x520	1351
32	75114/2	LP SHAFT SEAL COMPENSATOR ASSLY (TS)	1440x1420x520	1351
33	75115/1	LP JOINT COVERING	2300x1800x940	841
34	75115/2	LP JOINT COVERING	2300x1800x940	841
35	75201/0	HP/IP BRG.PED.ASSLY.	4080x2005x2126	12100
36	75202/0	HP/IP BRG.PED.PARTS	1000x600x600	300
37	75301/0	ASSEMBLY DEVICES	1000x750x750	210
38	75302/0	INSPECTION SHAFT FOR IPC	4050x600x900	1130
39	75304/0	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	3800x2500x1300	6395
40	75305/0	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	2300x2100x900	1510
41	75306/0	COMPONENTS OF ASSLY FIXTURE FOR HPT	3300x1800x1300	2852
42	75307/0	COMPONENTS FOR ASSLY FIXTUREFOR HPT	5450x4050x400	2566
43	75308/1	AUXILIARIES OF LP TURBINE	3000x1300x1000	1710
44	75308/2	AUXILIARIES OF LP TURBINE	3000x1300x1000	1710
45	75309/1	AUXILIARIES OF LP TURBINE	2000x1000x1825	1142
46	75309/2	AUXILIARIES OF LP TURBINE	2000x1000x1825	1142
47	75310/1	AUXILIARIES OF LP TURBINE	2000x1000x1825	1142
48	75310/2	AUXILIARIES OF LP TURBINE	2000x1000x1825	1142
49	75311/0	ASSEMBLY TOOLS	1700x800x400	580
50	75312/0	AUXILIARIES OF IP TURBINE	1200x500x550	205
51	75313/0	AUXILIARIES OF IP TURBINE	1100x500x650	205
52	75314/0	AUXILIARIES OF IP TURBINE	1100x500x650	205
53	75315/0	BOLT HEATING EQUIPMENT AND BREECH NUT HEATING DEVICE	1700x900x700	90
54	75316/0	GROMMET SLINGS	1700x1700x300	548
55	75318/0	OIL FLUSHING AND PRESSURE TEST DEVICE	750x550x400	150
56	75319/0	STEAM BLOWING & HYDRAULIC TESTDEVICES	2900x2100x1200	3910
57	75320/0	TOOLS FOR GOV.SYST.&VALVES	1750x1200x1000	900
58	75321/0	VALVE SUPPORT FOR HPT OVERHALL	1500x750x750	705
59	75401/0	IP-LP BEARING PEDESTAL ASSLY	3700x1860x2100	13500
60	75501/0	LP/GEN. PEDESTAL ASSEMBLY	3200x2280x2070	8478
61	75502/0	BEARING PEDESTAL (PARTS)	1600x800x600	1030

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

62	75503/0	LP1 - LP2 BEARING PEDESTAL	Xx	8478
63	75504/0	OIL FLUSHING & PRESSURE TEST D	Xx	150
64	75505/0	LP1-LP2 BEARING PEDESTAL PARTS	Xx	1030
65	75601/1	FRONT BEARING PEDESTAL	3140x3140x2050	11058
66	75601/2	HYDRAULIC TURNING GEAR	2100x1000x600	630
67	75601/3	MAIN OIL PUMP ASSEMBLY.	1400x1200x1000	380
68	75704/1	LP CASING ASSEMBLY (FASTENERS)	1800x1700x740	2190
69	75704/2	LP CASING ASSEMBLY (FASTENERS)	1800x1700x740	2190
70	75704/3	LP CASING ASSEMBLY (PARTS)	3760x2060x860	4511
71	75704/4	LP CASING ASSEMBLY (PARTS)	3760x2060x860	4511
72	75705/1	LP-1 EXTRACTION A1	4400x1620x870	1202
73	75705/2	LP-2 EXTRACTION A1	4400x1620x870	1202
74	75706/1	LP-1 EXTRACTION A1	4400x1620x850	1202
75	75706/2	LP-2 EXTRACTION A1	4400x1620x850	1202
76	75707/1	LP-1 EXTRACTION A1	3420x1620x870	790
77	75707/2	LP-2 EXTRACTION A1	950x750x750	290
78	75707/3	LP-1 EXTRACTION A1	3420x1620x870	790
79	75707/4	LP-2 EXTRACTION A1	3420x1620x870	790
80	75707/5	LP EXTRACTION A1	Xx	290
81	75707/6	LP EXTRACTION A1	Xx	290
82	75708/1	LP-1 EXTRACTION A2	2920x2120x1370	1340
83	75708/2	LP-2 EXTRACTION A2	2920x2120x1370	1340
84	75709/1	LP-1 EXTRACTION A2	3420x1220x1120	842
85	75709/2	LP-2 EXTRACTION A2	3420x1220x1120	842
86	75710/1	LP-1 EXTRACTION A3	1920x1120x920	355
87	75710/2	LP-2 EXTRACTION A3	1920x1120x920	355
88	75711/1	LP-1 EXTRACTION A3	3120x920x870	582
89	75711/2	LP-2 EXTRACTION A3	3120x920x870	582
90	75711/3	LP EXTRACTION A3	Xx	223
91	75711/4	LP EXTRACTION A3	Xx	223
92	75711/5	LP EXTRACTION A3	Xx	235
93	75711/6	LP EXTRACTION A3	Xx	235
94	75716/1	L.P. EXTRACTION PIPE SHEATHING	2600x2000x1400	889
95	75716/2	L.P. EXTRACTION PIPE SHEATHING	2600x2000x1400	889
96	75717/1	INNER GUIDE PLATE OF DIFFUSER(TS)	2600x2400x1000	1334
97	75717/2	INNER GUIDE PLATE OF DIFFUSER(TS)	2600x2400x1000	1334
98	75718/1	DIFFUSER (TS)	4880x1730x2340	3630

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

99	75718/2	DIFFUSER (TS)	4880x1730x2340	3630
100	75719/1	DIFFUSER (GS)	4880x1730x2340	3630
101	75719/2	DIFFUSER (GS)	4880x1730x2340	3630
102	75720/1	LP INNER OUTER CASING (U/H)	6720x3150x2325	20800
103	75720/2	LP INNER OUTER CASING (U/H)	6720x3150x2325	20800
104	75721/1	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750x3500x2350	29207
105	75721/2	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750x3500x2350	29207
106	75722/1	LP INNER CASING ASSY FASTENERS	1800x1700x740	1300
107	75722/2	LP INNER CASING ASSY FASTENERS	1800x1700x740	1300
108	75723/1	LP CASING ASSEMBLY (PARTS)	450x450x250	65
109	75723/2	LP CASING ASSEMBLY (PARTS)	450x450x250	65
110	75724/1	LP INNER-INNER CASING (U/H) PARTIAL	4000x1570x2000	10800
111	75724/2	LP INNER-INNER CASING (U/H) PARTIAL	4000x1570x2000	10800
112	75725/1	INNER GUIDE PLATE OF DIFFUSER (GS)	2600x2400x1000	1334
113	75725/2	INNER GUIDE PLATE OF DIFFUSER (GS)	2600x2400x1000	1334
114	75728/1	STEAM INLET PIPE (LPT)	2700x1300x900	512
115	75728/2	STEAM INLET PIPE (LPT)	2700x1300x900	512
116	75801/1	L.P. ROTOR	7210x3300x3350	58277
117	75801/2	LP ROTOR	7210x3300x3350	58277
118	75901/0	IP ROTOR	4800x2120x1995	21765
119	75902/0	IP OUTER CASING (U/H)	4050x3800x2650	25450
120	75903/0	IP OUTER CASING (L/H)	3400x5250x2600	25450
121	75904/0	IP INNER CASING (U/H)	2900x3200x1850	14150
122	75905/0	IP INNER CASING (L/H)	2900x3200x1850	14150
123	75906/0	IP INLET ASSEMBLY	4500x3725x1300	13500
124	75907/0	IP SHAFT SEALING	1400x1200x900	765
125	75908/0	IP TURBINE (PARTS)	2000x1900x1000	2750
126	75909/0	IP TURBINE PARTS	1000x1000x750	365
127	76001/1	HP TURBINE	5675x3400x2900	86350
128	76001/2	EMERGENCY GOVERNOR	495x395x695	48
129	76002/0	HP INLET ASSLY & HP EXHAUSTASSLY (PARTS)	1200x1200x500	35
130	76003/0	HP EXHAUST ASSEMBLY	1650x1400x900	1810
131	76004/0	HPT RELATED PARTS	1300x1300x700	120
132	76104/0	ESV & CV CASING WITH VALVES	3600x3600x2500	20276
133	76105/1	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x1200x1200	3849

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Technical Conditions of Contract –Volume I A (Part I : Contract Specific Details)

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**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

134	76105/2	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x1200x1200	3849
135	76107/0	HP CONTROL VALVE SERVOMOTOR	2800x1200x2100	2680
136	76108/0	ESV & CV CASING WITH VALVES	3600x3600x2500	20276
137	76112/0	HP CONTROL VALVE SERVOMOTOR	2800x1200x2100	2688
138	76201/0	SUSPENSION OF VALVE (IV)	4250x2640x750	6618
139	76202/0	IV & CV CASING WITH VALVES	5040x4690x2770	28276
140	76203/1	SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700x1450x1400	3385
141	76203/2	SERVOMOTOR WITH LIMIT SW MOUNTIGS	2700x1450x1400	3385
142	76204/0	IP CONTROL VALVE SERVOMOTOR	3240x1240x1950	2403
143	76205/1	FRAME FOR SUSPENSION (IV)	3400x3150x750	2026
144	76205/2	FRAME FOR SUSPENSION (IV)	3400x3150x750	2026
145	76205/3	LOOSE ITEMS FOR FRAME FORSUSPENSION (IV)	300x200x200	17
146	76206/0	IV & CV CASING WITH VALVES	5040x4690x2770	28276
147	76210/0	IP CONTROL VALVE SERVOMOTOR	3240x1240x1950	2387
148	76301/1	SUSPENSION OF LPBP VALVE	3600x1700x800	986
149	76301/2	SUSPENSION OF LPBP VALVE	3600x1700x800	986
150	76402/0	INJECTOR FOR SUC. PIPE NB 350	3300x800x800	338
151	76403/0	INJECTOR FOR SUC. PIPE NB 300	3300x1750x1200	499
152	76404/0	MAIN OIL TANK & NOZZLE ARRGT ASSY	6180x3260x2650	10697
153	76405/0	MAIN OIL TANK & NOZZLE ARRGT ASSY	4200x1200x900	327
154	76406/0	OIL STRAINERS	1500x1000x1200	168
155	76407/0	OIL STRAINERS	1500x1000x1200	168
156	76409/0	OIL STRAINERS	2050x1200x1410	170
157	76412/0	DIRTY/LEAKAGE OIL TANK	1000x1000x3000	515
158	76413/0	WASTE OIL TANK	1000x1000x3000	515
159	76414/0	VAR ORIFICES THR VALV & FLUSH PARTS	1700x700x760	165
160	76415/0	VARIABLE ORIFICE 125	400x300x200	30
161	76601/0	OBLIQUE REDUCER ASSLY. (CAP)	1980x1580x1380	686
162	76602/0	OBLIQUE REDUCER ASSLY. (CAP)	1980x1580x1380	686
163	76603/0	MANHOLE ASSLY. (CAP)	2240x1760x1830	1725
164	76604/0	MANHOLE ASSLY. (CAP)	2240x1760x1830	1725

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

165	76605/0	MITRE BEND ASSLY (CAP)	2270x2270x1730	1650
166	76606/0	MITRE BEND ASSLY (CAP)	2270x2270x1730	1650
167	76607/0	PIPE ASSLY. LPT1 (CAP)	8010x2600x2370	13139
168	76608/0	PIPE ASSLY. LPT1 (CAP)	8010x2600x2370	13139
169	76609/0	PIPE ASSLY. LPT2 (CAP)	5460x2240x2160	8120
170	76610/0	PIPE ASSLY. LPT2 (CAP)	5460x2240x2160	8120
171	76611/0	MANHOLE INLET ASSLY. (CAP)	1330x2110x1630	1366
172	76612/0	MANHOLE INLET ASSLY. (CAP)	1330x2110x1630	1366
173	76613/0	SPRING SUPPORT-1 (CAP)	1350x720x790	706
174	76614/0	SPRING SUPPORT-1 (CAP)	1350x720x790	706
175	76615/0	SPRING SUPPORT 2 & 3 (CAP)	1350x720x790	544
176	76616/0	SPRING SUPPORT 2 & 3 (CAP)	1350x720x790	544
177	76617/0	SPRING SUPPORT 2 & 3 (CAP)	1350x720x790	544
178	76618/0	SPRING SUPPORT 2 & 3 (CAP)	1350x720x790	544
179	76701/0	CHANGE OVER VALVE	800x500x200	77
180	76702/1	CRH NRV WITH SERVOMOTOR	3200x2300x2600	8990
181	76702/2	STEAM BLOWING DEV FOR NRV CRHLINE	2500x1600x1200	2600
182	76801/0	RATING,COLLABORATION&COMPAN Y'SMONOGRAM PLATE	850x550x200	36
183	76901/0	OIL STRIPPER	600x600x850	83
184	76902/0	OIL STRIPPER	600x600x850	83
185	76903/0	HOUSING FOR M.S STRAINER	1900x1380x700	3380
186	76904/0	HOUSING FOR M.S STRAINER	1900x1380x700	3380
187	76908/0	HOUSING FOR HRH STEAM STRAINER	2550x1850x1125	5400
188	76909/0	HOUSING FOR HRH STEAM STRAINER	2550x1850x1125	5400
189	76912/1	BLANKING ARRANGEMENT FOR MSSTRAINER HOUSING	1000x900x500	350
190	76912/2	BLANKING ARRANGEMENT FOR HRHSTEAM STRAINER HOUSING	1600x1200x600	940
191	76912/3	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000x900x500	350
192	76912/4	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING	1600x1200x600	940
193	76913/0	GASKETS FOR MS & HRH STRAINERHOUSINGS	1000x1000x600	21
194	76914/0	COMPENSATOR	600x600x900	27
195	76915/0	ASSY & DISASSY DEVICES FORMS & HRH STEAM STRAINERS	2140x1400x500	464
196	76917/0	STEAM STRAINER (MS)	1240x990x550	324
197	76918/0	STEAM STRAINER (HRH)	1900x1750x950	1244
198	77001/0	GOV.SYSTEM CONTROL RACK ASSLY.& TRANSPORT DEVICE	2800x1360x2750	1300

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

199	77002/0	SUPPLY RACK HP VALVE-2 (RIGHT)	2300x1400x2550	767
200	77003/0	SUPPLY RACK HP VALVE-1 (LEFT)	2300x1400x2550	767
201	77004/0	SUPPLY RACK FOR IP VALVES 1 &2	2300x1400x2550	1050
202	77006/0	GOVERNING SYSTEM PROTECTION RACK & TRANSPORT DEVICE	2450x1300x2250	1182
199	77201/0	TURBINE INSTRUMENTS RACKS (FRAMES)	2750x1500x800	2250
200	77202/0	TEMP. AND PRESSURE CONNECTIONS	1700x750x750	600
201	77203/0	IMPLUSE PIPES (CARBON STEEL)	6900x650x500	1025
202	77204/0	GAUGES AND SENSORS	2800x1250x1250	785
203	77205/0	TRANSMITTERS & J.B.OF BEARINGS	500x300x200	68
204	77206/0	IMPULSE PIPES (ALLOY STEEL AND S.S.)	6900x500x500	986
<b>SUB TOTAL(A)</b>				<b>1016063</b>

**HARIDWAR SUPPLY**

SL	PKG.NO	DESCRIPTION	PKG.SIZE(MM)	NET WT. IN KG.
<b>B</b>	<b>GENERATOR</b>			
1	601/0	FOUNDATION PLATES	6000x1500x1200	10130
2	602/0	FOUNDATION BOLTS	2540x655x600	760
3	603/0	FOUNDATION ITEMS	5800x1120x520	1670
4	604/0	EMBEDDED PARTS	1000x800x400	800
5	605/0	GENERATOR STATOR	9860x4440x4260	292000
6	606/0	GENERATOR ROTOR WITH SKIDPLATE	14125x1790x1740	75090
7	607/0	END SHIELD LOWER HALF (TE)	3800x1500x2240	8250
8	608/0	END SHIELD UPPER HALF (TE)	3900x1500x2150	7250
9	609/0	END SHIELD LOWER HALF (EE)	3900x1650x2150	8300
10	610/0	END SHIELD UPPER HALF (EE)	3900x1650x2150	7300
11	611/0	GENERATOR BEARING (EE & TE)	1180x1050x1170	1696
12	612/0	BAFFLE RING CARRIER & AIR GAP SEAL ASSY.	2035x1885x1200	897
13	613/0	TERMINAL BUSHINGS	2200x1830x610	1158
14	614/0	TERMINAL BUSHING BOX	3500x2600x1740	5302
15	615/0	SHAFT SEALS (EE & TE) & OIL CATCHER (INNER & OUTER)	2140x1140x965	1030
16	616/0	BAFFLE RING ASSY.	2070x1870x1080	738
17	617/0	GENERATOR ACCESSORIES	2140x2140x1240	450
18	618/0	FLEXIBLE TERMINAL CONNECTIONS	1350x950x400	492
19	619/0	GENERATOR ACCESSORIES	2240x940x1220	1200
20	620/0	GENERATOR ACCESSORIES	1000x1000x750	710
21	621/0	GENERATOR ACCESSORIES	1700x1200x250	85

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

22	622/0	PRIMARY WATER TANK	10500x2400x1200	1840
23	623/0	PW TANK PIPE LINES	6800x2100x1000	430
24	624/0	PW TANK PIPE LINES	3000x600x500	530
25	625/0	PLATFORM FOR PW TANK	5000x1200x600	790
26	626/0	COOLER HOUSING FRAME	4290x4450x1428	19992
27	627/0	SEAL RINGS	750x750x200	65
28	628/0	CONNECTION PIECE ASSLY	1650x1100x450	708
29	629/0	EMBEDMENTS FOR PORTAL CRANE	1400x1000x400	1391
30	631/0	DRY AIR BLOWER	1100x1000x700	52
31	632/0	ERECTION PEDESTALS	5300x1500x940	5500
32	633/0	ROTOR INSERTION AND OTHERERECTION DEVICES	2460x1170x1240	1910
33	634/0	WIRE ROPES FOR ROTOR	1800x1800x400	250
34	635/0	GENERATOR ERECTION DEVICES	3300x1555x1140	980
35	636/0	SPECIAL TOOLS AND TACKLES	800x700x300	95
36	637/0	BRUSHLESS EXCITER SET	5750x2350x3400	29928
37	638/0	BRUSHLESS EXCITER FRONT COVER	4400x3400x3100	1663
38	639/0	BRUSHLESS EXCITER REAR COVER	4400x3400x3100	2150
39	640/0	EXCITER BED PLATE ACCESSORIESAND RACK ASSEMBLY	3900x1250x1150	860
40	641/0	EXCITER BED PLATE ACCESSORIESAND RACK ASSEMBLY(NON TEST BED)	5800x1140x1240	1815
41	642/0	EXCITER ACCESSORIES	2200x1200x1100	611
42	643/0	EXCITER BED PLATE ACCESSORIES(NON TEST BED ITEMS)	1000x800x800	695
43	644/0	RR WHEEL AIR GUIDE COVER	2800x1500x2000	872
44	645/0	SEAL OIL STORAGE TANK	5000x1800x1700	1940
45	646/0	PW PUMP & FILTER UNIT	4000x4000x3000	4550
46	648/1	SINGLE FLOW S.O.U.-PART I	4000x2500x3000	4300
47	648/2	SINGLE FLOW S.O.U.-PART II	2500x2500x3400	3525
48	649/0	LIQUID DETECTOR RACK	2000x600x2000	460
49	650/0	GAS UNIT	1980x1640x2420	630
50	651/0	CO2 VAPOURISER	1520x840x840	170
51	652/0	H2 DISTRIBUTOR	3480x1540x440	150
52	653/0	CO2 DISTRIBUTOR	4860x1240x440	163
53	654/0	N2 DISTRIBUTOR	1400x1240x440	60
54	655/0	DRAIN OIL COLLECTOR	550x550x1750	89

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

55	656/0	RESINS	1200x600x600	56
56	657/0	TG SYSTEM INTEGRAL PIPING (VALVES)	2750x1400x1400	2360
57	658/0	TG SYSTEM INTEGRAL PIPING (INSTRUMENTS)	1000x940x900	172
58	659/0	CONSUMABLES	800x400x200	40
<b>SUB TOTAL (B)</b>				<b>517100</b>
<b>C</b>				
<b>CONDENSER</b>				
1	78001/1	CONDENSOR (HOTWALL-TS)	13300x2300x1400	7773
2	78001/2	CONDENSOR (HOTWALL-GS)	13300x2300x1400	7743
3	78004/1	FRONT END BOTTOM PLATE	7100x3350x625	6750
4	78004/2	FRONT END BOTTOM PLATE	7100x3350x625	6750
5	78005/1	REAR END BOTTOM PLATE	7100x3350x625	6750
6	78005/2	REAR END BOTTOM PLATE	7100x3350x625	6750
7	78006/1	MIDDLE BOTTOM PLATE -1	7100x3250x625	6025
8	78006/2	MIDDLE BOTTOM PLATE -1	7100x3250x625	6025
9	78007/1	MIDDLE BOTTOM PLATE -2	7100x3250x625	6025
10	78007/2	MIDDLE BOTTOM PLATE -2	7100x3250x625	6025
11	78010/0	BOTTOM PLATE (LOOSE ITEMS)	1900x700x600	830
12	78012/1	SPRING ELEMENT (CONDENSOR SUPPORT)	2000x1000x1250	3905
13	78012/2	SPRING ELEMENT (CONDENSOR SUPPORT)	2000x1000x1250	3905
14	78013/1	SPRING ELEMENT (CONDENSOR SUPPORT)	2000x1000x1250	3905
15	78013/2	SPRING ELEMENT (CONDENSOR SUPPORT)	2000x1000x1250	3905
16	78014/1	SPRING ELEMENT (CONDENSOR SUPPORT)	2000x1000x1250	3905
17	78014/2	SPRING ELEMENT (CONDENSOR SUPPORT)	2000x1000x1250	3905
18	78015/1	SPRING ELEMENT (CONDENSOR SUPPORT)	2000x1000x1250	3905
19	78015/2	SPRING ELEMENT (CONDENSOR SUPPORT)	2000x1000x1250	3905
20	78018/1	SPRING ELEMENT (CONDENSOR SUPPORT)	1600x950x950	5290
21	78018/2	SPRING ELEMENT (CONDENSOR SUPPORT)	1600x950x950	5290
22	78020/1	FRONT WATER CHAMBER (GS)	5224x3620x340	5725
23	78020/2	FRONT WATER CHAMBER (GS)	5224x3620x340	5725
24	78022/1	FRONT WATER BOX (GEN SIDE)	5950x3620x2485	13910
25	78022/2	FRONT WATER BOX (GEN SIDE)	5950x3620x2485	13910

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

26	78023/1	FRONT WATER CHAMBER (TS)	5225x3620x340	6115
27	78023/2	FRONT WATER CHAMBER (TS)	5225x3620x340	6115
28	78025/1	FRONT WATER BOX (GEN SIDE)	5950x3620x2485	13910
29	78025/2	FRONT WATER BOX (GEN SIDE)	5950x3620x2485	13910
30	78026/1	REAR WATER CHAMBER (GSI)	5225x3620x340	4532
31	78026/2	REAR WATER CHAMBER (GSI)	5225x3620x340	4532
32	78028/1	REAR WATER BOX (GEN SIDE)	4770x3610x2025	8130
33	78028/2	REAR WATER BOX (GEN SIDE)	4770x3610x1950	8130
34	78029/1	REAR WATER CHAMBER (TS)	5225x3620x340	4532
35	78029/2	REAR WATER CHAMBER (TS)	5225x3620x340	4532
36	78031/1	REAR WATER BOX (TUR SIDE)	4770x3610x2025	8150
37	78031/2	REAR WATER BOX (TUR SIDE)	4770x3610x2025	8150
38	78032/1	SIDE WALL(TUR.END)	5248x2480x32	3290
39	78032/2	SIDE WALL(TUR.END)	5248x2480x32	3290
40	78033/1	SIDE WALL(TUR.END)	5248x1515x32	1856
41	78033/2	SIDE WALL(TUR.END)	5248x1515x32	1856
42	78034/1	SIDE WALL(TUR.END)	5248x2480x32	3290
43	78034/2	SIDE WALL(TUR.END)	5248x2480x32	3290
44	78041/1	SIDE WALL(TUR.END)	5248x2480x32	3290
45	78041/2	SIDE WALL(TUR.END)	5248x2480x32	3290
46	78042/1	SIDE WALL(TUR.END)	5248x1515x32	1856
47	78042/2	SIDE WALL(TUR.END)	5248x1515x32	1856
48	78046/1	SIDE WALL(TUR.END)	5248x2480x32	3290
49	78046/2	SIDE WALL(TUR.END)	5248x2480x32	3290
50	78047/0	SIDE WALL(LOOSE ITEM)	6850x400x300	3186
51	78048/1	SHELL INTERNAL DETAILS	3650x1000x800	2548
52	78048/2	SHELL INTERNAL DETAILS	3650x1000x800	2548
53	78049/1	SHELL INTERNAL DETAILS	3650x1000x800	2548
54	78049/2	SHELL INTERNAL DETAILS	3650x1000x800	2548
55	78050/1	RODS (SHELL INTERNAL S)	3650x1000x800	2548
56	78050/2	RODS (SHELL INTERNAL S)	3650x1000x800	2548
57	78051/1	RODS (SHELL INTERNAL S)	3650x1000x800	2548
58	78051/2	RODS (SHELL INTERNAL S)	3650x1000x800	2548
59	78055/1	SHELL INTERNAL DETAILS	3700x850x350	608
60	78055/2	SHELL INTERNAL DETAILS	3700x850x350	106
61	78056/1	SHELL INTERNAL DETAILS	3700x850x350	4450
62	78056/2	SHELL INTERNAL DETAILS	3700x850x350	4450
63	78058/1	AIR EXTRACTION PIPING	5460x990x410	1400
64	78058/2	AIR EXTRACTION PIPING	5460x990x410	1400
65	78059/1	SHELL INTERNAL DETAILS	4700x3426x348	5168

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

66	78059/2	SHELL INTERNAL DETAILS	4700x3426x348	5168
67	78060/1	SHELL INTERNAL DETAILS	4700x3426x348	5168
68	78060/2	SHELL INTERNAL DETAILS	4700x3426x348	5168
69	78061/1	SHELL INTERNAL DETAILS	4700x3426x348	5168
70	78061/2	SHELL INTERNAL DETAILS	4700x3426x348	5168
71	78062/1	SHELL INTERNAL DETAILS	4700x3426x348	5168
72	78062/2	SHELL INTERNAL DETAILS	4700x3426x348	5168
73	78063/1	SHELL INTERNAL DETAILS	4700x3426x348	5168
74	78063/2	SHELL INTERNAL DETAILS	4700x3426x348	5168
75	78064/1	SHELL INTERNAL DETAILS	4700x3426x348	5168
76	78064/2	SHELL INTERNAL DETAILS	4700x3426x348	5168
77	78065/1	SHELL INTERNAL DETAILS	4700x3426x348	2584
78	78065/2	SHELL INTERNAL DETAILS	4700x3426x348	2584
79	78069/1	SHELL INTERNAL DETAILS	5500x940x750	6993
80	78069/2	SHELL INTERNAL DETAILS	5500x940x750	6993
81	78070/1	SHELL INTERNAL DETAILS	5500x940x630	334
82	78070/2	SHELL INTERNAL DETAILS	5500x940x630	334
83	78071/1	SHELL INTERNAL DETAILS	5500x940x630	4169
84	78071/2	SHELL INTERNAL DETAILS	5500x940x630	4169
85	78072/1	SHELL INTERNAL DETAILS	5500x940x630	2584
86	78072/1	SHELL INTERNAL DETAILS	5500x940x630	2584
87	78075/1	LOWER DOME WALL (TUR END)	10963x2500x650	7374
88	78075/2	LOWER DOME WALL (TUR END)	7051x584x257	822
89	78076/1	LOWER DOME WALL( TUR END) LOOSE	9093x617x550	1397
90	78076/2	LOWER DOME WALL(TUR END) LOOSE	10963x2500x257	7332
91	78077/1	LOWER DOME WALL(TUR END)	7024x350x200	606
92	78077/2	LOWER DOME WALL(TUR END)	9006x2500x257	6461
93	78078/1	LOWER DOME WALL (TUR END) LOOSE ITEMS	xx	1000
94	78078/2	LOWER DOME WALL (TUR.END) LOOSE ITEMS	xx	1000
95	78103/1	LOWER DOME WALL (GEN.SIDE)	7051x584x257	822
96	78103/2	LOWER DOME WALL (GEN.SIDE)	10963x1550x300	5138
97	78104/1	LOWER DOME WALL (GEN.END)	10963x2500x257	7332
98	78104/2	LOWER DOME WALL (GEN.END)	9804x2065x500	4635
99	78105/1	LOWER DOME WALL(GEN.END)	9006x2500x257	6461
100	78105/2	LOWER DOME WALL (GEN.END)	7024x350x200	606
101	78106/1	LOOSE DOME WALL (GEN.END) LOOSE ITEMS	xx	1000
102	78106/2	LOOSE DOME WALL (GEN.END) LOOSE	xx	1000

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

		ITEMS		
103	78109/1	LOWER DOME WALL (F.W/B SIDE)	7164x3465x600	4464
104	78109/2	LOWER DOME WALL (F.W./B SIDE)	7164x3465x600	4464
105	78110/1	LOWER DOME WALL (F.W/B SIDE)	6224x2730x300	5749
106	78110/2	LOWER DOME WALL (F.W/B SIDE)	6224x2830x300	5749
107	78112/1	LOWER DOME WALL (F.W/B SIDE)	3000x1000x1000	1000
108	78112/2	LOWER DOME WALL (F.W/B SIDE)	3000x1000x1000	1000
109	78114/1	LOWER DOME WALL (R.W/B SIDE)	5956x1760x550	2841
110	78114/2	LOWER DOME WALL (R.W/B SIDE)	5956x1760x550	2841
111	78115/1	LOWER DOME WALL (R.W/B SIDE)	7164x1442x300	3354
112	78115/2	LOWER DOME WALL (R.W/B SIDE)	7164x1442x300	3354
113	78116/1	LOOSE ITEMS	6915x3460x2400	4818
114	78116/2	LOOSE ITEMS	6915x3460x2400	4818
115	78117/1	LOWER DOME WALL (R.W/B SIDE)	5544x350x50	499
116	78117/2	LOWER DOME WALL (R.W/B SIDE)	5544x350x50	499
117	78118/1	LOWER DOME WALL (R.W/B SIDE) LOOSE ITEMS	1500x1300x1200	1000
118	78118/2	LOWER DOME WALL (R.W/B SIDE) LOOSE ITEMS	2000x1200x1000	1000
119	78121/1	LOOSE ITEMS	6016x200x200	2921
120	78121/2	LOOSE ITEMS	6016x200x200	900
121	78122/1	LOOSE ITEMS	6016x200x200	1529
122	78122/2	LOOSE ITEMS	6016x200x200	900
123	78123/1	LOOSE ITEMS	6016x200x200	222
124	78123/2	LOOSE ITEMS	6016x200x200	900
125	78124/1	LOOSE ITEMS	6016x200x200	2023
126	78124/2	LOOSE ITEMS	6016x200x200	900
127	78125/1	LOOSE ITEMS	3400x200x200	868
128	78125/2	LOOSE ITEMS	3400x200x200	500
129	78126/1	LOOSE ITEMS	3400x200x200	918
130	78126/2	LOOSE ITEMS	3400x200x200	500
131	78127/1	LOOSE ITEMS	3400x200x200	2929
132	78127/2	LOOSE ITEMS	3400x200x200	500
133	78128/1	LOOSE ITEMS	3400x200x200	2752
134	78128/2	LOOSE ITEMS	3400x200x200	500
135	78129/1	LP HEATER NO-1 SUPPORT ARRANGEMENT	2150x1800x1150	3000
136	78129/2	LP HEATER SUPPORT ARRANGEMENT LOOSE ITEMS	2150x1800x1150	3000
137	78130/1	LP HEATER NO-1 SUPPORT ARRANGEMENT	5950x1125x580	2950
138	78130/2	LP HEATER SUPPORT ARRANGEMENT	5950x1125x580	2950

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

		LOOSE ITEMS		
139	78132/1	UPPER DOME WALL (TUR/GEN.SIDE)	6870x1660x300	3577
140	78132/2	UPPER DOME WALL (TUR/GEN.SIDE)	6870x1660x300	3577
141	78133/1	UPPER DOME WALL (TUR/GEN.SIDE)	6870x1660x300	3575
142	78133/2	UPPER DOME WALL (TUR/GEN.SIDE)	6870x1660x300	3575
143	78136/1	UPPER DOME WALL (F/W/B.SIDE)	6000x3600x450	6152
144	78136/2	UPPER DOME WALL (TUR/GEN.SIDE)	6000x3600x450	6152
145	78137/1	UPPER DOME WALL,(LOOSE ITEMS)	5400x350x32	600
146	78137/2	UPPER DOME WALL,(LOOSE ITEMS)	5400x350x32	600
147	78138/1	UPPER DOME WALL	620x450x450	600
148	78138/2	UPPER DOME WALL	620x450x450	600
149	78139/1	UPPER DOME WALL (FWB SIDE)	6000x3580x300	4000
150	78139/2	UPPER DOME WALL (FWB SIDE)	6000x3580x300	4000
151	78142/1	FRONT W/BOX HINGE ARRANGEMENT	2500x1000x750	1682
152	78142/2	FRONT W/BOX HINGE ARRANGEMENT	2500x1000x750	1682
153	78143/1	LOOSE ITEMS (FRONT W/BOX HINGE ARRANGEMENT)	2000x1500x500	643
154	78143/2	LOOSE ITEMS (FRONT W/BOX HINGE ARRANGEMENT )	2000x1500x500	643
155	78144/1	FRONT WATER BOX HINGE ARRANGEMENT	2810x840x230	595
156	78144/2	FRONT WATER BOX HINGE ARRANGEMENT	2810x840x230	595
157	78150/1	FRONT W/BOX HINGE ARRANGEMENT	1850x840x230	595
158	78150/2	FRONT W/BOX HINGE ARRANGEMENT	1850x840x230	595
159	78154/1	STEAM THROW DEVICE	5500x940x630	2550
160	78154/2	STEAM THROW DEVICE	5500x940x630	2550
161	78157/1	CONDENSER (LOOSE ITEMS)	850x250x250	1805
162	78157/2	CONDENSER (LOOSE ITEMS)	850x250x250	30
163	78158/0	CONDENSER	2900x956x406	500
164	78159/0	CONDENSER LOOSE ITEMS	1000x500x500	300
165	78165	CONDENSOR LOOSE ITEMS	1000x600x500	25
166	78166/0	STAND PIPE NO.1	2750x420x400	100
167	78167/0	CONDENSER STAND PIPE	3150x350x330	200
168	78169/0	STAND PIPE NO.2	2750x420x390	100
169	78175/0	CONDENSER INSTRUMENTRATION	1500x1000x1000	900
170	78176/0	CONDENSER INSTRUMENTATION	1000x500x500	100
171	78301/0	GLAND STEAM CONDENSER	1750x1700x1700	1510
172	78304/0	LOOSE ITEMS OF GSC (FRAGILE)	700x300x200	34

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

173	78305/0	LOOSE ITEMS GSC(NON FRAGILE)	600x500x350	10
174	78315/1	LP.HEATER NO.1	11650x1250x1750	14500
175	78315/2	LP.HEATER NO.1	11650x1250x1750	14500
176	78316/1	LOOSE ITEMS OF LPH-1	500x400x400	100
177	78316/2	LOOSE ITEMS OF LPH-1	500x400x400	100
178	78317/1	LP HEATER NO.1 STAND PIPE	2200x700x500	45
179	78317/2	LP HEATER NO.1 STAND PIPE	2200x700x500	45
180	78318/1	LPH1 PANAL MOUNTED INSTRUMENT	2600x500x400	35
181	78318/2	LPH1 PANAL MOUNTED INSTRUMENT	2600x500x400	35
182	78319/1	LOOSE ITEMS LP HEATER NO.1	700x500x500	100
183	78319/2	LOOSE ITEMS LP HEATER NO.1	700x500x500	100
184	78320/1	TROLLEY FOR LP HEATER NO.1	1150x1050x250	664
185	78320/2	TROLLEY FOR LP HEATER NO.1	1150x1050x250	664
186	78401	TUBRINE OIL COOLER	5850x1700x2300	12450
187	78405	TUBRINE OIL COOLER	5850x1700x2300	12450
188	78406	TOC (LOOSE ITEMS)	800x800x500	120
189	78424	HYDROGEN COOLER	4500x1100x1150	3232
190	78425	HYDROGEN COOLER	4500x1100x1150	3232
191	78428	LOOSE ITEMS (HYDROGEN COOLERS)	1050x1050x600	650
192	78431	EXCITER AIR COOLER	3600x1000x830	1450
193	78432	EXCITER AIR COOLER	3600x1000x830	1450
194	78436	CONTROL FLUID COOLER	3300x850x1030	1315
195	78437	CONTROL FLUID COOLER	3300x850x1030	1315
196	78438	LOOSE ITEM (CFC)	600x600x500	86
<b>SUB TOTAL(C)</b>				<b>659834</b>
<b>D</b>	<b>ACG</b>			
1	10001/0	STARTER CABINET FOR DC S. OIL MOTOR	1230x1060x2550	450
2	10002/0	GENERATOR INSTRUMENTATION CABINET	1230x1060x2550	450
3	12004/0	LOOSE INSTRUMENTS	1000x800x400	26
4	12006/0	STARTER CABINET FOR DC EOP MOTOR	1230x1060x2550	450
<b>SUB TOTAL (D)</b>				<b>1376</b>
<b>TOTAL (A+B+C+D)</b>				<b>2194373</b>

**HYDERABAD SUPPLY**

S.No	Description	QTY/UNIT	APPROX.	PACKING SIZE (mm)
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**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

		TD BFP-2NOS	MD BFP-1NO	WT. (in Kg)	( L x W x H )
<b>A</b>	<b>BOILER FEED PUMPS (MD &amp; TD)</b>				
01	Motor Driven Boiler Feed Pump (MD BFP) with Base Plate & Tubing	NA	1	11500	3200 x 2000 x 3100
02	Turbine Driven Boiler Feed Pump (TD BFP) with Base Plate & Tubing	2	NA	11100	3200 x 2000 x 3450
03	Motor Driven Boiler Feed Booster Pump (MD BP) with Base Plate & Tubing	NA	1	4600	2200 x 1900 x 3000
04	Turbine Driven Boiler Feed Booster Pump (TD BP) with Base Plate & Tubing	2	NA	4710	2200 x 1900 x 3000
05	BFP + Booster Pump Mech.seal skid	2 + 2	1 + 1	1000	1600 x 1300 x 1700
06	MD BFP + Hydraulic Coupling Grillage	NA	1	3800	6400 x 2700 x 400
07	MD BFP Motor + BP Grillage	NA	1	3710	6100 x 2700 x 400
08	Hydraulic Coupling	NA	1	11000	3700 x 2800 x 3900
09	HC L.O & W.O Oil Coolers & accessories	NA	1 SET	3285	3900 x 2000 x 2150
10	Recirculation Valve	2	1	900	1000 x 1000 x 2800
11	Conical Suction Strainer at BFP suction	2	1	1200	3100 x 1000 x 1000
12	Basket type Suction Strainer at BP suction	2	1	2350	1500 x 1500 x 1600
13	Local Gauge Boards (LGB)- 1,2&3	4	2	400(EACH )	1100 x 900 x 2200
14	Local instrument Transmitter Rack (LIR)	2	1	150	1050 x 650 x 1500
15	MD BFP MOTOR 12000 KW		1	25000	4500 X 4700 X 3000
				<b>SUB TOTAL</b>	<b>86705</b>
<b>B</b>	<b>CONDENSATE EXTRACTION PUMP</b>				
S.No	Description	QTY/UNIT	APPROX. WT. (in Kg)	PACKING SIZE (mm) ( L x W x H )	
01	Condensate Extraction Pump	3	6220	10,000 x 1700 x 1800	
02	Foundation Frame	3	580	1600 x 1600 x 300	
03	Canister	3	2700	7600 x 1300 x 1300	
04	Basket type Suction Strainer at CEP suction	3	1350	1600 x 1600 x 1700	

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

05	Local Gauge Boards	2	300	1300 x 900 x 2000
06	LIR Rack for Pr.Transmitters	1 (Common for 3 pumps)	150	1050 x 650 x 1500
07	CEP MOTOR 900KW	3	6000	2600(H) X DIA 2100
			<b>SUB TOTAL</b>	<b>17300</b>
<b>C</b>	<b>DRAIN COOLER</b>			
1	DRAIN COOLER ASSLY	1	5800	L 6200 x W 1050 x H 1500
			<b>SUB TOTAL</b>	<b>5800</b>
<b>D</b>	<b>DEAERATOR</b>			
1	Header	1	29500	L 10800 x W 3400 x H 3700
2	Storage Tank Sec-1	1	27000	L 13350 x W 3700 x H 4350
3	Storage Tank Sec-2	1	26600	L 12500 x W 3700 x H 4350
4	Storage Tank Sec-3	1	26550	L 13200 x W 3700 x H 4350
			<b>SUB TOTAL</b>	<b>109650</b>
<b>E</b>	<b>LP HEATER</b>			
1	L.P. HEATER 2	1	26000	L 14500 x W 1900 x H 2200
2	L.P. HEATER 3	1	27500	L 13800 x W 1900 x H 2200
			<b>SUB TOTAL</b>	<b>53500</b>
<b>F</b>	<b>HP HEATER</b>			
1	H.P.HEATER 5A/B	1	32500	L 11300 x W 1900 x H 2300
2	H.P.HEATERS 6A/B	1	47300	L 13100 x W 1750 x H 2300
			<b>SUB TOTAL</b>	<b>79800</b>
<b>G</b>	<b>BFPDT Twin oil Cooler</b>			
1	Per Cooler	2	5700	Ø 508 x H 5000
			<b>SUB TOTAL</b>	<b>11400</b>
			<b>TOTAL (A+B+C+D+E+F+G)</b>	<b>364155</b>

<b>TRICHY SUPPLY</b>		
SI No.	Description	WT. (in KGs)
1	TG VALVES	145,000
2	QCNRV	21,600
3	HP Bypass	6,200
4	TIP Valves + ADV	12,000

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

5	RHID	15,700
<b>Sub Total</b>		<b>200,500</b>

<b>PEM BOIs</b>			
<b>S. No</b>	<b>SI No.</b>	<b>PACKAGE/ITEM DESCRIPTION</b>	<b>WT. (IN KGs)</b>
<b>ELECTRICAL</b>			
1	507	LT PVC CONTROL CABLES, SCREENED CONTROL CABLES	
2	507	ABOVE GROUND EARTHING MATERIAL	
3	509	CABLE TRAYS AND SUPPORT SYSTEM FOR BHEL SUPPLIED EQUIPMENT	
<b>C &amp; I</b>			
1	145	CONTROL VALVES	
2	145	FLOW ELEMENTS	
<b>MSE</b>			
1	100	COLTCS	
2	100	MISC. HORIZONTAL AND VERTICAL PUMPS	
3	179	PLATE HEAT EXCHANGERS	
4	165	AUXILIARY PRDS	
5	142	DE SUPERHEATER FOR WET STEAM WASHING SYSTEM	
<b>MAUX</b>			
1	154	CHEMICAL DOSING SYSTEM	
2	567	LUBE OIL TRANSFER PUMPS	
<b>MPL</b>			
1	100	VALVES, TRAPS	
2	100	ME BELLOWS	
<b>TOTAL WEIGHT(PEM BOI's) - 660090 KGS</b>			

<b>BHOPAL SUPPLY</b>					
<b>S.N</b>	<b>DESCRIPTION</b>	<b>QTY</b>	<b>SIZE (MM)</b>	<b>Unit Wt (Kg.)</b>	<b>Total Wt (Kg.)</b>
<b>A. RE JOINTS</b>					
1	RE Joint Inlet Assembly	1	6000 (L) X 2950 (W) X 2950 (H)	17200	17200
2	RE Joint Outlet Assembly	1	6000 (L) X 2950 (W) X 2950 (H)	16500	16500
<b>SUB TOTAL</b>					<b>33700</b>
<b>B. FLASH TANKS</b>					

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-STG/962

Technical Conditions of Contract –Volume I A (Part I : Contract Specific Details)

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**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

1	Flash Tank "A"	1	7000 (L) X 3350 (W) X 3250 (H)	8200	8200
2	Flash Tank "B"	1	7000 (L) X 3350 (W) X 3250 (H)	8200	8200
3	Unit Flash Tank	1	2500 (L) X 2150 (W) X 2050 (H)	1450	1450
<b>SUB TOTAL</b>				<b>17850</b>	
<b>C.</b>	<b>MISC TANKS</b>				
1	DMCW Tank	1	7200 (L) X 2500 (W) X 2800 (H)	6000	6000
2	Clean Oil Tank	1	5500 (L) X 5000 (W) X 3400 (H)	10500	10500
3	Dirty Oil Tank	1	5500 (L) X 5000 (W) X 3400 (H)	10500	10500
4	Oil Unloading Vessel	1	2250 (L) X 1200 (W) X 1000 (H)	590	590
<b>SUB TOTAL</b>				<b>27590</b>	
<b>D.</b>	<b>BF VALVES</b>				
1	1800 Dia EA	8	2800 (L) X 2000 (W) X 750 (H)	7035	56280
2	500 Dia MO	3	1300 (L) X 800 (W) X 350 (H)	695	2085
3	450 Dia EA	3	1300 (L) X 800 (W) X 350 (H)	470	1410
4	400 Dia MO	12	1100 (L) X 600 (W) X 300 (H)	430	5160
<b>SUB TOTAL</b>				<b>64935</b>	
<b>E.</b>	<b>HT MOTORS</b>				
1	BFP Motor	1	4000 (L) X 3000 (W) X 3000 (H)	15000	15000
2	CEP Motor	3	2000 (L) X 1600 (W) X 2500 (H)	6000	18000
3	DMCW Motor	3	2000 (L) X 1600 (W) X 2500 (H)	6000	18000
<b>SUB TOTAL</b>				<b>51000</b>	
<b>TOTAL(A+B+C+D+E)</b>				<b>195075</b>	
<b>HARDWAR BOI's</b>					
<b>A</b>	<b>GENERATOR &amp; AUXILIARIES</b>				
<b>SN</b>	<b>ITEM ID</b>	<b>ITEM DESCRIPTION</b>		<b>QTY</b>	<b>UNIT</b>
1	BG001	EMPTY H2 CYLINDER		180	NO
2	BG002	EMPTY CO2 CYLINDER		60	NO
3	BG003	EMPTY N2 CYLINDER		12	NO
4	BG005	MOISTURE MEASURING SYSTEM		1	ST

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

5	BG007	VAPOUR EXHAUSTER	2	NO
6	BG009	H2 GAS ANALYSER CABINET	1	NO
7	BG011	REFRIGERATION GAS DRYER	2	NO
8	BG018	STARTING RESISTOR FOR DC S.O MOTOR	1	NO
9	BG019	SOUND ABSORBING LINING FOR EXCITER COVER & COUPLING COVER	1	ST
10	BG079	PRIMARY WATER COOLER (PLATE TYPE)	2	NO
11	BG080	STROBOSCOPE	1	NO
12	BG090	GENERATOR INTEGRAL PIPING	1	ST
13	BG091	HYDROGEN COOLERS PIPING	1	ST
<b>B</b>	<b>CONDENSER</b>			
1	BH001	WELDED AUSTENITIC S.S. TUBES GR.304 ( FOR CONDENSOR)	26810	NO
2	BH010	CONDENSOR AIR EVACUATION PACKAGE (VACUUM PUMP)	3	NO
3	BH012	AIR EXHAUSTER WITH MOTOR (GSC AIR EXHAUSTER)	2	NO
<b>C</b>	<b>STEAM TURBINE</b>			
1	BT001	LIFTING BEAM	1	NO
2	BT004	DUPLEX FILTER (LUB.OIL)	1	NO
3	BT005	DUPLEX FILTER (JACKING OIL)	1	NO
4	BT006	BUTTERFLY VALVES	1	ST
5	BT007	THREE WAY TEMP. CONTROL VALVE	2	NO
6	BT008	DOUBLE THREE WAY VALVES	2	NO
7	BT009	NRV WITH ALUMINIUM FLAP	1	ST
8	BT010	PRESSURE LIMIT VALVE	2	NO
9	BT011	OIL PURIFICATION UNIT (OIL CENTRIFUGE)	1	NO
10	BT012	OIL VAPOUR EXHAUSTER	2	NO
11	BT013	LEAD DIAPHRAGM	8	NO
12	BT014	SPRAY NOZZLES	1	ST
13	BT015	DIRT CATCHERS	2	NO
14	BT016	DAMPER	1	ST
15	BT017	VARIABLE LOAD SPRING CAGES	1	ST
16	BT018	FLEXIBLE BENDS	1	ST
17	BT020	THERMAL INSULATION OF TURBINE	-	ST
18	BT021	THERMAL INSULATION OF TIP	+	ST
19	BT022	TURBINE CLEADING	-	ST
20	BT023	TURBINE OIL	-	LT
21	BT024	DRY AIR PRESERVATION SYSTEM	1	NO
22	BT025	OIL PURIFICATION SYSTEM (CENTRAL)	1	NO
23	BT027	TURBINE INTEGRAL PIPING	-	KG
24	BT028	H & S FOR TURBINE INTEGRAL PIPING	1	ST
25	BT029	CALIBRATED FLOW NOZZLE ASSLY.	1	ST
26	BT031	THROUGH PORT GATE VALVE	1	ST
27	BT032	GLOBE VALVE	2	NO
28	BT033	SPRING LOADED NRV	4	NO

BHEL-PSWR

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**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

29	BT035	CONTROL FLUID PUMP	2	NO
30	BT036	CONTROL FLUID VAPOUR EXHAUSTER	2	NO
31	BT037	CONTROL FLUID PURIFICATION UNIT	1	NO
32	BT038	CONTROL FLUID TANK (SS)	1	NO
33	BT039	ON LINE CONTROL FLUID HEATER	1	NO
34	BT040	REMOTE TRIP SOLENOID VALVE	1	NO
35	BT043	CONTROL FLUID (FRF)	-	KG
36	BT044	GEAR PUMPS	3	NO
37	BT046	LP BYPASS STOP & CONTROL VALVE WITH EHA AND WATER INJECTION VALVE	1	ST
38	BT067	HYDRAULIC ACCUMULATORS ALONG WITH FILLING & GAUGING DEVICE	1	ST
39	BT068	POWER CABLES FOR 24 V SOLENOID VALVES (5x2.5mm <sup>2</sup> )	1	ST
40	BT072	AUXILIARY OIL PUMP WITH AC MOTOR	2	NO
41	BT073	EMERGENCY OIL PUMP WITH DC MOTOR & RESISTANCE	1	NO
42	BT074	VACUUM BREAKER VALVE WITH PNEUMATIC ACTUATOR	2	NO
43	BT081	HPT STEAM EVACUATION VALVE	1	NO
44	BT102	JACKING OIL PUMP WITH AC MOTOR	1	NO
45	BT103	JACKING OIL PUMP WITH DC MOTOR	1	NO
46	BT104	SEAL STEAM CONTROL VALVE WITH ACTUATOR	1	NO
47	BT105	LEAK STEAM CONTROL VALVE WITH ACTUATOR	1	NO
		<b>TOTAL WEIGHT(HARDWAR BOI's)- 622210 KGS approx.</b>		

**Tentative Weight of TG/Generator Integral Piping shall be taken as 85 MT.**

**NOTE :**

1. THE LIST IS **FOR ONE UNIT** & 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 ASSY. CONTRACTOR MAY HAVE TO DISMANTLE AND ERECT OR, ERECT AS SINGLE ASSEMBLY AS PER THE INSTRUCTION OF BHEL ENGINEERS WITHOUT ANY EXTRA COST.

TECHNICAL CONDITIONS OF CONTRACT (TCC)  
Annexure-IB  
SUMMARY OF WEIGHT DETAILS

APPENDIX-II

**WEIGHT DETAILS**

S.N.	EQUIPMENT / PACKAGE	APPROX. WT. (IN MT)
1	STEAM TURBINE	1016.06
2	GENERATOR	517.10
3	CONDENSOR	659.83
4	ACG	1.38
5	FLASH TANKS	17.85
6	MISC TANKS	27.59
7	RE JOINTS	33.70
8	MOTORS	51.00
9	BUTTERFLY VALVES	64.94
10	BOILER FEED PUMPS	86.71
11	CONDENSATE EXTRACTION PUMPS	17.30
12	DRAIN COOLER	5.80
13	DEAERATOR	109.65
14	LP HEATERS	53.50
15	HP HEATERS	79.80
16	BFPDT TWIN OIL COOLER	11.40
18	TRY-VALVES	200.50
19	HARIDWAR BOI	622.21
20	PEM BOI	660.09
21	INSULATION	500.00
<b>TOTAL ( FOR ONE UNIT ONLY)</b>		<b>4736.41</b>

**NOTE:**

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)  
Annexure-II  
PAINTING SCHEME

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(SHALL BE INTIMATED LATER ON)

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

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### **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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

---

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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

---

### 11.0.15

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

### 11.0.16

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

### 11.0.17

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

### 11.0.18

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

## **11.1 COLLECTION AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES**

### 11.1.1

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

### 11.1.2

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

### 11.1.3

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

## **11.2 TEST TAPPING POINTS**

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# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

---

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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

---

### 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XII CIVIL WORKS, FOUNDATION, GROUTING

---

### 12 PREPARATION OF FOUNDATION

#### 12.1

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

#### 12.2

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

#### 12.3

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

##### 12.3.1

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

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

In order to ensure the quality, the major grouting of equipments using any of above grout mixes shall essential be done as per the recommendations of supplier with regard to grout preparation and use of machinery etc under the supervision of the respective supplier. 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XII CIVIL WORKS, FOUNDATION, GROUTING

---

### 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIII EQUIPMENT INSTALLATION

---

### **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, 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, 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIV PIPING INSTALLATION

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### 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.

~~The scope of work for TG integral, LP Piping and miscellaneous piping covered under this specification shall include but not be limited to the following systems-~~

- ~~(a) — Condenser air evacuation system~~
- ~~(b) — Condenser cooling water system~~
- ~~(c) — Cycle make up system~~
- ~~(d) — Control fluid system~~
- ~~(e) — Gland steam sealing system~~
- ~~(f) — Steam evacuation line (HPT exhaust) from CRH piping system~~
- ~~(g) — Equipment cooling water system~~
- ~~(h) — Lube oil system~~
- ~~(i) — Central oil storage and purification system~~
- ~~(j) — Exhaust hood spray system~~
- ~~(k) — Gland sealing (of valves and pumps) system.~~
- ~~(l) — Generator integral piping~~
- ~~(j) — Main circulation water piping~~
- ~~(k) — TG Aux. cooling water piping~~
- ~~(l) — Demineralised water system piping~~
- ~~(m) — Service water piping~~
- ~~(n) — Condensate transfer piping etc.~~

~~Indicative list of schemes of piping and their approximate weights are provided relevant Appendix.~~

#### 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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIV PIPING INSTALLATION

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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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIV PIPING INSTALLATION

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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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XV CONDENSER INSTALLATION

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### 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVI GENERATOR, DEAREATOR INSTALLATION & HANDLING HEAVIER EQUIPMENTS

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### **16.1 GENERATOR INSTALLATION**

#### **16.1.1 GENERATOR STATOR**

Generator stator will be transported from HARIDWAR works to site on special wagon / Trailer. This will be received at site nearer to the lifting point of Portal Gantry Crane / Strand Jack (near 'A' row columns). Unloading of Gen. Stator from wagon/trailer, lifting of stator and shifting it to TG Deck foundation, assembling the terminal box & cooler housing is in the scope of this work.

#### **16.1.2**

The generator stator shall be lifted and placed by the contractor with the help of portal gantry crane/strand jack (as per the availability), as per the scheme envisaged by BHEL on to the generator foundation. For this purpose, the portal crane/strand jack system will be provided by BHEL free of hire charges to the contractor. However, the transportation from store/ storage yard / shed, assembly, erection, testing and commissioning of this portal crane/strand jack system before the stator lifting and transporting, dismantling, cleaning, shifting/ packing back to store/ storage yard/ shed after its use will be the responsibility of the contractor.

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

### **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, Deaerator/ FST sections 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.

### **16.3 DEAREATOR INSTALLATION**

#### **16.3.1**

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVI GENERATOR, DEAREATOR INSTALLATION & HANDLING HEAVIER EQUIPMENTS

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### 16.3.2

Erection of permanent approach platform and ladders etc for de-aerator and FST, GSC, flash tanks, lubes oil / control oil tanks, ESVS/ IVS, 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVII HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS

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### **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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVII HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS

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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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVIII PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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### **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, Deaerator, FST, 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, Deaerator and FST as per requirement. Contractor shall carry out disassembly and reassembly of vulnerable components like deaerator 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

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVIII PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVIII PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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### 18.11

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

### 18.12

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

### 18.13

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

### 18.14

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

### 18.15

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

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

### 18.16

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVIII PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIX WELDING, HEAT TREATMENT, RADIOGRAPHY

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### 19.1 WELDING AND HEAT TREATMENT

#### 19.1.1

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

#### 19.1.2

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

#### 19.1.3

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

#### 19.1.4

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

#### 19.1.5

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

#### 19.1.6

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

#### 19.1.7

All electrodes shall be stored in a clean dry area. The storage room shall be of permanent nature and damp proof, and the room shall be exclusively meant for storage of welding electrodes and filler wires. Excepting for a vent in the top, it is not preferred to have any other opening like windows or ventilators. The temperature inside the room has to be kept in the range of 8-10° 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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIX WELDING, HEAT TREATMENT, RADIOGRAPHY

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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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIX WELDING, HEAT TREATMENT, RADIOGRAPHY

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### 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIX WELDING, HEAT TREATMENT, RADIOGRAPHY

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### 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 penetrometer/ 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XX ACID CLEANING/ALKALI FLUSHING/STEAM BLOWING/OIL FLUSHING

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### **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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XX ACID CLEANING/ALKALI FLUSHING/STEAM BLOWING/OIL FLUSHING

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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

TECHNICAL CONDITIONS OF CONTRACT (TCC)  
Chapter-XX ACID CLEANING/ALKALI FLUSHING/STEAM  
BLOWING/OIL FLUSHING

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXI TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

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### **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.

#### 21.3

Contractor shall carry out installation, commissioning, testing and dismantling of the 360 ton portal gantry crane, if provided by BHEL. Contractor's scope shall also include to & fro transportation of the portal gantry crane between BHEL stores and site of work and shall provide T&P including crane etc required for assembly and dismantling of above portal gantry crane.

#### 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, deaerator/FST sections 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 deaerator/ FST 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 & portal gantry cranes. It may be specifically noted that the EOT crane/ gantry 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.

Portal gantry crane will be issued in parts/ components and are to be assembled at site by the contractor as per the instructions of BHEL engineers/ erection manual. The scope includes receipt of the materials from BHEL stores, transportation to site, servicing of the components/

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## Chapter-XXI TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

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drives / pulleys etc., checking and lubricating wire ropes , pre assembly and assembly of components, preparation of foundation, erection of crane on the foundation, grouting of crane base plates, cabling, pre-commissioning and commissioning of drives, load testing , checking of over-load protection , regular maintenance etc. a qualified / experienced operator is to be provided by the contractor. After erection of the generator stator, the contractor has to dismantle the crane in sequence as instructed by BHEL and apply preservatives / touch-up paints, wherever required and return the same to store in good condition. Necessary consumables, tools and plants including gas welding m/c etc. are to be provided by the contractor. There is no separate rate for the above and quoted rates shall be inclusive of this.

The required loads will be provided by BHEL free of charges for load testing of portal cranes.

### 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

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## Chapter-XXI TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

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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.

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## Chapter-XXII PRESERVATIVE PAINTING

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

- 1) All protective paints for the protection of weld joint fit-ups, application of primers on finished weld joints are in the scope of contractor.
- 2) Two coats of steam washable paints shall be applied on steam side of LP turbine and condenser components, as advised by BHEL. The steam washable paints, primer and thinner will be provided by contractor as part of scope of work along with other like arrangements for surface preparation and paint application like sand/shot-blasting, consumables like surface cleaning agents, paint brush, brush cleanser, labour and necessary tools and plants as required for completion of work.
- 3) The water boxes shall be sandblasted to remove all traces of primer applied at the works. Thereafter apply two coats of primer paint followed by two/three coats of alloyed resin machinery enamel paints as approved by BHEL. Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL approved laboratory for the primers and paints. Prior approval of BHEL for each and every batch of the primer & paints shall be mandatory. In order to achieve a desired minimum paint dry film thickness (DFT) as specified in BHEL drawing, number of coats may be applied and method of application shall be as recommended by the paint manufacturer. Required paints & primers and other consumables shall be arranged by contractor.
- 4) All site weld joints falling in steam side shall be painted with two coats of steam washable paint.
- 5) All water side surfaces of water chambers including tube plate shall be thoroughly surface prepared and painted. Required primer & paints and other consumables for condenser water box and tube plates shall be provided by Contractor.
- 6) After the successful completion of hydraulic testing, the interior surfaces of the water boxes, main tube plates shall be painted with suitable anticorrosive paints as per special procedures laid down by BHEL. Required necessary paints along with primers and other consumables shall be arranged by Contractor.
- 7) Prior to hydraulic testing of water side of condenser, interior surfaces of water boxes shall be painted.
- 8) After completion of tubing and tube side hydro test, all water side surfaces of water chambers including tube plate shall be painted.
- 9) Preservation of all components/equipments during various stages of erection, commissioning till handing over is in the contractor's scope. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor. **Contractor has to arrange all primer and paints, and other consumables like wire brush, painting brush required for this work.**
- 10) Condenser internal components/parts/surfaces have to be surface protected with steam washable paint as per BHEL standards.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIII LINING AND INSULATION

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### **23 LINING AND INSULATION**

#### 23.1

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

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

#### 23.2

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIII LINING AND INSULATION

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23.9

The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for aluminium 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 mortar	-	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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIII LINING AND INSULATION

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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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)  
Chapter-XXIII LINING AND INSULATION

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### 24 FINAL PAINTING

#### 24.1

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

#### 24.2 Touch-up painting on damaged areas –

##### a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer has to be applied by brush immediately after the surface preparation.

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

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

#### 24.3

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

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

#### 24.4

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

#### 24.5

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIV FINAL PAINTING

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- 24.6 In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.
- 24.7 Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The contractor at his own cost shall provide all the consumables and application implements.
- 24.8 During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, contractor shall repair the same free of cost to BHEL.
- 24.9 Specified drying time shall be permitted from one to another coat.
- 24.10 This work requires working at higher altitudes from ground level to as high as 90 m and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of standard quality for safe and smooth execution of work.
- 24.11 Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by contractor, BHEL shall have the right to recover the cost of such damages from the contractor.
- 24.12 Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the contractor without any extra charges.
- 24.13 In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipment inaccessible for manual painting has to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the contractor. For the purpose of spray painting, air at one point will be made available by BHEL free. Laying of air hose pipe and any other line required shall be done by contractor at his cost. The contractor shall provide spray equipment set.
- 24.14 The contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.
- 24.15

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIV FINAL PAINTING

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