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

**NO: BHE/PW/PUR/ CHT-STG/755**

FOR

**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 AND FINAL PAINTING ETC OF 2X500 MW UNIT 8 & 9**

AT

**MAHARASHTRA STATE POWER GENERATION COMPANY LIMTED**

## CHANDRAPUR SUPER THERMAL POWER STATION EXPANSION PROJECT (2X500MW)

**CHANDRAPUR, DIST- CHANDRAPUR (MAHARASHTRA)**

**VOLUME – I**

## CONSISTING OF:

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

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

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# Tender Specification Issue Details

**Tender Specification No: BHE/PW/PUR/ CHT- STG /755**

FOR

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 AND FINAL PAINTING ETC OF 2X500 MW UNIT 8 & 9

AT

**MAHARASHTRA STATE POWER GENERATION COMPANY LIMTED**

## CHANDRAPUR SUPER THERMAL POWER STATION EXPANSION PROJECT (2X500MW)

**CHANDRAPUR, DIST- CHANDRAPUR (MAHARASHTRA)**

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION . Refer Notice Inviting Tender

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

M/s. ……

……

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date :

755

# NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/ CHT- STG/755 Date: 12/08/2010

# NOTICE INVITING TENDER (NIT)

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

==========

To

Dear Sir/Madam

**Sub : NOTICE INVITING TENDER**

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

**1.0 Salient Features of NIT**

| SL NO | ISSUE | DESCRIPTION | |
|---|---|---|---|
| i | **TENDER NUMBER** | **BHE/PW/PUR/CHT-STG/755** | |
| ii | **Broad Scope of job** | 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 AND FINAL PAINTING ETC OF 2X500 MW UNIT 8 & 9 AT MAHARASHTRA STATE POWER GENERATION COMPANY LIMTED CHANDRAPUR SUPER THERMAL POWER STATION EXPANSION PROJECT (2X500MW) CHANDRAPUR, DIST- CHANDRAPUR (MAHARASHTRA) | |
| iii | **DETAILS OF TENDER DOCUMENT** | | |
| a | Volume-IA | *Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc* | *Applicable* |
| b | Volume-IB | *Special Conditions of Contract (SCC)* | *Applicable* |
| c | Volume-IC | *General Conditions of Contract (GCC)* | *Applicable* |
| d | Volume-ID | *Forms and Procedures* | *Applicable* |
| e | Volume-II | *Price Schedule (Absolute value).* | *Applicable* |
| iv | **Issue of Tender Documents** | ***1. Sale from BHEL PS Regional office at :Nagpur***<br>***Start :12/08/2010***<br>***Closes: 01/09/2010 , Time :16.00 Hrs***<br>**2. From BHEL website (www.bhel.com)** | *Applicable* |

| | | | |
|---|---|---|---|
| | | Tender documents can however be downloaded from website till due date of submission | |
| v | **DUE DATE & TIME OF OFFER SUBMISSION** | ***Date : 02/09/2010 , Time :15.00Hrs***<br>***Place : BHEL PS Regional office at :Nagpur***<br>Tenders being submitted through representative shall be handed over to any of the following BHEL officials after making entry/registration at the reception:<br>SM Borkar/ Sr Manager (Purchase)<br>RK Ranade/ Manager (Purchase)<br>Vivek Kamal/ Engineer(Purchase)<br>Pratish Gee Varghese/Engineer(Purchase) | *Applicable* |
| vi | **OPENING OF TENDER** | ***1 hours after the latest due date and time of Offer submission***<br>*Notes:*<br>*(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.*<br>*(2) Bidder may depute representative to witness the opening of tender* | *Applicable* |
| vii | **EMD AMOUNT** | *Rs 2,00,000/- (Rupees Two Lakhs Only)* | *Applicable* |
| viii | **COST OF TENDER** | *Rs 2000/-.* | *Applicable* |
| ix | **LAST DATE FOR SEEKING CLARIFICATION** | *Date: Atleast 5 days before the due date of offer submission*<br>*Along with soft version also, addressing to undersigned & to others as per contact address given below* | *Applicable* |
| x | **SCHEDULE OF Pre Bid Discussion (PBD)** | *Date : Not applicable.* | *Not applicable.* |
| xi | **INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)** | *Not Applicable* | *Not Applicable* |
| xii | **Latest updates** | Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information | |

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

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

Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at NAgpur, Sundays and second/ last Saturdays

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

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

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

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

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

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

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

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

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

| | | |
|---|---|---|
| | **CONTAINING THE FOLLOWING:** | |
| i | o Envelopes I<br>o Envelopes II<br>o Envelopes III | |

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

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

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

**9.0 Assessment of Capacity of Bidders: (Shall be applicable for Bid Evaluation after 1st Jan 2011)**
**Bidders capacity for executing the job under tender shall be assessed as per the following:**

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

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

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

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

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

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

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

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

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

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

IV. **Explanatory note**:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

26.0 Order of Precedence

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

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

for BHARAT HEAVY ELECTRICALS LTD

AGM(Purchase)

**Enclosure**

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

**ANNEXURE - 1**

## PRE QUALIFYING CRITERIA

| | |
|---|---|
| JOB | 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 AND FINAL PAINTING ETC OF 2X500 MW UNIT 8 & 9 AT MAHARASHTRA STATE POWER GENERATION COMPANY LIMTED CHANDRAPUR SUPER THERMAL POWER STATION EXPANSION PROJECT (2X500MW) CHANDRAPUR, DIST- CHANDRAPUR (MAHARASHTRA) |
| TENDER NO | **BHE/PW/PUR/CHT-STG/755** |

| SL NO | PRE QUALIFICATION CRITERIA | Bidders claim in respect of fulfilling the PQR Criteria | |
|---|---|---|---|
| | | **Name and Description of qualifying criteria** | Page no of supporting document |
| A | Submission of Integrity Pact duly signed (if applicable) | **NOT APPLICABLE** | |
| B | Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable) | **Shall be applicable for Bid Evaluation after 1st Jan 2011** | |
| C | **Technical**<br>**C)** Bidder must have, achieved any one of the following:<br>**C.1)** Bidder must have, in last seven years as on 31/07/2010, executed Erection, Testing and Commissioning (Upto Synchronization of the Unit or beyond) of any one of the following listed works :<br>**C.1.1)** One set of Steam Turbine Generator of 190 MW or higher rating<br>OR<br>**C.1.2)** Two sets of Steam Turbine Generators of 100 MW or higher rating<br>**C.2)** Bidder should have been Techno Commercially Qualified for E&C works of one Steam Turbine Generator of 490 MW or higher rated unit by any of the Power Sector Region of BHEL, in the last 3(Three) years as on 31/07/2010<br>**C.3)** Bidder should be empanelled with BHEL-PSWR for M-TG-3 (Turbines Rating above 300 MW) category. | | |
| D<br>1 | **Financial**<br>**TURNOVER**<br>Bidders must have achieved an average annual financial turnover (Audited) of Rs 310 Lakhs or more over last three Financial Years (FY) i.e 2007-08, 2008-2009, 2009-2010 if Annual Accounts for FY 2009-10 are audited or for 2006-2007, 2007-2008 and 2008-2009 if not audited | | |
| 2 | NETWORTH<br>Net worth of bidder based on Audited Accounts of 2009-10 (**OR** 2008-09 incase accounts for FY 09-10 has not been audited) should be higher than 50% of paid up capital in case | | |

| | | | |
|---|---|---|---|
| | of companies. | | |
| 3 | PROFIT<br>Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'D1 above based on latest Audited Accounts. | | |
| | | | |
| E | Approval of Customer<br>Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer. | **APPLICABLE** | |
| F | Consortium criteria (if applicable) | **NOT APPLICABLE** | |
| | **Explanatory Notes for QR 'A'**<br>1. The word 'executed' means the bidder should have achieved the criteria specified in the QR even if the total contract has not been completed or closed<br>2. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as given above along with all annexures<br>~~(a) The word 'executing' means~~ | | |

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

**ANNEXURE - 2**

## CHECK LIST

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

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

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# TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

# TECHNICAL CONDITIONS OF CONTRACT (TCC)
# CONTENTS

## 1.0 Project Information

## 1.1 INTROUCTION

| | | | |
|---|---|---|---|
| 1 | OWNER | : | Maharashtra State Power Generation Company Ltd. |
| 2 | PROJECT TITLE | : | Chandrapur Thermal Power Expansion Project Unit- 8&9 |
| 3 | PROJECT RATING | : | 2X500 MW |
| 4 | LOCATION | : | Chandrapur, Distt – Chandrapur, Maharashtra |
| 5 | NEAREST RAILWAY STATION | : | Chandrapur Railway Station on Delhi - Chennai rail route- 6 Km from project site |
| 6 | NEAREST PORT | : | Vishakhapatanam |
| 7 | NEAREST AIRPORT | : | Nagpur - 150 Kms |
| 8 | MAIN ROAD HIGHWAYS | : | **State Highway**- SH 264 connecting Chandrapur with Jam, Rajura & Mul<br><br>**National Highway**– NH-7 connecting Varanasi to Madurai passing through Jabalpur, Seoni, Nagpur, Buti Bori, Jam, Adilabad and Hyderabad. Jam is at a distance of 100 Km from Chandrapur |
| 9 | LATITUDE | : | 19° - 59'12" N |
| 10 | LONGITUDE | : | 79° - 17'20" E |

## 1.2 CLIMATIC CONDITIONS

| | | | |
|---|---|---|---|
| 1 | MAXIMUM TEMPERATURE | : | 48.3°C |
| 2 | MINIMUM TEMPERATURE | : | 2.8°C |
| 3 | MAXIMUM RELATIVE HUMIDITY | : | 70% |
| 4 | MINIMUM RELATIVE HUMIDITY | : | 20% |
| 5 | AVERAGE ANNUAL RAINFALL | : | 1420 mm |
| 6 | HEIGHT ABOVE MSL | : | 189.70 mtr |

## 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 Turbines 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 sets 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
7. HP/LP Steam Bypass System excluding power cycle piping and valves
8. Boiler Feed Pumps (2X50% Turbine Driven 1X50% Motor Driven)
10. Condensate Extraction Pumps (3X50%)
11. Steel Storage Tanks/Vessels such as Condensate Storage tank, Main oil Tank, Dirty Oil tank etc
12. 2X100% Capacity Boiler Fill Pumps
13. 2X100% Capacity Condensate Transfer Pumps
14. Closed Loop Equipment Cooling Water System
15. Turbine integral and other miscellaneous piping
16. Insulation of equipment and piping
17. Painting of all erected equipments and structures

of Chandrapur Super Thermal Power Station Expansion Project (2x500MW), Chandrapur, Maharashtra.

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

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

| Sl.No | Description<br>PART I | Scope / to be taken care by | | *Remarks* |
|---|---|---|---|---|
| | | **BHEL** | **Bidder** | |
| c | Duties and deposits including statutory clearances if applicable | | Yes | |
| 3.2.3 | **Electricity for living accommodation of the bidder's staff, engineers, supervisors etc** | | | Chargeable as per standard rates |
| a | Single point source | Yes | | |
| b | Further distribution including all materials, Energy Meter, Protection devices and its service | | Yes | |
| c | Duties and deposits including statutory clearances if applicable | | Yes | |
| 3.3.0 | **WATER SUPPLY** | | | |
| 3.3.1 | **For construction purposes** | | | Free; duty & taxes, if levied by the Govt, shall be payable by the bidder |
| a | Making the water available at single point | Yes | | |
| b | Further distribution as per the requirement of work including supply of materials and execution | | Yes | |

| Sl.No | Description<br>PART I | Scope / to be taken care by | | *Remarks* |
|---|---|---|---|---|
| | | **BHEL** | **Bidder** | |
| 3.3.2 | **Water supply for bidder's office, stores, canteen etc** | | | |
| a | Making the water available at single point | Yes | | |
| b | Further distribution as per the requirement of work including supply of materials and execution | | Yes | |
| 3.3.3 | **Water supply for Living Purpose** | | | |
| a | Making the water available at single point | | Yes | |
| b | Further distribution as per the requirement of work including supply of materials and execution | | Yes | |
| 3.4.0 | **LIGHTING** | | | |
| a | For construction work (supply of all the necessary materials)<br>1. At office/storage area<br>2. At the preassembly area<br>3. At the construction site /area | | Yes | |
| b | For construction work (execution of the lighting work/ arrangements)<br>1. At office/storage area<br>2. At the preassembly area<br>3 At the construction site /area | | Yes | |

| Sl.No | Description<br>PART I | Scope / to be taken care by | | *Remarks* |
|---|---|---|---|---|
| | | **BHEL** | **Bidder** | |
| c | Providing the necessary consumables like bulbs, switches, etc during the course of project work | | Yes | |
| d | Lighting for the living purposes of the bidder at the colony / quarters | | Yes | |
| 3.5.0 | **COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER** | | | |
| a | Telephone, fax, internet, intranet, e-mail etc | | Yes | |
| 3.6.0 | **COMPRESSED AIR wherever required for the work** | | Yes | |
| 3.7.0 | **Demobilization of all the above facilities** | | Yes | |
| 3.8.0 | **TRANSPORTATION** | | | |
| a | For site personnel of the bidder | | Yes | |
| b | For bidder's equipments and consumables (T&P, Consumables etc) | | Yes | |

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

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

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

| S.N. | DESCRIPITION | CAPACITY | QUANTITY |
|---|---|---|---|
| 1 | 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 SOURSE AND FILM VIEWER | | -DO- |
| 7 | TIG WELDING SET | | -DO- |
| 8 | STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS | | -DO- |
| 9 | ELECTRICAL BAKING OVEN - BIG | | -DO- |
| 10 | ELECTRODE BAKING OVEN - PORTABLE | | -DO- |
| 11 | MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS | | -DO- |
| 12 | VACUUM CLEANER (INDUSTRIAL) | | -DO- |
| 13 | PIPE CUTTING AND BEVELLING MACHINE | | -DO- |
| 14 | PIPE BENDING M/C | ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE | -DO- |
| 15 | AIR COMPRESSOR | 120 CFM | 01 NO |
| 16 | STEP DOWN TRANSFORMER | 230V/24V | AS PER REQUIREMENT |
| 17 | CONDENSER TUBE EXPANDER SET | | DO |
| 18 | ELECTRICALLY OPERATED WINCHES | 3T/5T | DO |
| 19 | JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.) | | DO |
| 20 | **HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :** | | |
| | A) - JACKS (WITH HAND OPERATED PUMPS) | 100 MT | 06 NOS. |
| | B) - JACKS (WITH HAND OPERATED PUMPS) | 50 MT | 06 NOS. |
| | **GANG OPERATED JACKS CONSISTING OF THE FOLLOWING :** | | |
| | 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 GENERATOR ALIGNMENT) | | 12 NOS. |

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

## B: MEASURING AND MONITORING DEVISES (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.

| 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 75 T | 1 | FOR LOADING HEAVY ITEMS OF TURBINE, DEAERATOR ETC AT BHEL STORE |
| 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&P will be provided on sharing basis only. Contractor has to plan his activities well in advance and inform BHEL engineer in charge/ construction manager the date of actual use.

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.

## 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-8 | UNIT-9 |
|---|---|---|---|
| 1 | CONDENSOR ERECTION START | 9-Oct-10 | 9-Jan-11 |
| 2 | TURBINE BOX UP | 9-Dec-11 | 9-Mar-12 |
| 3 | COMPLETION OF OIL FLUSHING | 9-Feb-12 | 9-May-12 |
| 4 | BARRING GEAR | 9-Mar-12 | 9-Jun-12 |
| 5 | SYNCHRONISATION | 9-Apr-12 | 9-Jul-12 |
| 6 | COAL FIRING | 9-May-12 | 9-Aug-12 |
| 7 | TRIAL OPERATION COMPLETION | 9-Jul-12 | 9-Oct-12 |
| 8 | PG TEST | 9-Aug-12 | 9-Nov-12 |

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 **29 (Twenty nine)** 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.

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

**FOR EACH STG**

| | | CND (1) | TUR (2) | GEN (3) | PMP & AUX/ EQ (4) | HEATERS AND DEAERATORS (5) | MISCELLANEOUS ITEMS (6) | INTEGRAL PPG (7) | PIPING (8) ON PER MT BASIS |
|---|---|---|---|---|---|---|---|---|---|
| | **Overall weightage for each area out of lumpsum value quoted for STG** | **20%** | **18%** | **15%** | **13%** | **11%** | **7%** | **16%** | **NOT APPLICABLE** |
| **Sl. No.** | **Activity/Work Description** | **%** | | | | | | | |
| **I** | **PRO RATA PAYMENTS (85%)** | | | | | | | | |
| **1** | **CONDENSER (weightage 20% )** | | | | | | | | |
| 1.1 | PREPARATION OF FOUNDATION | 2% | | | -- | | | -- | |
| 1.2 | PLACEMENT, ALIGNMENT, ASSEMBLY AND WELDING OF BOTTOM PLATE SEGMENTS, HOT WELL, NDT AND SPRING ELEMENTS PLACEMENT & GROUTING. | 10% | | | -- | | | -- | |
| 1.3 | ASSEMBLY AND POSITIONING OF WATER CHAMBER, SIDE PLATES, BOTTOM PLATES, WELDING AND NDT INCLUDING HINGE ASSY | 12% | | -- | -- | | | -- | |
| 1.4 | ASSEMBLY, ALIGNMENT AND WELDING & NDT OF TUBE SUPPORT PLATES AND INTERNALS LIKE BAFFLE PLATES, AIR EVACUATION PIPES ETC. | 13% | | -- | -- | | | -- | |
| 1.5 | ASSEMBLY, WELDING & NDT OF DOME WALLS AND DOME STIFFENERS, EXTRACTION PIPING AND STEAM THROW DEVICE, LPH-1 SUPPORT ETC. | 10% | | -- | -- | | | -- | |
| 1.6 | INSERTION, EXPANSION, CUTTING ETC. OF CONDENSER TUBES | 15% | | -- | -- | | | -- | |
| 1.9 | HYDRO TEST OF STEAM AND WATER SIDE | 10% | | -- | -- | | | -- | |
| 1.10 | WELDING OF CONDENSER NECK JOINT AND NDT& COMPLETION OF BALANCE WORKS | 10% | | -- | -- | | | -- | |
| 1.11 | ERECTION, COMMISSIONING, LOAD TESTING OF CONDENSER WATER BOX HANDLING SYSTEM | 3% | | -- | -- | | | -- | |

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

| | | CND (1) | TUR (2) | GEN (3) | PMP & AUX/ EQ (4) | HEATERS AND DEAERATORS (5) | MISCELLANEOUS ITEMS (6) | INTEGRAL PPG (7) | PIPING (8) ON PER MT BASIS |
|---|---|---|---|---|---|---|---|---|---|
| 2.14 | FINAL BOX-UP OF LP TURBINE | -- | 5% | | -- | | | -- | |
| 2.15 | ASSEMBLY AND PREPARATION OF HYDRO-TEST, STEAM BLOWING DEVICES AND NORMALISATION ETC. | -- | 0% | | -- | | | -- | |
| 2.16 | FINAL BOXING UP OF PEDESTALS AFTER OIL FLUSHING COMPLETION | -- | 5% | | -- | | | -- | |
| | **Subtotal for Steam Turbine** | | **85%** | | | | | | |
| **3** | **TURBO GENERATOR (15%)** | -- | | -- | -- | | | -- | |
| 3.1 | PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES | -- | | 5% | | | | -- | |
| 3.2 | LIFTING, LEVELLING AND ALIGNMENT OF STATOR (including erection and dismantling of portal crane if used for stator lifting) | | | 23% | | | | -- | |
| 3.3 | FIXING OF END SHIELDS ON TO FOUNDATION BEAMS | -- | -- | 6% | | | | -- | |
| 3.4 | ROTOR INSERTION | -- | -- | 6% | | | | -- | |
| 3.5 | BOXING UP OF GENERATOR AND ASSEMBLY OF HYDROGEN SEALS | -- | -- | 11% | | | | -- | |
| 3.6 | ALIGNMENT OF GENERATOR ROTOR WITH LP TURBINE ROTOR, RUN-OUT CHECKS AND REAMING, HONING OF COUPLING HOLES AND FIXING OF COUPLING BOLTS | -- | -- | 9% | | | | -- | |
| 3.7 | ERECTION OF EXCITATION EQUIPMENTS & ALIGNMENT OF GEN.-EXCITER ROTORS INCLUDING SWING CHECK AND COMPLETION OF BALANCE WORKS | -- | -- | 10% | | | | -- | |
| 3.8 | INSTALLATION OF ENCLOSURES OF GENERATOR/EXCITER WITH ALL AUXILIARIES | -- | -- | 5% | | | | -- | |
| 3.9 | GROUTING OF GEN BEARING PEDESTALS AND EXCITOR | -- | -- | 5% | | | | -- | |
| 3.10 | FINAL GAS TIGHTNESS TEST OF STATOR WITH COMPLETE SYSTEM | -- | -- | 5% | | | | -- | |
| | **Subtotal for Generator** | | | **85%** | | | | | |
| **4** | **PUMPS AND AUXILIARIES (13 %)** | -- | -- | | -- | | | -- | |

| | | CND (1) | TUR (2) | GEN (3) | PMP & AUX/ EQ (4) | HEATERS AND DEAERATORS (5) | MISCELLANEOUS ITEMS (6) | INTEGRAL PPG (7) | PIPING (8) ON PER MT BASIS |
|---|---|---|---|---|---|---|---|---|---|
| **4.1** | ERECTION / TESTING and commissioning OF MAIN OIL PUMP, JOP, EOP, AOP, CENTRALISED LUBE OIL PURIFICATION SYSTEM, ALONG WITH ALL AUXILLIARIES | -- | -- | | 18% | | | -- | |
| 4.2 | ERECTION / TESTING and commissioning OF 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% | | | -- | |
| | **Subtotal for pumps and Auxilliaries** | | | | **85%** | | | | |
| 5 | **HEATERS AND DEAERATORS (11%)** | | | | | | | | |
| 5.1 | ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS | -- | -- | -- | | 27% | | -- | |
| 5.2 | ERECTION, TESTING & COMMISSIONING OF GLAND STEAM CONDENSER, DRAIN COOLERS | -- | -- | -- | | 12% | | -- | |
| 5.3 | ERECTION, TESTING & COMMISSIONING OF DE-AERATOR, FEED STORAGE TANK AND ASSOCIATED APPROACH PLATFORM WITH LADDERS ETC. | -- | -- | -- | | 46% | | -- | |
| | **Subtotal FOR HEATERS AND DEAERATORS** | **--** | **--** | **--** | | **85%** | | **--** | |
| 6 | **MISCELLANEOUS ITEMS (7%)** | | | | | | | | |
| 6.1 | DEBRIS FILTERS, RE JOINTS, ME BELLOWS, DIRTY, CLEAN OIL TANKS, ENCLOSURES, CO2/H2 CYLIDER RACKS ETC | | | | | | 20% | | |
| 6.2 | ACW PUMPS, RELATED ITEMS/ BOILER FILL PUMPS | -- | -- | -- | | | 10% | | |
| 6.3 | ERECTION, TESTING & COMMISSIONING OF CONTROL FLUID TANK, C.F. COOLERS, C.F. PUMPS, PURIFICATION UNIT ETC. | -- | -- | -- | | | 9% | | |

| | | CND (1) | TUR (2) | GEN (3) | PMP & AUX/ EQ (4) | HEATERS AND DEAERATORS (5) | MISCELLANEOUS ITEMS (6) | INTEGRAL PPG (7) | PIPING (8) ON PER MT BASIS |
|---|---|---|---|---|---|---|---|---|---|
| 6.4 | ERECTION, TESTING & COMMISSIONING OF FLASH TANKS & FLASH VESSELS | -- | -- | -- | | | 8% | | |
| 6.5 | ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE | -- | -- | -- | | | 10% | | |
| 6.6 | ERECTION, TESTING & COMMISSIONING OF CONDENSER ON LOAD TUBE CLEANING PACKAGE/ CONDENSATE TRANSFER PUMPS | -- | -- | -- | | | 12% | | |
| 6.7 | ERECTION, TESTING & COMMISSIONING OF SELF CLEANING STRAINER PACKAGE | -- | -- | -- | | | 8% | | |
| 6.8 | ERECTION, TESTING & COMMISSIONING OF MISC. HOISTS & CHAIN PULLEY BLOCKS. | | | | | | 8% | | |
| | **Subtotal for MISCELLANEOUS ITEMS** | | | | | | **85%** | | |
| **7** | **INTEGRAL PIPING (16%)** | -- | -- | -- | | | | -- | |
| 7.1 | Turbine Integral piping and Generator Integral piping consisting of Lube oil, Jacking oil, Oil vapour extraction, Seal Oil, Control oil, Seal steam, Condensate spray/Exhaust Hood spray, Turbine water drainage, Gas Piping, Primary Stator Water piping, etc including all accessories like thermowells, probes, orifices etc and hangers and supports (Erection and commissioning on prorata basis) | -- | -- | -- | | | | 85% | |
| | **Total for integral piping** | | | | | | | **85%** | |
| 8 | **PIPING** | | | | | | | | |
| 8.1 | ON PRE-ASSEMBLY WHEREVER APPLICABLE ( IF NOT APPLICABLE, THIS PORTION TO BE PAID ALONG WITH PLACEMENT IN POSITION) | | | | | | | | 15% |
| 8.2 | PLACEMENT IN POSITION | | | | | | | | 20% |
| 8.3 | ALIGNMENT | | | | | | | | 15% |
| 8.4 | WELDING/BOLTING/FIXING | | | | | | | | 20% |
| 8.5 | COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be clubbed with next activity) | | | | | | | | 5% |
| 8.6 | HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG | | | | | | | | 5% |

| | | CND (1) | TUR (2) | GEN (3) | PMP & AUX/ EQ (4) | HEATERS AND DEAERATORS (5) | MISCELLANEOUS ITEMS (6) | INTEGRAL PPG (7) | PIPING (8) ON PER MT BASIS |
|---|---|---|---|---|---|---|---|---|---|
| 8.7 | HYDRAULIC TEST/PNEUMATIC TEST WHERE EVER APPLICABLE | | | | | | | | 5% |
| | **Total for Prorata (85%)** | **85%** | **85%** | **85%** | **85%** | **85%** | **85%** | **85%** | **85%** |
| | | | | | | | | | |
| **II** | **STAGE/MILESTONE PAYMENTS (15%)** | | | | | | | | |
| 1 | Boiler Light Up | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 2 | ABO | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 3 | Steam Blowing | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 4 | Safety Valve Floating | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 5 | Oil Flushing (TG) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| 6 | Barring Gear (TG) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| 7 | Rolling and Synchronisation | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% |
| 8 | Coal Firing | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 9 | Full Load | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| 10 | Trial Operation of Unit | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| 11 | Painting (including arrow marking, nomenclature, etc) | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| 12 | Area cleaning, temporary structures cutting/removal and return of scrap | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| 13 | Punch List points/pending points liquidation | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| 14 | Submission of 'As Built Drawings' | | | | | | | | |
| 15 | Material Reconciliation | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| 16 | Completion of Contractual Obligations | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | **Total for Milestone/Stage payments (15%)** | **15%** | **15%** | **15%** | **15%** | **15%** | **15%** | **15%** | **15%** |
| | | | | | | | | | |
| | **Total of I & II** | **100 %** | **100%** | **100 %** | **100%** | **100%** | **100%** | **100 %** | **100%** |
| | | | | | | | | | |

| | | CND (1) | TUR (2) | GEN (3) | PMP & AUX/ EQ (4) | HEATERS AND DEAERATORS (5) | MISCELLANEOUS ITEMS (6) | INTEGRAL PPG (7) | PIPING (8) ON PER MT BASIS |
|---|---|---|---|---|---|---|---|---|---|
| | **Note-A:**<br>In case strand jack system for stator lifting is also included in scope of contractor, then 10% of the lumpsum value quoted/ derived per unit of STG package will be paid upon lifting and placement of stator in position of respective unit, using the strand jack system.<br><br>In such a case, 90% of lumpsum value quoted/ derived per unit of STG package shall be considered for progressive payments as per terms of payment for the respective unit of STG package | | | | | | | | |

**TAXES, DUTIES, LEVIES**

## 8.1.0 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 output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and deposit the same with the concerned tax authorities, such applicable amount will be paid by BHEL.

**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.**
Contractor shall obtain prior written consent from BHEL before billing the amount towards such taxes.

With introduction of Cenvat Credit Rules 2004, which came into force w.e.f. 10.09.2004, Excise Duty paid on Input Goods including Capital Goods and Service Tax paid on Input Services that are used for providing the output services can be taken credit of against the Service Tax payable on output services. However BHEL may opt for availing the abatement provision in which case cenvat credit may not be available on input duty.

## 8.1.3 VAT (Sales Tax /WCT)

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

### 8.1.4 Modalities of Tax Incidence on BHEL

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

### 8.1.5 New Taxes/Levies

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

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

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

## SPECIFIC INCLUSIONS

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

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

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

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

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

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

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

**9.8**
Most of the Misc. Pumps with drive motors, base frame, fittings etc will be supplied in loose parts/ dismantled condition as skid mount. These pumps along with drive and fittings shall be assembled at site. The Delivery 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

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

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

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

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

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

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

**9.13**
**WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES**

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

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

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

**9.15**

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

**9.16**

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

**10.0 EXLUSIONS**

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

**A) Regenerative system piping is <u>excluded</u> from the scope. For details of piping *<u>included</u>* 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.

## HARIDWAR SUPPLY

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| **A** | **STEAM TURBINE** | | | |
| **A.1** | **STEAM TURBINE U#8** | | | |
| 1 | 75001 | EMBEDMENT FOR ANCHOR POINTS | 4400X1600X1000 | 4940 |
| 2 | 75003 | COMPONENTS FOR BASE PLATE ASSEMBLY | 4900X1200X600 | 6350 |
| 3 | 75004 | COMPONENTS OF BASE PLATE | 2800X1700X600 | 3700 |
| 4 | 75101 | BASE PLATE FOR LP CASING | 1850X1400X500 | 7200 |
| 5 | 75102 | LP OUTER CASING PARTS | 9000X2187X3460 | 15520 |
| 6 | 75103 | LP OUTER CASING PARTS | 9000X2190X3460 | 15520 |
| 7 | 75104 | LP OUTER CASING PARTS | 5670X3290X1140 | 4600 |
| 8 | 75105 | LP OUTER CASING PARTS | 5670X3290X1140 | 4600 |
| 9 | 75106 | LP OUTER CASING PARTS | 3400X1200X1200 | 1255 |
| 10 | 75107 | LP LONGITUDINAL GIRDER (LEFT) | 8200X1680X1950 | 21412 |
| 11 | 75108 | LP LONGITUDINAL GIRDER (RIGHT) | 8200X1680X1950 | 21412 |
| 12 | 75109 | LP FRONT WALL (TS) | 8760X3850X1150 | 18300 |
| 13 | 75110 | LP FRONT WALL (GS) | 8760X3850X1150 | 18300 |
| 14 | 75111 | LP SHAFT SEALING (FRONT) | 1800X1700X740 | 2300 |
| 15 | 75112 | LP SHAFT SEALING (REAR) | 1800X1700X740 | 2300 |
| 16 | 75113 | LP SHAFT SEAL COMPENSATOR (TS) | 1500X1500X650 | 350 |
| 17 | 75114 | LP SHAFT SEAL COMPENSATOR (GS) | 1500X1500X650 | 350 |
| 18 | 75115 | AUXILARIES OF LP TURBINE | 2300X1200X900 | 2340 |
| 19 | 75201 | HP/IP BRG.PED.ASSLY. | 4080X2005X2126 | 13275 |
| 20 | 75202 | HP/IP BRG.PED.PARTS | 1000X600X600 | 400 |
| 21 | 75301 | ASSEMBLY DEVICES | 1000x 750x 750 | 300 |

| | | | | |
|---|---|---|---|---|
| 22 | 75302 | INSPECTION SHAFT FOR IPC | 4050x 600x 900 | 1430 |
| 23 | 75304 | COMPONENTS OF ASSEMBLY FIXTURE FOR HPT | 3800x 2500x 1300 | 6860 |
| 24 | 75305 | COMPONENTS OF ASSEMBLY FIXTURE FOR HPT | 2300x 2100x 900 | 1800 |
| 25 | 75306 | COMPONENTS OF ASSY FIXTURE FOR HPT | 3300x 1800x 1300 | 3350 |
| 26 | 75307 | COMP.OF ASSY.FIXT.FOR H.P.T. | 5450x 4050x 400 | 3400 |
| 27 | 75308 | AUXILARIES OF LP TURBINE | 3750x 1000x 1000 | 1680 |
| 28 | 75309 | AUXLIARIES OF LP TURBINE | 2000x 1000x 1550 | 890 |
| 29 | 75310 | AUXLIARIES OF LP TURBINE | 2000x 1000x 1550 | 890 |
| 30 | 75311 | ASSEMBLY TOOLS | 1700x 800x 400 | 1020 |
| 31 | 75312 | AUXILIARIES OF IP TURBINE | 1200x 500x 550 | 260 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 32 | 75313 | AUXILIARIES OF IP TURBINE | 1100x 500x 650 | 210 |
| 33 | 75314 | AUXILIARIES OF IP TURBINE | 1100x 500x 650 | 210 |
| 34 | 75315 | BOLT HEATING EQUIPMENT AND BREECH NUT HEATING DEVICE | 1700x 900x 700 | 150 |
| 35 | 75316 | GROMMET SLINGS | 1700x 1700x 300 | 625 |
| 36 | 75318 | OIL FLUSHING AND PRESSURE TEST DEVICE | 750x 550x 400 | 250 |
| 37 | 75319 | STEAM BLOWING & HYDRAULIC TEST DEVICES | 2900x 2100x 1200 | 4650 |
| 38 | 75320 | TOOLS FOR GOV.SYST.&VALVES | 1750x 1200x 1000 | 1500 |
| 39 | 75321 | VALVE SUPPORT FOR HPT OVERHALL | 1500x 750x 750 | 905 |
| 40 | 75401 | IP-LP BEARING PEDESTAL ASSLY | 3700X1860X2100 | 14500 |

| | | | | |
|---|---|---|---|---|
| 41 | 75501 | LP/GEN. PEDESTAL ASSEMBLY | 3200X2280X2070 | 9370 |
| 42 | 75502 | BEARING PEDESTAL (PARTS) | 1600x 800x 600 | 1150 |
| 43 | 75601/1 | FRONT BEARING PEDESTAL | 3140x 3140x 2050 | 12386 |
| 44 | 75601/2 | HYDRAULIC TURNING GEAR | 2100x 1000x 600 | 750 |
| 45 | 75601/3 | MAIN OIL PUMP ASSEMBLY. | 1400x 1200x 1000 | 550 |
| 46 | 75704/1 | LP CASING ASSEMBLY | 2250x 1350x 750 | 3000 |
| 47 | 75704/2 | PARTS OF LP OUTER CASING ASSLY | 1000x 800x 800 | 300 |
| 48 | 75705 | LP EXTRACTION A1 | 4400x 1620x 870 | 1820 |
| 49 | 75706 | LP EXTRACTION A1 | 4400x 1620x 850 | 1814 |
| 50 | 75707/1 | LP EXTRACTION A1 | 3420x 1620x 870 | 1286 |
| 51 | 75707/2 | LP EXTRACTION A1 | 950x 750x 750 | 330 |
| 52 | 75708 | LP EXTRACTION A2 | 2920x 2120x 1370 | 1730 |
| 53 | 75709 | LP EXTRACTION A2 | 3420x 1220x 1120 | 1350 |
| 54 | 75710 | LP EXTRACTION A3 | 1920x 1120x 920 | 655 |
| 55 | 75711 | LP EXTRACTION A3 | 3120x 920x 870 | 1050 |
| 56 | 75716 | LP EXTRACTION PIPE SHEATHING | 2900x 2050x 1180 | 2650 |
| 57 | 75717 | INNER GUIDE PLATE OF DIFFUSER(TS) | 2300x 2300x 500 | 1850 |
| 58 | 75718 | DIFFUSER (TS) | 5050x 1800x 2550 | 6800 |
| 59 | 75719 | DIFFUSER (GS) | 5050x 1800x 2550 | 6800 |
| 60 | 75720 | LP INNER OUTER CASING (U/H) | 8640x 3650x 2550 | 36100 |
| 61 | 75721 | LP INNER CASING (L/H) | 9100x 3890x 3180 | 54540 |
| 62 | 75722 | LP INNER INNER CASING (U/H) | 4600x 1900x | 13300 |

| | | | | |
|---|---|---|---|---|
| | | | 2350 | |
| 63 | 75723 | LP CASING ASSEMBLY | 5000x 2500x 800 | 5910 |
| 64 | 75724 | LP INNER CASING ASSLY/FASTENER | 2000x 1000x 600 | 2050 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 65 | 75725 | INNER GUIDE PLATE OF DIFFUSER(GS) | 2300x 2300x 500 | 1700 |
| 66 | 75728 | STEAM INLET PIPE (LPT) | 3200x 1500x 1500 | 1700 |
| 67 | 75801 | LP ROTOR | 8800x 4000x 4162 | 95240 |
| 68 | 75901 | IP ROTOR | 4800x 2120x 1995 | 23132 |
| 69 | 75902 | IP OUTER CASING (U/H) | 4050x 3800x 2650 | 25850 |
| 70 | 75903 | IP OUTER CASING (L/H) | 3400x 5250x 2600 | 25870 |
| 71 | 75904 | IP INNER CASING (U/H) | 2900x 3200x 1850 | 15200 |
| 72 | 75905 | IP INNER CASING (L/H) | 2900x 3200x 1850 | 15200 |
| 73 | 75906 | IP INLET ASSEMBLY | 4500x 3725x 1300 | 13550 |
| 74 | 75907 | IP SHAFT SEALING | 1400x 1200x 900 | 950 |
| 75 | 75908 | IP TURBINE (PARTS) | 2000x 1900x 1000 | 3125 |
| 76 | 75909 | I.P. TURBINE PARTS | 1000x 1000x 750 | 475 |
| 77 | 76001/1 | HP TURBINE | 5675x 3400x 2900 | 88650 |
| 78 | 76001/2 | EMERGENCY GOVERNOR | 495x 395x 695 | 57 |
| 79 | 76002 | HP INLET ASSLY. & HP EXHAUST ASSLY.(PARTS) | 1200x 1200x 500 | 80 |
| 80 | 76003 | HP EXHAUST ASSEMBLY | 1650x 1400x 900 | 2000 |
| 81 | 76004 | HPT RELATED PARTS | 1300x 1300x 700 | 200 |

| | | | | |
|---|---|---|---|---|
| 82 | 76104 | ESV & CV CASING WITH VALVES | 3360x 3360x 2590 | 23146 |
| 83 | 76105/1 | ESV SERVOMOTOR WITH LIMIT SWITCHES | 2300x 1200x 1200 | 4250 |
| 84 | 76105/2 | ESV SERVOMOTOR WITH LIMIT SWITCHES | 2300x 1200x 1200 | 4250 |
| 85 | 76107 | HP CONTROL VALVE SERVOMOTOR | 2800x 1200x 2100 | 3280 |
| 86 | 76108 | ESV & CV CASING WITH VALVES | 3360x 3360x 2590 | 23146 |
| 87 | 76112 | HP CONTROL VALVE SERVOMOTOR | 2800x 1200x 2100 | 3288 |
| 88 | 76201 | SUSPENSION OF VALVE (IV) | 4250x 2640x 750 | 8078 |
| 89 | 76202 | IV & CV CASING WITH VALVES | 5040x 4690x 2770 | 33276 |
| 90 | 76203/1 | IV SERVOMOTOR WITH LIMIT SW. MOUNTINGS | 2700x 1450x 1400 | 3965 |
| 91 | 76203/2 | IV SERVOMOTOR WITH LIMIT SW. MOUNTINGS | 2700x 1450x 1400 | 3965 |
| 92 | 76204 | IP CONTROL VALVE SERVOMOTOR | 3240x 1240x 1950 | 3019 |
| 93 | 76205/1 | FRAME FOR SUSPENSION (IV) | 3400x 3150x 750 | 2026 |
| 94 | 76205/2 | FRAME FOR SUSPENSION (IV) | 3400x 3150x 750 | 2026 |
| 95 | 76205/3 | LOOSE ITEMS FOR FRAME FOR SUSPENSION | 300x 200x 200 | 20 |

## HARIDWAR SUPPLY

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 96 | 76206 | IV & CV CASING WITH VALVES | 5040x 4690x 2770 | 33276 |
| 97 | 76210 | IP CONTROL VALVE SERVOMOTOR | 3240x 1240x 1950 | 3019 |
| 98 | 76301/1 | SUSPENSION OF LPBP VALVES | 3600x 1700x 800 | 1836 |
| 99 | 76301/2 | SUSPENSION OF LPBP VALVES | 3600x 1700x 800 | 1836 |
| 100 | 76402 | INJECTOR FOR SUC. PIPE NB 350 | 3300x 800x 800 | 588 |

| | | | | |
|---|---|---|---|---|
| 101 | 76403 | INJECTOR FOR SUC. PIPE NB 300 | 3300x 1750x 1200 | 999 |
| 102 | 76404 | MAIN OIL TANK & NOZZLE ARRGT. ASSY | 6180x 3260x 2650 | 10697 |
| 103 | 76405 | MAIN OIL TANK & NOZZLE ARRGT. ASSY | 4200x 1200x 900 | 402 |
| 104 | 76406 | OIL STRAINERS | 1500x 1000x 1200 | 228 |
| 105 | 76407 | OIL STRAINERS | 1500x 1000x 1200 | 228 |
| 106 | 76409 | OIL STRAINERS | 2050x 1200x 1410 | 470 |
| 107 | 76412 | DIRTY/LEAKAGE OIL TANK | 1000x 1000x 3000 | 515 |
| 108 | 76413 | WASTE OIL TANK | 1000x 1000x 3000 | 515 |
| 109 | 76414 | VAR.ORIFICES THR.VALV.&FLUSH.PARTS | 1700x 700x 760 | 255 |
| 110 | 76415 | VARIABLE ORIFICE 125 | 400x 300x 200 | 50 |
| 111 | 76601 | PARTS OF A CROSS AROUND PIPE | 3500x 1750x 1800 | 2150 |
| 112 | 76602 | PARTS OF A CROSS AROUND PIPE | 3500x 1750x 1800 | 2150 |
| 113 | 76603 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3190 |
| 114 | 76604 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3190 |
| 115 | 76605 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3190 |
| 116 | 76606 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3190 |
| 117 | 76607 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3270 |
| 118 | 76608 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3270 |
| 119 | 76609 | REDUCER ASSEMBLY(CAP) | 1250x 1250x 500 | 242 |
| 120 | 76610 | REDUCER ASSEMBLY(CAP) | 1250x 1250x 500 | 242 |
| 121 | 76611 | CROSS AROUND PIPE (PARTS) | 2000x 1150x 600 | 2030 |
| 122 | 76612 | CROSS AROUND PIPE (PARTS) | 2000x 1150x | 2030 |

| | | | | |
|---|---|---|---|---|
| | | | 600 | |
| 123 | 76613 | MITRE BEND ASSEMBLY(CAP) | 3640x 1540x 2040 | 2240 |
| 124 | 76614 | MITRE BEND ASSEMBLY(CAP) | 3640x 1540x 2040 | 2240 |
| 125 | 76701 | CHANGE OVER VALVE | 800x 500x 200 | 97 |
| 126 | 76702/1 | CRH NRV WITH SERVOMOTOR | 3200x 2300x 2600 | 10528 |
| 127 | 76702/2 | STEAM BLOWING DEV. FOR NRV CRH LINE | 2500X1600X1200 | 5600 |
| 128 | 76703 | GLAND STEAM PRESSURE INDICATOR | 300X300X300 | 15 |
| 129 | 76801 | RATING,COLLABORATION&COMPANY 'S MONOGRAM PLATE | 850x 550x 200 | 55 |
| 130 | 76901 | OIL STRIPPER | 600x 600x 850 | 133 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 131 | 76902 | OIL STRIPPER | 600x 600x 850 | 133 |
| 132 | 76903 | HOUSING FOR M.S STRAINER | 1725x 1250x 730 | 2370 |
| 133 | 76904 | HOUSING FOR M.S STRAINER | 1725x 1250x 730 | 2370 |
| 134 | 76908 | HOUSING FOR HRH STEAM STRAINER | 2275x 1650x 1100 | 4480 |
| 135 | 76909 | HOUSING FOR HRH STEAM STRAINER | 2275x 1650x 1100 | 4480 |
| 136 | 76912/1 | BLANKING ARRANGEMENT FOR MS STRAINER HOUSINGS | 1000x 900x 800 | 948 |
| 137 | 76912/2 | BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSINGS | 1600x 1200x 1000 | 2535 |
| 138 | 76913 | GASKETS FOR MS & HRH STRAINER HOUSINGS | 1000x 1000x 600 | 37 |
| 139 | 76914 | COMPENSATOR | 600x 600x 900 | 50 |
| 140 | 76915 | ASSY. & DISASSY. DEVICES FORMS & HRH STEAM STRAINERS | 2140x 1400x 500 | 564 |
| 141 | 76917 | STEAM STRAINER (MS) | 1200x 900x 500 | 350 |
| 142 | 76918 | STEAM STRAINER (HRH) | 1800x 1500x 800 | 750 |

| | | | | |
|---|---|---|---|---|
| 143 | 77001 | GOV.SYSTEM CONTROL RACK ASSLY. & TRANSPORT DEVICE | 2800x 1360x 2750 | 1847 |
| 144 | 77002 | SUPPLY RACK HP VALVE-2 (RIGHT) | 2300x 1400x 2550 | 1797 |
| 145 | 77003 | SUPPLY RACK HP VALVE-1 (LEFT) | 2300x 1400x 2550 | 1797 |
| 146 | 77004 | SUPPLY RACK FOR IP VALVES 1 & 2 | 2300x 1400x 2550 | 2080 |
| 147 | 77006 | GOVERNING SYSTEM PROTECTION RACK & TRANSPORT DEVICE | 2450x 1300x 2250 | 1622 |
| 148 | 77201 | TURBINE INSTRUMENTS RACKS-FRAME | 2750x 1500x 800 | 2600 |
| 149 | 77202 | TEMP. AND PRESSURE CONNECTIONS | 1700x 750x 750 | 750 |
| 150 | 77203 | IMPLUSE PIPES (CARBON STEEL) | 6900x 650x 500 | 1225 |
| 151 | 77204 | GAUGES AND SENSORS | 2800x 1250x 1250 | 1035 |
| 152 | 77205 | TRANSMITTERS & J.B.OF BEARINGS | 500x 300x 200 | 118 |
| 153 | 77206 | IMPULSE PIPES (ALLOY STEEL AND SS ) | 6900x 500x 500 | 1136 |
| | | | **SUB TOTAL(A.1)** | **946599** |
| **A. 2** | **STEAM TURBINE U#9** | | | |
| 1 | 75001 | EMBEDMENT FOR ANCHOR POINTS | 4400X1600X1000 | 4940 |
| 2 | 75003 | COMPONENTS FOR BASE PLATE ASSEMBLY | 4900X1200X600 | 6350 |
| 3 | 75004 | COMPONENTS OF BASE PLATE | 2800X1700X600 | 3700 |
| 4 | 75101 | BASE PLATE FOR LP CASING | 1850X1400X500 | 7200 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 5 | 75102 | LP OUTER CASING PARTS | 9000X2187X3460 | 15520 |
| 6 | 75103 | LP OUTER CASING PARTS | 9000X2190X3460 | 15520 |
| 7 | 75104 | LP OUTER CASING PARTS | 5670X3290X1140 | 4600 |
| 8 | 75105 | LP OUTER CASING PARTS | 5670X3290X1140 | 4600 |

| | | | | |
|---|---|---|---|---|
| 9 | 75106 | LP OUTER CASING PARTS | 3400X1200X1200 | 1255 |
| 10 | 75107 | LP LONGITUDINAL GIRDER (LEFT) | 8200X1680X1950 | 21412 |
| 11 | 75108 | LP LONGITUDINAL GIRDER (RIGHT) | 8200X1680X1950 | 21412 |
| 12 | 75109 | LP FRONT WALL (TS) | 8760X3850X1150 | 18300 |
| 13 | 75110 | LP FRONT WALL (GS) | 8760X3850X1150 | 18300 |
| 14 | 75111 | LP SHAFT SEALING (FRONT) | 1800X1700X740 | 2300 |
| 15 | 75112 | LP SHAFT SEALING (REAR) | 1800X1700X740 | 2300 |
| 16 | 75113 | LP SHAFT SEAL COMPENSATOR (TS) | 1500X1500X650 | 350 |
| 17 | 75114 | LP SHAFT SEAL COMPENSATOR (GS) | 1500X1500X650 | 350 |
| 18 | 75115 | AUXILARIES OF LP TURBINE | 2300X1200X900 | 2340 |
| 19 | 75201 | HP/IP BRG.PED.ASSLY. | 4080X2005X2126 | 13275 |
| 20 | 75202 | HP/IP BRG.PED.PARTS | 1000X600X600 | 400 |
| 21 | 75318 | OIL FLUSHING AND PRESSURE TEST DEVICE | 750X550X400 | 250 |
| 22 | 75401 | IP-LP BEARING PEDESTAL ASSLY | 3700X1860X2100 | 14500 |
| 23 | 75501 | LP/GEN. PEDESTAL ASSEMBLY | 3200X2280X2070 | 9370 |
| 24 | 75502 | BEARING PEDESTAL (PARTS) | 1600x 800x 600 | 1150 |
| 25 | 75601/1 | FRONT BEARING PEDESTAL | 3140x 3140x 2050 | 12386 |
| 26 | 75601/2 | HYDRAULIC TURNING GEAR | 2100x 1000x 600 | 750 |
| 27 | 75601/3 | MAIN OIL PUMP ASSEMBLY. | 1400x 1200x 1000 | 550 |
| 28 | 75704/1 | LP CASING ASSEMBLY | 2250x 1350x 750 | 3000 |
| 29 | 75704/2 | PARTS OF LP OUTER CASING ASSLY | 1000x 800x 800 | 300 |
| 30 | 75705 | LP EXTRACTION A1 | 4400x 1620x 870 | 1820 |
| 31 | 75706 | LP EXTRACTION A1 | 4400x 1620x 850 | 1814 |
| 32 | 75707/1 | LP EXTRACTION A1 | 3420x 1620x | 1286 |

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|---|---|---|---|---|
| | | | 870 | |
| 33 | 75707/2 | LP EXTRACTION A1 | 950x 750x 750 | 330 |
| 34 | 75708 | LP EXTRACTION A2 | 2920x 2120x 1370 | 1730 |
| 35 | 75709 | LP EXTRACTION A2 | 3420x 1220x 1120 | 1350 |
| 36 | 75710 | LP EXTRACTION A3 | 1920x 1120x 920 | 655 |
| 37 | 75711 | LP EXTRACTION A3 | 3120x 920x 870 | 1050 |
| 38 | 75716 | LP EXTRACTION PIPE SHEATHING | 2900x 2050x 1180 | 2650 |
| 39 | 75717 | INNER GUIDE PLATE OF DIFFUSER(TS) | 2300x 2300x 500 | 1850 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 40 | 75718 | DIFFUSER (TS) | 5050x 1800x 2550 | 6800 |
| 41 | 75719 | DIFFUSER (GS) | 5050x 1800x 2550 | 6800 |
| 42 | 75720 | LP INNER OUTER CASING (U/H) | 8640x 3650x 2550 | 36100 |
| 43 | 75721 | LP INNER CASING (L/H) | 9100x 3890x 3180 | 54540 |
| 44 | 75722 | LP INNER INNER CASING (U/H) | 4600x 1900x 2350 | 13300 |
| 45 | 75723 | LP CASING ASSEMBLY | 5000x 2500x 800 | 5910 |
| 46 | 75724 | LP INNER CASING ASSLY/FASTENER | 2000x 1000x 600 | 2050 |
| 47 | 75725 | INNER GUIDE PLATE OF DIFFUSER(GS) | 2300x 2300x 500 | 1700 |
| 48 | 75728 | STEAM INLET PIPE (LPT) | 3200x 1500x 1500 | 1700 |
| 49 | 75801 | LP ROTOR | 8800x 4000x 4162 | 95240 |
| 50 | 75901 | IP ROTOR | 4800x 2120x 1995 | 23132 |
| 51 | 75902 | IP OUTER CASING (U/H) | 4050x 3800x 2650 | 25850 |
| 52 | 75903 | IP OUTER CASING (L/H) | 3400x 5250x | 25870 |

| | | | | |
|---|---|---|---|---|
| | | | 2600 | |
| 53 | 75904 | IP INNER CASING (U/H) | 2900x 3200x 1850 | 15200 |
| 54 | 75905 | IP INNER CASING (L/H) | 2900x 3200x 1850 | 15200 |
| 55 | 75906 | IP INLET ASSEMBLY | 4500x 3725x 1300 | 13550 |
| 56 | 75907 | IP SHAFT SEALING | 1400x 1200x 900 | 950 |
| 57 | 75908 | IP TURBINE (PARTS) | 2000x 1900x 1000 | 3125 |
| 58 | 75909 | I.P. TURBINE PARTS | 1000x 1000x 750 | 475 |
| 59 | 76001/1 | HP TURBINE | 5675x 3400x 2900 | 88650 |
| 60 | 76001/2 | EMERGENCY GOVERNOR | 495x 395x 695 | 57 |
| 61 | 76002 | HP INLET ASSLY. & HP EXHAUST ASSLY.(PARTS) | 1200x 1200x 500 | 80 |
| 62 | 76003 | HP EXHAUST ASSEMBLY | 1650x 1400x 900 | 2000 |
| 63 | 76004 | HPT RELATED PARTS | 1300x 1300x 700 | 200 |
| 64 | 76104 | ESV & CV CASING WITH VALVES | 3360x 3360x 2590 | 23146 |
| 65 | 76105/1 | ESV SERVOMOTOR WITH LIMIT SWITCHES | 2300x 1200x 1200 | 4250 |
| 66 | 76105/2 | ESV SERVOMOTOR WITH LIMIT SWITCHES | 2300x 1200x 1200 | 4250 |
| 67 | 76107 | HP CONTROL VALVE SERVOMOTOR | 2800x 1200x 2100 | 3280 |
| 68 | 76108 | ESV & CV CASING WITH VALVES | 3360x 3360x 2590 | 23146 |
| 69 | 76112 | HP CONTROL VALVE SERVOMOTOR | 2800x 1200x 2100 | 3288 |
| 70 | 76201 | SUSPENSION OF VALVE (IV) | 4250x 2640x 750 | 8078 |
| 71 | 76202 | IV & CV CASING WITH VALVES | 5040x 4690x 2770 | 33276 |
| 72 | 76203/1 | IV SERVOMOTOR WITH LIMIT SW. MOUNTINGS | 2700x 1450x 1400 | 3965 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 73 | 76203/2 | IV SERVOMOTOR WITH LIMIT SW. MOUNTINGS | 2700x 1450x 1400 | 3965 |
| 74 | 76204 | IP CONTROL VALVE SERVOMOTOR | 3240x 1240x 1950 | 3019 |
| 75 | 76205/1 | FRAME FOR SUSPENSION (IV) | 3400x 3150x 750 | 2026 |
| 76 | 76205/2 | FRAME FOR SUSPENSION (IV) | 3400x 3150x 750 | 2026 |
| 77 | 76205/3 | LOOSE ITEMS FOR FRAME FOR SUSPENSION | 300x 200x 200 | 20 |
| 78 | 76206 | IV & CV CASING WITH VALVES | 5040x 4690x 2770 | 33276 |
| 79 | 76210 | IP CONTROL VALVE SERVOMOTOR | 3240x 1240x 1950 | 3019 |
| 80 | 76301/1 | SUSPENSION OF LPBP VALVES | 3600x 1700x 800 | 1836 |
| 81 | 76301/2 | SUSPENSION OF LPBP VALVES | 3600x 1700x 800 | 1836 |
| 82 | 76402 | INJECTOR FOR SUC. PIPE NB 350 | 3300x 800x 800 | 588 |
| 83 | 76403 | INJECTOR FOR SUC. PIPE NB 300 | 3300x 1750x 1200 | 999 |
| 84 | 76404 | MAIN OIL TANK & NOZZLE ARRGT. ASSY | 6180x 3260x 2650 | 10697 |
| 85 | 76405 | MAIN OIL TANK & NOZZLE ARRGT. ASSY | 4200x 1200x 900 | 402 |
| 86 | 76406 | OIL STRAINERS | 1500x 1000x 1200 | 228 |
| 87 | 76407 | OIL STRAINERS | 1500x 1000x 1200 | 228 |
| 88 | 76409 | OIL STRAINERS | 2050x 1200x 1410 | 470 |
| 89 | 76412 | DIRTY/LEAKAGE OIL TANK | 1000x 1000x 3000 | 515 |
| 90 | 76413 | WASTE OIL TANK | 1000x 1000x 3000 | 515 |
| 91 | 76414 | VAR.ORIFICES THR.VALV.&FLUSH.PARTS | 1700x 700x 760 | 255 |
| 92 | 76415 | VARIABLE ORIFICE 125 | 400x 300x 200 | 50 |
| 93 | 76601 | PARTS OF A CROSS AROUND PIPE | 3500x 1750x | 2150 |

| | | | | |
|---|---|---|---|---|
| | | | 1800 | |
| 94 | 76602 | PARTS OF A CROSS AROUND PIPE | 3500x 1750x 1800 | 2150 |
| 95 | 76603 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3190 |
| 96 | 76604 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3190 |
| 97 | 76605 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3190 |
| 98 | 76606 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3190 |
| 99 | 76607 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3270 |
| 100 | 76608 | COMPENSATOR ASSEMBLY(CAP) | 1900x 1950x 1750 | 3270 |
| 101 | 76609 | REDUCER ASSEMBLY(CAP) | 1250x 1250x 500 | 242 |
| 102 | 76610 | REDUCER ASSEMBLY(CAP) | 1250x 1250x 500 | 242 |
| 103 | 76611 | CROSS AROUND PIPE (PARTS) | 2000x 1100x 600 | 2030 |
| 104 | 76612 | CROSS AROUND PIPE (PARTS) | 2000x 1100x 600 | 2030 |
| 105 | 76613 | MITRE BEND ASSEMBLY(CAP) | 3640x 1540x 2040 | 2240 |
| 106 | 76614 | MITRE BEND ASSEMBLY(CAP) | 3640x 1540x 2040 | 2240 |
| 107 | 76701 | CHANGE OVER VALVE | 800x 500x 200 | 97 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 108 | 76702/1 | CRH NRV WITH SERVOMOTOR | 3200x 2300x 2600 | 10528 |
| 109 | 76703 | GLAND STEAM PRESSURE INDICATOR | 300X300X300 | 15 |
| 110 | 76801 | RATING,COLLABORATION&COMPANY 'S MONOGRAM PLATE | 850x 550x 200 | 55 |
| 111 | 76901 | OIL STRIPPER | 600x 600x 850 | 133 |
| 112 | 76902 | OIL STRIPPER | 600x 600x 850 | 133 |
| 113 | 76903 | HOUSING FOR M.S STRAINER | 1725x 1250x 730 | 2370 |
| 114 | 76904 | HOUSING FOR M.S STRAINER | 1725x 1250x | 2370 |

| | | | | |
|---|---|---|---|---|
| | | | 730 | |
| 115 | 76908 | HOUSING FOR HRH STEAM STRAINER | 2275x 1650x 1100 | 4480 |
| 116 | 76909 | HOUSING FOR HRH STEAM STRAINER | 2275x 1650x 1100 | 4480 |
| 117 | 76912/1 | BLANKING ARRANGEMENT FOR MS STRAINER HOUSINGS | 1000x 900x 800 | 948 |
| 118 | 76912/2 | BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSINGS | 1600x 1200x 1000 | 2535 |
| 119 | 76913 | GASKETS FOR MS & HRH STRAINER HOUSINGS | 1000x 1000x 600 | 37 |
| 120 | 76914 | COMPENSATOR | 600x 600x 900 | 50 |
| 121 | 76917 | STEAM STRAINER (MS) | 1200x 900x 500 | 350 |
| 122 | 76918 | STEAM STRAINER (HRH) | 1800x 1500x 800 | 750 |
| 123 | 77001 | GOV.SYSTEM CONTROL RACK ASSLY. & TRANSPORT DEVICE | 2800x 1360x 2750 | 1847 |
| 124 | 77002 | SUPPLY RACK HP VALVE-2 (RIGHT) | 2300x 1400x 2550 | 1797 |
| 125 | 77003 | SUPPLY RACK HP VALVE-1 (LEFT) | 2300x 1400x 2550 | 1797 |
| 126 | 77004 | SUPPLY RACK FOR IP VALVES 1 & 2 | 2300x 1400x 2550 | 2080 |
| 127 | 77006 | GOVERNING SYSTEM PROTECTION RACK & TRANSPORT DEVICE | 2450x 1300x 2250 | 1622 |
| 128 | 77201 | TURBINE INSTRUMENTS RACKS(FRAMES) | 2750x 1500x 800 | 2600 |
| 129 | 77202 | TEMP. AND PRESSURE CONNECTIONS | 1700x 750x 750 | 750 |
| 130 | 77203 | IMPLUSE PIPES (CARBON STEEL) | 6900x 650x 500 | 1225 |
| 131 | 77204 | GAUGES AND SENSORS | 2800x 1250x 1250 | 1035 |
| 132 | 77205 | TRANSMITTERS & J.B.OF BEARINGS | 500x 300x 200 | 118 |
| 133 | 77206 | IMPULSE PIPES (ALLOY STEEL AND SS ) | 6900x 500x 500 | 1136 |
| | | | **SUB TOTAL(A.2)** | **910305** |
| | | | **SUB TOTAL A(A.1+A.2)** | **1856904** |

## HARIDWAR SUPPLY

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| **B** | **GENERATOR** | | | |
| **B.1** | **GENERATOR U#8** | | | |
| 1 | 501 | STATOR | 8830x 4100x 4120 | 258000 |
| 2 | 502 | ROTOR | 14000x 1850x1750 | 73159 |
| 3 | 503 | END SHIELD LOWER HALF (TE) | 6000x 2296x 2640 | 31473 |
| 4 | 504 | END SHIELD UPPER HALF (TE) | 6000x 2296x 2640 | 28747 |
| 5 | 505 | END SHIELD LOWER HALF (EE) | 4700x 1500x 2420 | 12847 |
| 6 | 506 | GENERATOR BEARING (2 NOS.). | 1250x 1150x 1250 | 3006 |
| 7 | 508 | BAFFLE RING,BAFFLE RING CARIER & AIR GAP SEAL ASSLY. | 1682x 1688x 1095 | 347 |
| 8 | 509 | TERMINAL BUSHING (6 NOS.) | 2200x 1830x 610 | 1427 |
| 9 | 510 | TERMINAL BUSHING BOX WITH COVER | 3600x 2500x 1940 | 11580 |
| 10 | 511 | SHAFT SEALS (EE & TE) AND OIL CATCHER(INNER & OUTER) | 2140x 1140x 840 | 1560 |
| 11 | 512 | COMPRESSOR BAFFLE RING ASSLY. | 1920x 1920x 1340 | 1745 |
| 12 | 515 | GENERATOR END SHIELD BASE EE & TE (2 NOS EACH) | 1940x 1550x 980 | 3464 |
| 13 | 516 | PRIMARY WATER TANK | 8100x 2000x 1200 | 2000 |
| 14 | 517 | P.W.TANK PIPE LINES | 6800x 2100x 500 | 818 |
| 15 | 518 | FOUNDATION PLATES | 2895x 760x 840 | 3030 |
| 16 | 519 | ANCHOR BOLTS | 2740x 655x 600 | 1485 |
| 17 | 520 | CHANNELS,ANGLES,PIPES & STUDS | 5800x 1120x 520 | 1558 |
| 18 | 521 | ROTOR & GENERAL ASSY.DEVICES | 2460x 1170x 1240 | 2952 |

| | | | | |
|---|---|---|---|---|
| 19 | 524 | WIRE ROPE FOR ROTOR (2 NO.) | 1800x 1800x 400 | 289 |
| 20 | 530 | GENERATOR ACCESSORIES | 2140x 2140x 1240 | 1608 |
| 21 | 530/1 | GENERATOR ACCESSORIES | 1350x 850x 300 | 472 |
| 22 | 531 | GENERATOR ACCESSORIES | 2240x 940x 1220 | 1525 |
| 23 | 532/1 | DRY AIR BLOWER | 1100x 1000x 700 | 80 |
| 24 | 532/2 | GENERATOR MAINTENANCE DEVICES | 2550X1180X1140 | 1405 |
| 25 | 533 | ERECTION DEVICES/FOUNDTN ITEMS | 1640x 1140x 1240 | 2781 |
| 26 | 534 | BRUSHLESS EXCITER SET WITH COVERS | 5750x 2350x 3400 | 32928 |
| 27 | 535 | BRUSHLESS EXCITER FRONT COVER WITH PACKING | 4400x 3400x 3100 | 4478 |
| 28 | 536 | BRUSHLESS EXCITER REAR COVER WITH PACKING | 4400x 3400x 3100 | 4978 |

## HARIDWAR SUPPLY

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 29 | 537 | EXCITER BED PLATE ACCESSORIES & RACK ASSLY. | 3900x 1250x 1150 | 1741 |
| 30 | 539 | SEAL OIL STORAGE TANK | 3700x 1400x 1260 | 1532 |
| 31 | 540 | PW PUMP AND FILTER UNIT | 3450x 2750x 2815 | 5294 |
| 32 | 541 | MEASURING INSTRUMENT RACK | 1550x 910x 1715 | 831 |
| 33 | 542 | SEAL OIL MOTOR PUMP UNIT | 3320x 1740x 1340 | 3035 |
| 34 | 543 | SEAL OIL UNIT | 3100x 3000x 3400 | 7890 |
| 35 | 544 | SEAL OIL VALVE RACK | 2700x 1140x 2440 | 1935 |
| 36 | 545 | GAS UNIT | 1980x 1640x 2420 | 1205 |
| 37 | 547 | CO2 VAPOURISER | 1520x 840x | 250 |

| | | | | |
|---|---|---|---|---|
| | | | 840 | |
| 38 | 549 | EXCITER BED PLATE ACCESSORIES(NON TEST BED) | 5800x 1140x 1240 | 2925 |
| 39 | 550 | EXCITER ACCESSORIES | 2200x 1100x 1100 | 1111 |
| 40 | 551 | END SHIELD UPPER HALF (EE) | 4700x 1500x 2420 | 9353 |
| 41 | 556 | P.W.TANK PIPE LINES | 3000x 600x 500 | 454 |
| 42 | 557 | SPECIAL TOOLS AND TACKLES | 800X700X300 | 87 |
| 43 | 558 | EMBEDMENTS | 800x 800x 300 | 928 |
| 44 | 559 | SEALING FOR TRANSPORT | 3950x 2420x 150 | 869 |
| 45 | 561 | SEAL RING | 700x 700x 200 | 80 |
| 46 | 562 | CONNECTION PIECE ASSEMBLY | 1600x 1050x 400 | 862 |
| 47 | 563 | GENERATOR ACCESSORIES | 1700x 1200x 250 | 140 |
| 48 | 564 | COOLER AIR VENT ASSEMBLY | 8300x 150x 100 | 51 |
| 49 | 565 | H2 DISTRIBUTOR | 3480x 1540x 440 | 333 |
| 50 | 566 | CO2 DISTRIBUTOR | 4860x 1240x 440 | 353 |
| 51 | 567 | N2 DISTRIBUTOR | 1400x 1240x 440 | 143 |
| 52 | 568 | TG SYSTEM INTEGRAL PIPING(HANGER & SUPPORTS) | 6200x 1500x 1200 | 3410 |
| 53 | 569 | TG SYSTEM INTEGRAL PIPING(FITTINGS) | 3500x 1700x 1000 | 2576 |
| 54 | 570 | TG SYSTEM INTEGRAL PIPING(STRAIGHT PIPES) | 7000x 1000x 1300 | 5560 |
| 55 | 571 | TG SYSTEM INTEGRAL PIPING(STRAIGHT PIPES) | 6600x 1500x 2000 | 9380 |
| 56 | 572 | TG SYSTEM INTEGRAL PIPING(FLANGES) | 3500x 1700x 300 | 2576 |
| 57 | 573 | TG SYSTEM INTEGRAL PIPING(HANGER & SUPPORTS) | 2500x 1200x 1000 | 1555 |

**HARIDWAR SUPPLY**

| SL | PKG.N | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| | **O** | | | **KG.** |
| 58 | 574 | TG SYSTEM INTEGRAL PIPING(VALVES) | 2750x 1400x 1400 | 3799 |
| 59 | 575 | TG SYSTEM INTEGRAL PIPING(INSTRUMENTS) | 1000x 940x 900 | 177 |
| 60 | 576 | TG SYSTEM INTEGRAL PIPING(FASTENERS & SEALINGS) | 1000x 1000x 500 | 630 |
| 61 | 577 | EXCTR. BED PLATE ACCESSORIES(NON TEST BED ITEMS) | 1000x 800x 800 | 775 |
| 62 | 578 | RESINS | 1200x 600x 600 | 100 |
| 63 | 580 | EMBEDMENTS FOR PORTAL CRANE | 1400x 1000x 400 | 1651 |
| 64 | 581 | ALKALYSER UNIT | 1150x 780x 1900 | 267 |
| 65 | 582 | PLATFORM FOR P W TANK | 5000x 1000x 500 | 852 |
| 66 | 583 | TG SYSTEM INTEGRAL PIPING(STRAIGHT PIPES) | 7000x 400x 300 | 230 |
| 67 | 584 | RR WHEEL AIR GUIDE COVER | 2800x 1500x 2000 | 1572 |
| 68 | 585 | CONSUMABLES | 800x 400x 200 | 55 |
| | | | **SUB TOTAL(B.1)** | **566309** |
| **B.2** | **GENERATOR U#9** | | | |
| 1 | 501 | STATOR | 8830x 4100x 4120 | 258000 |
| 2 | 502 | ROTOR | 14000x 1850x1750 | 72964 |
| 3 | 503 | END SHIELD LOWER HALF (TE) | 6000x 2296x 2640 | 31473 |
| 4 | 504 | END SHIELD UPPER HALF (TE) | 6000x 2296x 2640 | 28747 |
| 5 | 505 | END SHIELD LOWER HALF (EE) | 4700x 1500x 2420 | 12847 |
| 6 | 506 | GENERATOR BEARING (2 NOS.). | 1250x 1150x 1250 | 3006 |
| 7 | 508 | BAFFLE RING,BAFFLE RING CARIER & AIR GAP SEAL ASSLY. | 1682x 1688x 1095 | 347 |
| 8 | 509 | TERMINAL BUSHING (6 NOS.) | 2200x 1830x 610 | 1427 |
| 9 | 510 | TERMINAL BUSHING BOX WITH COVER | 3600x 2500x | 11580 |

| | | | | |
|---|---|---|---|---|
| | | | 1940 | |
| 10 | 511 | SHAFT SEALS (EE & TE) AND OIL CATCHER(INNER & OUTER) | 2140x 1140x 840 | 1560 |
| 11 | 512 | COMPRESSOR BAFFLE RING ASSLY. | 1920x 1920x 1340 | 1745 |
| 12 | 515 | GENERATOR END SHIELD BASE EE & TE (2 NOS EACH) | 1940x 1550x 980 | 3464 |
| 13 | 516 | PRIMARY WATER TANK | 8100x 2000x 1200 | 2000 |
| 14 | 517 | P.W.TANK PIPE LINES | 6800x 2100x 500 | 818 |
| 15 | 518 | FOUNDATION PLATES | 2895x 760x 840 | 3030 |
| 16 | 519 | ANCHOR BOLTS | 2740x 655x 600 | 1485 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 17 | 520 | CHANNELS,ANGLES,PIPES & STUDS | 5800x 1120x 520 | 1558 |
| 18 | 530 | GENERATOR ACCESSORIES | 2140x 2140x 1240 | 1608 |
| 19 | 530/1 | GENERATOR ACCESSORIES | 1350x 850x 300 | 472 |
| 20 | 531 | GENERATOR ACCESSORIES | 2240x 940x 1220 | 1525 |
| 21 | 532/1 | DRY AIR BLOWER | 1100x 1000x 700 | 80 |
| 22 | 533 | ERECTION DEVICES/FOUNDTN ITEMS | 1640x 1140x 1240 | 2781 |
| 23 | 534 | BRUSHLESS EXCITER SET WITH COVERS | 5750x 2350x 3400 | 32928 |
| 24 | 535 | BRUSHLESS EXCITER FRONT COVER WITH PACKING | 4400x 3400x 3100 | 4478 |
| 25 | 536 | BRUSHLESS EXCITER REAR COVER WITH PACKING | 4400x 3400x 3100 | 4978 |
| 26 | 537 | EXCITER BED PLATE ACCESSORIES & RACK ASSLY. | 3900x 1250x 1150 | 1741 |
| 27 | 539 | SEAL OIL STORAGE TANK | 3700x 1400x 1260 | 1532 |
| 28 | 540 | PW PUMP AND FILTER UNIT | 3450x 2750x | 5294 |

| | | | | |
|---|---|---|---|---|
| | | | 2815 | |
| 29 | 541 | MEASURING INSTRUMENT RACK | 1550x 910x 1715 | 831 |
| 30 | 542 | SEAL OIL MOTOR PUMP UNIT | 3320x 1740x 1340 | 3035 |
| 31 | 543 | SEAL OIL UNIT | 3100x 3000x 3400 | 7890 |
| 32 | 544 | SEAL OIL VALVE RACK | 2700x 1140x 2440 | 1935 |
| 33 | 545 | GAS UNIT | 1980x 1640x 2420 | 1205 |
| 34 | 547 | CO2 VAPOURISER | 1520x 840x 840 | 250 |
| 35 | 549 | EXCITER BED PLATE ACCESSORIES(NON TEST BED) | 5800x 1140x 1240 | 2925 |
| 36 | 550 | EXCITER ACCESSORIES | 2200x 1100x 1100 | 1111 |
| 37 | 551 | END SHIELD UPPER HALF (EE) | 4700x 1500x 2420 | 9353 |
| 38 | 556 | P.W.TANK PIPE LINES | 3000x 600x 500 | 454 |
| 39 | 558 | EMBEDMENTS | 800x 800x 300 | 928 |
| 40 | 559 | SEALING FOR TRANSPORT | 3950x 2420x 150 | 869 |
| 41 | 561 | SEAL RING | 700x 700x 200 | 80 |
| 42 | 562 | CONNECTION PIECE ASSEMBLY | 1600x 1050x 400 | 862 |
| 43 | 563 | GENERATOR ACCESSORIES | 1700x 1200x 250 | 140 |
| 44 | 564 | COOLER AIR VENT ASSEMBLY | 8300x 150x 100 | 51 |
| 45 | 565 | H2 DISTRIBUTOR | 3480x 1540x 440 | 333 |
| 46 | 566 | CO2 DISTRIBUTOR | 4860x 1240x 440 | 353 |
| 47 | 567 | N2 DISTRIBUTOR | 1400x 1240x 440 | 143 |

## HARIDWAR SUPPLY

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 48 | 568 | TG SYSTEM INTEGRAL PIPING(HANGER & SUPPORTS) | 6200x 1500x 1200 | 3410 |
| 49 | 569 | TG SYSTEM INTEGRAL PIPING(FITTINGS) | 3500x 1700x 1000 | 2576 |
| 50 | 570 | TG SYSTEM INTEGRAL PIPING(STRAIGHT PIPES) | 7000x 1000x 1300 | 5560 |
| 51 | 571 | TG SYSTEM INTEGRAL PIPING(STRAIGHT PIPES) | 6600x 1500x 2000 | 9380 |
| 52 | 572 | TG SYSTEM INTEGRAL PIPING(FLANGES) | 3500x 1700x 300 | 2576 |
| 53 | 573 | TG SYSTEM INTEGRAL PIPING(HANGER & SUPPORTS) | 2500x 1200x 1000 | 1555 |
| 54 | 574 | TG SYSTEM INTEGRAL PIPING(VALVES) | 2750x 1400x 1400 | 3799 |
| 55 | 575 | TG SYSTEM INTEGRAL PIPING(INSTRUMENTS) | 1000x 940x 900 | 177 |
| 56 | 576 | TG SYSTEM INTEGRAL PIPING(FASTENERS & SEALINGS) | 1000x 1000x 500 | 630 |
| 57 | 577 | EXCTR. BED PLATE ACCESSORIES(NON TEST BED ITEMS) | 1000x 800x 800 | 775 |
| 58 | 578 | RESINS | 1200x 600x 600 | 100 |
| 59 | 580 | EMBEDMENTS FOR PORTAL CRANE | 1400x 1000x 400 | 1651 |
| 60 | 581 | ALKALYSER UNIT | 1150x 780x 1900 | 267 |
| 61 | 582 | PLATFORM FOR P W TANK | 5000x 1000x 500 | 852 |
| 62 | 583 | TG SYSTEM INTEGRAL PIPING(STRAIGHT PIPES) | 7000x 400x 300 | 230 |
| 63 | 584 | RR WHEEL AIR GUIDE COVER | 2800x 1500x 2000 | 1572 |
| 64 | 585 | CONSUMABLES | 800x 400x 200 | 55 |
| | | | **SUB TOTAL(B.2)** | **561381** |
| | | | **SUB TOTAL B(B.1+B.2)** | **1127690** |
| **C** | **CONDENSER** | | | |
| | | | | **For each U# 8 & 9** |
| 1 | 78001 | HOT WELL(FRONT HALF) | 7680x 3280x 1800 | 7855 |
| 2 | 78002 | HOTWELL (REAR HALF) | 5680x 3280x | 6300 |

| | | | | |
|---|---|---|---|---|
| | | | 1870 | |
| 3 | 78004 | FRONT / REAR BOTTOM PLATE | 8760x 2050x 720 | 4736 |
| 4 | 78005 | FRONT/REAR BOTTOM PLATE | 8760x 2050x 720 | 4736 |
| 5 | 78006 | MIDDLE BOTTOM PLATE-I | 8760x 3000x 720 | 5052 |
| 6 | 78007 | MIDDLE BOTTOM PLATE-I | 8760x 3000x 720 | 5052 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 7 | 78008 | MIDDLE BOTTOM PLATE-I | 8760x 3000x 720 | 5052 |
| 8 | 78009 | MIDDLE BOTTOM PLATE-II | 8760x 2340x 720 | 5024 |
| 9 | 78010 | BOTTOM PLATE LOOSE ITEMS | 2400x 850x 100 | 750 |
| 10 | 78012 | CONDENSER SUPPORT | 2280x 2000x 740 | 5265 |
| 11 | 78013 | CONDENSER SUPPORT | 3060x 2080x 960 | 5265 |
| 12 | 78014 | CONDENSER SUPPORT | 3000x 2110x 1000 | 6400 |
| 13 | 78018 | CONDENSER SUPPORT | 1100x 800x 650 | 4552 |
| 14 | 78019 | CONDENSER SUPPORT | 1920x 1000x 660 | 6100 |
| 15 | 78020 | FRONT WATER CHAMBER (GS) | 7044x 4469x 540 | 10000 |
| 16 | 78022 | FRONT WATER BOX (GS) | 7645x 4460x 2640 | 28700 |
| 17 | 78023 | FRONT WATER CHAMBER (TS) | 7044x 4460x 540 | 10000 |
| 18 | 78025 | FRONT WATER BOX (TS) | 7645x 4460x 2640 | 28700 |
| 19 | 78026 | REAR WATER CHAMBER (GS) | 7044x 4469x 540 | 10000 |
| 20 | 78028 | REAR WATER BOX (GS) | 6655x 4460x 2495 | 21560 |
| 21 | 78029 | REAR WATER CHAMBER (TS) | 7044x 4469x 540 | 10000 |

| | | | | |
|---|---|---|---|---|
| 22 | 78031 | REAR WATER BOX (TS) | 6655x 4460x 2495 | 21560 |
| 23 | 78032 | SIDE WALL (TUR.SIDE) | 7070x 2400x 120 | 14488 |
| 24 | 78038 | SIDE WALL TUR.SIDE(LOOSE ITEM) | 7050x 300x 230 | 880 |
| 25 | 78040 | SIDE WALL (GEN.SIDE) | 7070x 2400x 120 | 14488 |
| 26 | 78046 | SIDE WALL GEN.SIDE(LOOSE IT | 7050x 300x 230 | 880 |
| 27 | 78048 | SHELL INTERNAL STIFFENING RODS | 3616x 825x 500 | 4393 |
| 28 | 78049 | SHELL INTERNAL STIFFENING RODS | 3616x 800x 500 | 4393 |
| 29 | 78050 | SHELL INTERNAL STIFFENING RODS | 3616x 800x 500 | 4393 |
| 30 | 78051 | SHELL INTERNAL STIFFENING RODS | 3616x 800x 500 | 4393 |
| 31 | 78052 | SHELL INTERNAL STIFFENING RODS | 3616x 800x 500 | 4393 |
| 32 | 78053 | SHELL INTERNAL STIFFENING RODS | 3616x 800x 500 | 4393 |
| 33 | 78054 | SHELL INTERNAL STIFFENING RODS | 2550x 750x 500 | 4424 |
| 34 | 78055 | SHELL INTERNAL STIFFENING RODS | 2550x 500x 500 | 2328 |
| 35 | 78056 | SHELL INTERNAL STIFFENING RODS | 3840x 500x 500 | 3591 |
| 36 | 78057 | SHELL INTERNAL DETAILS | 1800x 550x 550 | 1100 |
| 37 | 78058 | AIR EXTRACTION PIPE | 6550x 1030x 750 | 2200 |
| 38 | 78059 | TUBE SUPPORT PLATE | 6490x 4225x 224 | 8620 |
| 39 | 78060 | TUBE SUPPORT PLATE | 6490x 4225x 224 | 8620 |
| 40 | 78061 | TUBE SUPPORT PLATE | 6490x 4225x 224 | 8620 |
| 41 | 78062 | TUBE SUPPORT PLATE | 6490x 4225x 224 | 8620 |
| 42 | 78063 | TUBE SUPPORT PLATE | 6490x 4225x 224 | 8620 |

## HARIDWAR SUPPLY

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 43 | 78064 | TUBE SUPPORT PLATE | 6490x 4225x 224 | 8620 |
| 44 | 78065 | TUBE SUPPORT PLATE | 6490x 4225x 224 | 8620 |
| 45 | 78066 | TUBE SUPPORT PLATE | 6490x 4225x 224 | 8620 |
| 46 | 78069 | SHELL INTERNAL DETILS | 1500x 800x 450 | 6320 |
| 47 | 78070 | SHELL INTERNAL DETAILS | 6300x 900x 600 | 4430 |
| 48 | 78071 | SHELL INTERNAL DETAILS | 1300x 1200x 600 | 3196 |
| 49 | 78075 | LOWER DOME WALL (TUR.SIDE) | 13350x 4030x 550 | 10775 |
| 50 | 78076 | LOWER DOME WALL (TUR.SIDE) | 10200x 1600x 113 | 4306 |
| 51 | 78077 | LOWER DOME WALL (TUR.SIDE) | 4900x 700x 360 | 1090 |
| 52 | 78103 | LOWER DOME WALL (GEN. SIDE) | 13350x 4030x 930 | 11171 |
| 53 | 78104 | LOWER DOME WALL (GEN.SIDE) | 10200x 1600x 1073 | 4002 |
| 54 | 78105 | LOWER DOME WALL(GEN.SIDE)LOOSE | 4900x 1400x 900 | 1170 |
| 55 | 78109 | LOWER DOME WALL (FWB SIDE) | 9052x 4266x 1000 | 7710 |
| 56 | 78110 | LOWER DOME WALL (FWB SIDE) | 7808x 2192x 865 | 3280 |
| 57 | 78111 | LOWER DOME WALL (FWB SIDE) | 1650x 1100x 1100 | 837 |
| 58 | 78115 | LOWER DOME WALL (RWB.SIDE) | 7805x 2182x 510 | 3650 |
| 59 | 78116 | LOWER DOME WALL (RWB SIDE) | 9052x 4158x 1525 | 9845 |
| 60 | 78117 | LOWER DOME WALL (RWB SIDE) | 1800x 1800x 1500 | 942 |
| 61 | 78121 | DOME INTERNAL STIFFENING | 1840x 1350x 1535 | 3988 |
| 62 | 78122 | DOME INTERNAL STIFFENING | 2176x 1500x | 4919 |

| | | | | |
|---|---|---|---|---|
| | | | 1285 | |
| 63 | 78123 | DOME INTERNAL STIFFENING | 2766x 1500x 1120 | 6370 |
| 64 | 78124 | DOME INTERNAL STIFFENING | 5250x 2270x 220 | 981 |
| 65 | 78125 | DOME INTERNAL STIFFENING | 1470x 750x 500 | 2880 |
| 66 | 78126 | DOME INTERNAL STIFFENING | 5250x 2270x 220 | 981 |
| 67 | 78129 | LP HEATER NO-1 SUPPORT ARRANGE | 2250x 1700x 1070 | 3425 |
| 68 | 78130 | LP HEATER SUPPORT ARRANGEMENT | 7125x 1125x 580 | 3665 |
| 69 | 78132 | UPPER DOME WALL (TURBINE SIDE) | 8700x 1600x 296 | 2628 |
| 70 | 78133 | UPPER DOME WALL(GEN SIDE) | 8700x 1600x 296 | 2628 |
| 71 | 78136 | UPPER DOME WALL (FWB SIDE) | 7180x 3000x 300 | 5410 |
| 72 | 78137 | UPPER DOME WALL (FWB SIDE) | 3600x 550x 200 | 692 |
| 73 | 78139 | UPPER DOME WALL (RWB SIDE) | 7180x 3000x 450 | 5754 |
| 74 | 78140 | UPPER DOME WALL (RWB SIDE) | 3600x 550x 200 | 692 |
| 75 | 78142 | W/BOX HINGE ARRANGEMENT | 2450x 1650x 400 | 3710 |
| 76 | 78143 | W/BOX HINGE ARRANGEMENT | 500x 500x 250 | 60 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 77 | 78144 | W/BOX HINGE ARRANGEMENT | 2500x 600x 750 | 1630 |
| 78 | 78149 | W/BOX HINGE ARRANGEMENT | 800x 660x 300 | 300 |
| 79 | 78151 | W/BOX HINGE ARRANGEMENT | 1670x1040x480 | 914 |
| 80 | 78154 | STEAM THROW DEVICE | 2400x 1250x 1100 | 2356 |
| 81 | 78155 | STEAM THROW DEVICE | 2400x 1250x 1100 | 2356 |
| 82 | 78157 | CONDENSER LOOSE ITEMS | 4250x 1050x 1150 | 1212 |

| | | | | |
|---|---|---|---|---|
| 83 | 78158 | CONDENSER LOOSE ITEMS | 800x 600x 500 | 103 |
| 84 | 78159 | LOOSE ITEMS | 1150x 1150x 1000 | 2737 |
| 85 | 78160 | LOOSE ITEMS (TOOLS & TACKLES) | 300x 350x 500 | 45 |
| 86 | 78161 | CONDENSER LOOSE ITEMS | 550x 550x 150 | 146 |
| 87 | 78166 | CONDENSER STAND PIPES NO.1,2 | 3500x 600x 600 | 184 |
| 88 | 78167 | LOOSE ITEMS CONDENSER STAND | 3100x 250x 250 | 383 |
| 89 | 78175 | CONDENSER INSTRUMENTATION | 1500x 1300x 700 | 733 |
| 90 | 78176 | CONDENSER INSTRUMENTATION | 1550x 600x 600 | 242 |
| 91 | 78301 | GLAND STEAM CONDENSER | 1750x 1200x 1700 | 1610 |
| 92 | 78304 | LOOSE ITEMS OF GSC | 700x 300x 200 | 60 |
| 93 | 78305 | LOOSE ITEMS OF GSC (FRAGILE) | 600x 500x 350 | 35 |
| 94 | 78315 | LP HEATER 1 | 13000x 2100x2000 | 21100 |
| 95 | 78316 | STAND PIPES OF LPH-1 | 2800x 350x 350 | 150 |
| 96 | 78317 | LOOSE ITEMS OF LPH NO.1 | 500x 400x 400 | 135 |
| 97 | 78318 | LOOSE ITEMS OF LP HEATER NO.1 | 700x 400x 400 | 75 |
| 98 | 78319 | LOOSE ITEMS OF LPH -1(NFRAGILE | 2100x 500x 400 | 170 |
| 99 | 78320 | TROLLEY FOR LP HEATER NO.1 | 1350x 800x 200 | 664 |
| 100 | 78401 | TURBINE OIL COOLER | 5850x 1700x 2300 | 13830 |
| 101 | 78402 | TURBINE OIL COOLER | 5850x 1700x 2300 | 13830 |
| 102 | 78406 | LOOSE ITEMS OF TOC | 800x 800x 500 | 130 |
| 103 | 78417 | PRIMARY WATER COOLER | 4300x 1350x 1350 | 2220 |
| 104 | 78418 | PRIMARY WATER COOLER | 4300x 1350x 1350 | 2220 |
| 105 | 78420 | LOSE ITEMS OF PWC | 400x 300x 300 | 38 |
| 106 | 78424 | HYDROGEN COOLER | 4600x 1450x 800 | 2665 |
| 107 | 78425 | HYDROGEN COOLER | 4600x 1450x 800 | 2665 |
| 108 | 78426 | HYDROGEN COOLER | 4600x 1450x | 2665 |

| | | | | |
|---|---|---|---|---|
| | | | 800 | |
| 109 | 78427 | HYDROGEN COOLER | 4600x 1450x 800 | 2665 |
| 110 | 78428 | LOOSE ITEMS (HYDROGEN COOLERS) | 1300x 1000x 600 | 2140 |
| 111 | 78431 | EXCITER AIR COOLER | 3780x 920x 830 | 1980 |

**HARIDWAR SUPPLY**

| SL | PKG.NO | DESCRIPTION | PKG.SIZE(MM) | GR.WT IN KG. |
|---|---|---|---|---|
| 112 | 78432 | EXCITER AIR COOLER | 3780x 920x 830 | 1980 |
| 113 | 78436 | CONTROL FLUID COOLER | 3300x 850x 1030 | 1506 |
| 114 | 78437 | CONTROL FLUID COOLER | 3300x 850x 1030 | 1506 |
| 115 | 78438 | LOOSE ITEMS(CFC) | 600x 600x 500 | 103 |
| | | | **SUB TOTAL (each unit)** | **563346** |
| | | | **SUB TOTAL C(for both U# 8 & 9)** | **1126692** |
| | | | | |
| **D** | **ACG** | | | |
| | | | | **For each U# 8&9** |
| 1 | 12001 | STARTER CABINET FOR DC SEAL MOTOR | 1230x 1060x 2550 | 450 |
| 2 | 12002 | GENERATOR INSTRUMENTATION CABINET | 1230x 1060x 2550 | 550 |
| 3 | 12003 | LOOSE ITEMS | 600x 600x 400 | 60 |
| 4 | 12004 | LOOSE ITEMS | 1000x 800x 600 | 60 |
| 5 | 12005 | STARTER CABINET FOR DC JACKING MOTOR | 1230x 1060x 2550 | 550 |
| 6 | 12006 | STARTER CABINET FOR DC EMERGENCY OIL MOTOR | 1230x 1060x 2550 | 550 |
| | | | **SUB TOTAL (each unit)** | **2220** |
| | | | **SUB TOTAL D(for both U# 8 & 9)** | **4440** |
| | | | | |
| | | | **TOTAL(A+B+C+D) for both U#8&9** | **4115726** |

## Bhopal Supply

**for each unit**

| S.N | DESCRIPTION | QTY | SIZE (MM) | Unit Wt (Kg.) | Total Wt (Kg.) |
|---|---|---|---|---|---|
| **A.** | **RE JOINTS** | | | | |
| 1 | REJ OUTLET (PB Type) | 1 | 3750(W)X4450(H) | 23090 | 23090 |
| 2 | REJ INLET (PB Type) | 1 | 3550(W)X4150(H) | 24010 | 24010 |
| | | | | **SUB TOTAL (for each unit)** | **47100** |
| | | | | **SUB TOTAL A(For both U#8&9)** | **94200** |
| **B.** | **FLASH TANKS** | | | | |
| 1 | H.P. Flash Tank | 1 | 3000(D)X5300(L) | 8060 | 8060 |
| 2 | L.P. Flash Tank | 1 | 2500(D)X5200(L) | 6405 | 6405 |
| 3 | Steam Drain Flash Tank | 1 | 2200(D)X3450(L) | 3700 | 3700 |
| 4 | Unit Flash Tank | 1 | 1200(D)X3000(L) | 1630 | 1630 |
| 5 | F.W.H.S.V.D Flash Tank | 1 | 1200(D)X3450(L) | 1711 | 1711 |
| | | | | **SUB TOTAL (for each unit)** | **21506** |
| | | | | **SUB TOTAL B(For both U#8&9)** | **43012** |
| **C.** | **MISC TANKS** | | | | |
| 1 | DMCW Tank, 10 Cu.m. | 2 | 7150 (L) x 2000 (D) x 12 Tk | 6000 | 12000 |
| 2 | Clean Oil Tank, 60 Cu. m | 1 | 5.0 (L) x 4.5 (w) x 3 (H) | 10200 | 10200 |
| 3 | Dirty Oil Tank , 60 Cu. m | 1 | 5.0 (L) x 4.5 (w) x 3 (H) | 10200 | 10200 |
| 4 | Oil Unloading Vessel, 01 | 1 | 2 (L) x 1.0 (w) x 0.5 | 584 | 584 |

| | | | | | |
|---|---|---|---|---|---|
| | Cu. m | | (H) | | |
| | | | | **SUB TOTAL (for each unit)** | **32984** |
| | | | | **SUB TOTAL C(For both U#8&9)** | **65968** |
| **D.** | **BF VALVES** | | | | |
| 1 | DIA. 2200 | 8 | 3800 X 3200 X 800 | 11530 | 92240 |
| 2 | DIA. 700 | 4 | 1600 X 1100 X 400 | 1310 | 5240 |
| 3 | DIA. 500 | 6 | 1300 X 800 X 350 | 645 | 3870 |
| 4 | DIA. 400 | 2 | 1100 X 600 X 300 | 430 | 860 |
| 5 | DIA. 400 | 26 | 1100 X 600 X 300 | 390 | 10140 |
| 6 | DIA. 400 | 6 | 1100 X 600 X 300 | 390 | 2340 |
| | | | | **SUB TOTAL (for each unit)** | **114690** |
| | | | | **SUB TOTAL D(For both U#8&9)** | **229380** |
| **E.** | **MOTORS** | | | | |
| 1 | BFP | 1 | 4300Lx4500Wx2400H | 23500 | 23500 |
| 2 | CEP | 3 | 2050Lx1600Wx2550H | 5400 | 16200 |

## Bhopal Supply

**for each unit**

| S.N | DESCRIPTION | QTY | SIZE (MM) | Unit Wt (Kg.) | Total Wt (Kg.) |
|---|---|---|---|---|---|
| 3 | Boxes for Loose Items | 6 | 2500Lx1000Wx1000H | 1000 | 6000 |
| | | | | **SUB TOTAL (for each unit)** | **45700** |
| | | | | **SUB TOTAL E(For both U#8&9)** | **91400** |
| | | | | **TOTAL (for each unit)** | **261980** |
| | | | | **TOTAL(A+B+C+D+E) for both U# 8&9** | **523960** |

## Hyderabad Supply

**For each unit**

| S.No | Description | Total Qty | Unit WT(in Kg) | Total Weight(in Kg) |
|---|---|---|---|---|
| **A.** | **BOOSTER PUMPS** | | | |
| 1 | BOOSTER PUMPS (MD+TDA+TDB) | 3 | 5710 | 17130 |
| 2 | B.P. SKIDS | 3 | 1000 | 3000 |
| 3 | LOOSE ITEMS | | | 115 |
| | | | **SUB TOTAL (for each Unit)** | **20245** |
| | | | **SUB TOTAL A(for both U#8&9)** | **40490** |
| **B.** | **BOILER FEED PUMPS** | | | |
| 1 | BOILER FEED PUMP(MD+TDA+TDB) | 3 | 11500 | 34500 |
| 2 | GRILLAGE ASSLY. (BP+MOTOR) | 1 | 3710 | 3710 |
| 3 | GRILLAGE ASSY. (BPF+HC) | 1 | 3800 | 3800 |
| 4 | BFP SKIDS | 3 | 1000 | 3000 |
| 5 | HYDRAULIC COUPLING | 1 | 15000 | 15000 |
| 6 | R.C. VALVES | 3 | 900 | 2700 |
| 7 | CONICAL TYPE SUCTION STRAINER | 3 | 1200 | 3600 |
| 8 | BASKET TYPE SUCTION STRAINER | 3 | 2350 | 7050 |
| 9 | PORTABLE OIL CENRIFUSE | 1 | 1000 | 1000 |
| 10 | LOCAL GUAGE BOARD | 3 | 1000 | 3000 |
| 11 | CONNECTING COUPLING (BFP AND | 1 | 80 | 80 |

| | | | | |
|---|---|---|---|---|
| | HC) | | | |
| 12 | CONNECTING COUPLING (MOTOR AND HC) | 1 | 357 | 357 |
| 13 | CONNECTING COUPLING (BP AND MOTOR) | 1 | 31 | 31 |
| 14 | LOCAL INSTRUMENT RACK | 1 | 200 | 200 |
| 15 | LOCAL GUAGE BOARD | 3 | 1050 | 3150 |
| 16 | LOCAL GUAGE BOARD | 3 | 850 | 2550 |
| 17 | HYDRAULIC COUPLING WORKING OIL | 1 | 8820 | 8820 |
| 18 | LOOSE ITEMS | | | 9800 |
| | | | **SUB TOTAL (for each Unit)** | **102348** |
| | | | **SUB TOTAL B(for both U#8&9)** | **204696** |
| **C.** | **CONDENSATE EXTRACTION PUMP** | | | |
| 1 | CONDENSATE EXTRACTION PUMP(A, B, C) | 3 | 6220 | 18660 |
| 2 | CEP CANISTERS ASSLY | 3 | 2910 | 8730 |
| 3 | SUCTION STRAINER SIMPLEX | 3 | 1500 | 4500 |
| 4 | CONNECTING COUPLING FOR CEP | 3 | 50 | 150 |
| 5 | LOCAL INSTRUMENT RACK | 1 | 250 | 250 |
| 6 | LOCAL GUAGE BOARD | 1 | 400 | 400 |

## Hyderabad Supply

**For each unit**

| S.No | Description | Total Qty | Unit WT(in Kg) | Total Weight(in Kg) |
|---|---|---|---|---|
| 7 | LOCAL GUAGE BOARD | 1 | 1000 | 1000 |
| 8 | LOOSE ITEMS | | | 4350 |
| | | | **SUB TOTAL (for each Unit)** | **38040** |
| | | | **SUB TOTAL C(for both U#8&9)** | **76080** |
| **D.** | **DRAIN COOLER** | | | |
| 1 | DRAIN COOLER ASSLY | 1 | 5400 | 5400 |
| 2 | LOOSE ITEMS | | | 143 |
| | | | **SUB TOTAL (for each Unit)** | **5543** |
| | | | **SUB TOTAL D(for both U#8&9)** | **11086** |
| **E.** | **DEAERATOR** | | | |
| 1 | DEAERATOR STORAGE TANK SECTION -I | 1 | 30280 | 30280 |
| 2 | DEAERATOR STORAGE TANK SECTION -II | 1 | 25388 | 25388 |

| | | | | |
|---|---|---|---|---|
| 3 | DEAERATOR STORAGE TANK SECTION -III | 1 | 31897 | 31897 |
| 4 | HEADER ASSLY | 1 | 28532 | 28532 |
| 5 | LOOSE ITEMS | | | 23130 |
| | | | **SUB TOTAL (for each Unit)** | **139227** |
| | | | **SUB TOTAL E(for both U#8&9)** | **278454** |
| **F.** | **LP HEATER** | | | |
| 1 | L.P. HEATER 2 | 1 | 26000 | 26000 |
| 2 | L.P. HEATER 3 | 1 | 18000 | 18000 |
| 3 | LOOSE ITEMS | | | 1784 |
| | | | **SUB TOTAL (for each Unit)** | **45784** |
| | | | **SUB TOTAL F(for both U#8&9)** | **91568** |
| **G.** | **HP HEATER** | | | |
| 1 | H.P.HEATER 5A | 1 | 44500 | 44500 |
| 2 | H.P.HEATERS 6A | 1 | 54000 | 54000 |
| 3 | H.P.HEATERS 5B | 1 | 44500 | 44500 |
| 4 | H.P.HEATERS 6B | 1 | 54000 | 54000 |
| 5 | LOOSE ITEMS | | | 5186 |
| | | | **SUB TOTAL (for each Unit)** | **202186** |
| | | | **SUB TOTAL G(for both U#8&9)** | **404372** |
| **H.** | **DRIVE TURBINE** | | | |
| 1 | TWIN OIL COOLER(BFP AND DT) | 2 | 5700 | 11400 |
| 2 | DC STARTER CUIBICAL | 2 | 2000 | 4000 |

## Hyderabad Supply

**For each unit**

| S.No | Description | Total Qty | Unit WT(in Kg) | Total Weight(in Kg) |
|---|---|---|---|---|
| 3 | ASSEMBLED DRIVE TURBINE | 2 | 14560 | 29120 |
| 4 | GEAR BOX | 2 | 1000 | 2000 |
| 5 | LUBE OIL CONSOLE ASSEMBLY 1 | 2 | 9011 | 18022 |
| 6 | LUBE OIL CONSOLE ASSEMBLY 2 | 2 | 65818 | 131636 |
| 7 | EMERGENCY OIL PUMP | 2 | 1700 | 3400 |
| 8 | THERMAL INSULATION | 2 | 800 | 1600 |
| 9 | JACKING OIL PUMP | 2 | 175 | 350 |
| 10 | TURBINE OIL PURIFICATION UNIT | 2 | 1500 | 3000 |
| 11 | OIL ACCUMULATOR | 2 | 30 | 60 |
| 12 | CHARGING KIT | 2 | 10 | 20 |

| | | | | |
|---|---|---|---|---|
| 13 | CENTRIFUGAL EXAUST FAN | 4 | 150 | 600 |
| 14 | TRANSFER OIL PUMP | 2 | 350 | 700 |
| 15 | SERO PRIME-46 OIL | 2 | 21000 | 42000 |
| 16 | ACCOUSTICS ENCLOSURE | 2 | 3000 | 6000 |
| 17 | URBINE BLADED ROTOR | 1 | | 0 |
| 18 | LOOSE ITEMS | | | 41126 |
| | | | **SUB TOTAL (for each Unit)** | **295034** |
| | | | **SUB TOTAL H(for both U#8&9)** | **590068** |
| | | | **TOTAL( for each unit)** | **848407** |
| | | | **TOTAL (A+B+C+D+E+F+G+H)(for both U#8&9)** | **1696814** |

## HARIDWAR BOI SUPPLY

**For each Unit**

| SN | ITEM ID | ITEM DESCRIPTION | QTY | UNIT | WT Gross ( KG) |
|---|---|---|---|---|---|
| **(A)** | **Generator & Auxilaries** | | | | |
| 1 | BG001 | Empty H2 Cylinder | 123 | Nos. | 10835.0 |
| 2 | BG002 | Empty CO2 Cylinder | 62 | Nos. | |
| 3 | BG003 | Empty N2 Cylinder | 12 | Nos. | |
| 4 | BG004 | Portable Gas Analyzer | 1 | No. | |
| 5 | BG005 | Moisture Measuring Equipment | 1 | Set | 16.0 |
| 6 | BG007 | Vapour Exhauster | 2 | Nos. | 80.0 |
| 7 | BG009 | Hydrogen Gas Analyzer Cabinet | 2 | Nos. | |
| 8 | BG011 | Refrigeration Gas Dryer | 2 | Nos. | 2000.0 |
| 9 | BG018 | Starting Resistor for DC Seal Oil Motor | 1 | No. | 250.0 |

| | | | | | |
|---|---|---|---|---|---|
| 10 | BG019 | Sound Absorbing Lining for Exciter Cover & Coupling Cover | 1 | Set | 1500.0 |
| 11 | BG021 | Grounding Brush Monitor | 1 | Set | |
| 12 | BG023 | Continuous On-line Partial Discharge Monitoring System | 1 | Set | 39.0 |
| 13 | BG066 | Generator End Winding Vibration Monitoring Equip. | 1 | Set | |
| 14 | BG080 | Stroboscope | 1 | No. | |
| 15 | BG082 | Hydraulic Unit Assembly (Common for both units) | 1 | Set | |
| | | | | **SUB TOTAL (A)** | **14720.0** |
| **(B)** | **Condenser & Heat Exchanger** | | | | |
| 1 | BH001 | Welded Austenitic S.S. Tubes GR.304 (For Condenser) | 1 | Set | 300000.0 |
| 2 | BH010 | Condenser Air Evacuation Package (Vacuum Pump) | 2 | Nos. | 8556.0 |
| 3 | BH012 | Air Exhauster with Motor (GSC Air Exhauster) | 2 | Nos. | 300.0 |
| 4 | BH013 | Front Water Box Handling Arrangement | 1 | Set | 3000.0 |
| | | | | **SUB TOTAL (B)** | **311856.0** |
| **(C)** | **Turbine & Auxilaries** | | | | |
| 1 | BT001 | Lifting Beam (Common for both units) | 1 | No. | 6200.0 |
| 2 | BT002 | Jacking oil pumps | 1 | Set | 2630.0 |
| 3 | BT003 | AOP & EOP | 1 | Set | 1000.0 |
| 4 | BT004 | Duplex Filter (Lub. Oil) | 1 | No. | 620.0 |
| 5 | BT005 | Duplex Filter (Jacking Oil) | 1 | No. | 163.0 |
| 6 | BT006 | Butterfly Valves | 1 | Set | 80.0 |

## HARIDWAR BOI SUPPLY

**For each Unit**

| SN | ITEM ID | ITEM DESCRIPTION | QTY | UNIT | WT Gross ( KG) |
|---|---|---|---|---|---|
| 7 | BT007 | Three Way Temp. Control Valve | 1 | Set | 615.0 |
| 8 | BT008 | Double Three way valves | 1 | Set | 230.0 |
| 9 | BT009 | NRV with Aluminum Flap | 1 | Set | 35.0 |
| 10 | BT010 | Pressure Limit Valve | 2 | No. | |
| 11 | BT011 | Oil Purification Unit (Oil Centrifuge) | 1 | No. | |
| 12 | BT012 | Oil Vapour Exhauster | 2 | Nos. | 180.0 |
| 13 | BT013 | Lead Diaphragm | 4 | Nos. | 108.0 |
| 14 | BT014 | Spray Nozzles | 1 | Set | 1.5 |
| 15 | BT015 | Dirt Catchers | 1 | No. | 27.0 |

| | | | | | |
|---|---|---|---|---|---|
| 16 | BT016 | Damper | 1 | Set | 125.0 |
| 17 | BT017 | Variable load spring Cages | 1 | Set | 1370.0 |
| 18 | BT018 | Flexible Bends | 1 | Set | |
| 19 | BT019 | Vacuum Breaker Valve Assy. Along with solinoid valve | 1 | No. | |
| 20 | BT023 | Turbine Oil | 1 | Ltr | 98070.0 |
| 21 | BT024 | Dry Air Preservation system | 1 | No. | |
| 22 | BT025 | Oil Purification System (Ctrl | 1 | No. | |
| 23 | BT027 | Turbine Integral Piping | 1 | Set | 62658.0 |
| 24 | BT028 | H&S For Turbine Integral Piping | 1 | Set | 15321.0 |
| 25 | BT029 | Flow Nozzles for PG Test | 1 | Set | |
| 26 | BT031 | Through Port Gate Valve | 1 | Set | 300.0 |
| 27 | BT032 | Globle Valve | 2 | Nos. | 500.0 |
| 28 | BT033 | Spring Loaded NRV | 1 | Set | 200.0 |
| 29 | BT035 | Control Fluid Pump | 2 | Nos. | 500.0 |
| 30 | BT036 | Control Fluid Vapour Exhauster | 2 | Nos. | |
| 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) | 1 | Lot | |
| 36 | BT044 | Gear Pumps | 1 | Set | |
| 37 | BT046 | LP Bypass Stop & Control Valve with EHA and Water Injection Valve | 1 | Set | 500.0 |
| 38 | BT067 | Hydraulic Accumulators along with Filling and Gauging device | 1 | Set | 500.0 |
| 39 | BT068 | Power Cables for 24 V Solenoid Valves | 1 | Set | |

## HARIDWAR BOI SUPPLY

**For each Unit**

| SN | ITEM ID | ITEM DESCRIPTION | QTY | UNIT | WT Gross ( KG) |
|---|---|---|---|---|---|
| 40 | BT075 | Seal Steam Supply & Leakage Steam Control Valve With Pneumatic Actuator | 1 | Set | |
| 41 | BT081 | HPT Steam Evacuation Valve | 1 | No. | |
| 42 | BT093 | TG Deck Embedment | 1 | Set | |
| | | | | **SUB TOTAL (C)** | **191933.5** |

| | |
|---|---|
| **TOTAL(A+B+C)(for each unit)** | **518509.5** |
| **TOTAL(For both U#8&9)** | **1037019.0** |

## PEM BOI

**For each Unit**

| S. No | PACKAGE | WT Gross ( KG) |
|---|---|---|
| 1 | AIR RELEASE VALVE | 600.0 |
| 2 | AIR TRAPS | 500.0 |
| 3 | ALUMINIUM SHEET | 62500.0 |
| 4 | CHAIN PULLEY BLOCK | 6000.0 |
| 5 | CONTROL VALVES | |
| 6 | ELECTRIC HOIST | 3000.0 |

| | | |
|---|---|---|
| 7 | FLOW ELEMENTS | 6000.0 |
| 8 | LUBE OIL TRANSFER PUMPS | 500.0 |
| 9 | ME BELLOWS | 34500.0 |
| 10 | MISC. PUMPS: HORIZONTAL | 60000.0 |
| 11 | PLATE HEAT EXCHANGERS | 3000.0 |
| 12 | PORTABLE OIL PURIFICATION SYSTEM | 500.0 |
| 13 | PRESSURE GAUGE | |
| 14 | TEMPERATURE GAUGES | |
| 15 | DIFF. PRESSURE SWITCH | |
| 16 | ROTAMETER | |
| 17 | SELF CLEANING STRAINER | |
| 18 | STEAM TRAPS | 100.0 |
| 19 | SUMP PUMPS/ SUBMERSIBLE PUMPS | 2000.0 |
| 20 | TEMPERATURE ELEMENT | |
| 21 | THERMAL INSULATION | 265000.0 |
| 22 | VALVES: ANGLE VALVE | 500.0 |
| 23 | VALVES: BALL VALVES | 700.0 |
| 24 | VALVES: BF VALVES (STEAM SERVICE) | 11000.0 |
| 25 | VALVES: BF VALVES (WATER SERVICE) | 4000.0 |
| 26 | VALVES: CI/GATE/GLOBE/NRV | 3000.0 |
| 27 | VALVES: Dual Plate check valve | 3600.0 |
| 28 | VALVES: FS / FSS GATE/GLOBE/NRV | 2000.0 |
| 29 | VALVES: GM VALVES | 800.0 |
| 30 | VALVES: STEEL GATE/GLOBE/NRV | 800.0 |
| 31 | VIS FOR BFP FOUNDATION | 6432.5 |
| 32 | VIS FOR TG FOUNDATION | 45039.5 |
| **TOTAL(for each unit)** | | **522072.0** |
| **TOTAL(For both U#8&9)** | | **1044144.0** |

**NOTE:**

1. The list is tentative and has been given to enable the contractor to study the nature of work to be done in this contract. There may be variation in size, weight etc. and no claim, whatsoever, will be entertained on account of this by BHEL.
2. Some of the packages may be sent in parts to suit the site condition / transportation, the same is to be assembled at site without any extra cost, likewise the package may be assembled together and send as a single assembly. Contractor may have to dismantle and erect or erect as single assembly as per the instruction of BHEL engineers without any extra cost.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)
## Annexure-I B
## WEIGHT DETAILS (FOR BOTH UNITS)

| S.N. | EQUIPMENT / PACKAGE | GR.WT (IN KG.) | APPROX. WT. (IN MT) |
|---|---|---|---|
| 1 | STEAM TURBINE | 1856904.0 | 1856.9 |
| 2 | GENERATOR | 1127690.0 | 1127.7 |
| 3 | CONDENSOR | 1126692.0 | 1126.7 |
| 4 | ACG | 4440.0 | 4.4 |
| 5 | RE JOINTS | 94200.0 | 94.2 |
| 6 | FLASH TANKS | 43012.0 | 43.0 |
| 7 | MISC TANKS | 65968.0 | 66.0 |
| 8 | BUTTERFLY VALVES | 229380.0 | 229.4 |
| 9 | MOTORS | 91400.0 | 91.4 |
| 10 | BOOSTER PUMPS | 40490.0 | 40.5 |
| 11 | BOILER FEED PUMPS | 204696.0 | 204.7 |
| 12 | CONDENSATE EXTRACTION PUMPS | 76080.0 | 76.1 |
| 13 | DRAIN COOLER | 11086.0 | 11.1 |
| 14 | DEAERATOR | 278454.0 | 278.5 |
| 15 | LP HEATERS | 91568.0 | 91.6 |
| 16 | HP HEATERS | 404372.0 | 404.4 |
| 17 | DRIVE TURBINE | 590068.0 | 590.1 |
| 18 | HARIDWAR BOI | 1037019.0 | 1037.0 |
| 19 | PEM BOI | 1044144.0 | 1044.1 |
| **TOTAL(FOR BOTH Units - 8&9)** | | **8417663.0** | **8417.7** |

**NOTE:**

THE WEIGHT INDICATED ABOVE IS APPROXIMATE AND THERE MAY BE A VARIATION IN WEIGHT OF EQUIPMENT / PACKAGE. NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED BY BHEL ON ACCOUNT OF VARIATION IN WEIGHT QUANTITIES.

**PROPOSED PAINTING SCHEME FOR TG AREA**

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

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

NOTE:

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

## 11 GENERAL

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## 11.2 TEST TAPPING POINTS

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

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

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

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

## 11.3 GENERAL

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

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

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

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

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

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

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

## 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.

12.4

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

12.5

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

12.6

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

## 13 EQUIPMENTS INSTALLATION – COMMON REQUIREMENTS

13.1
Filling of lubricants for steam turbine, turbo-generator and other rotating auxiliaries for purpose of oil flushing, initial fill up and subsequent topping up during various stages of work is in the scope of the contractor.

13.2
All works such as cleaning, leveling, aligning, hot alignment, trial assembly, dismantling of certain equipments/components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, grinding, straightening, chamfering, filling, machining, chipping, drilling, reaming, scraping, lapping, shaping, fitting-up, drilling of holes, making dowel pins, minor rectification of foundation bolts etc. are incidental to the erection/commissioning and any other work/activity which is necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

13.3
Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, ESV & IV, control valves, LP bypass, HP Overload Bypass valves, Cold Re-heat Non Return Valves with power cylinders and other valves, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/pickings/lubricants for replacement will be provided by BHEL free of cost.

13.4
All equipment shall be preserved and protected periodically before and after erection as per advice of BHEL engineer. The journals of steam turbine rotors, generator rotor, HT motors and other rotating machines shall be thoroughly cleaned, greased/painted with preservative agents periodically as instructed by BHEL engineer.

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

13.6
After initial trial of rotating equipments, control and power cabling for motors and other equipments/instrumentation may have to be disconnected for checking alignment and resetting/realignment/hot alignment. Contractor will have to provide services for disconnection and reconnection of control and power cables.

13.7
All racks or assembled units like Governing Rack, LP Bypass Rack & HP Bypass system, Cold Re-heat Non Return Valve, Seal Oil Unit, Gas Unit, Seal Oil Valve Rack, Gas Cylinder Racks etc supplied from manufacturing units will be tested in BHEL/ Customer stores or at site. This may require transportation, filling of oil, water etc in these racks for carrying out testing of these racks. Defects noticed during testing of these racks will have to be rectified by the contractor

free of charges. Further, any pipeline / flanges / fittings not found assembled properly, the same have to be rectified / corrected by the contractor free of charges.

## 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 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

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

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

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

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

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

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

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

and loading of the supports shall be checked and the required settings to be ensured as per requirement.

## 15 CONDENSER INSTALLATION

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

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

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

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

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

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

## 16.1 GENERATOR INSTALLATION

16.1.1 GENERATOR STATOR

The generator stator, weighing approximately 258 MT, will be delivered to site on a special wagon consisting of 8 bogies (four on either side) with facilities to swivel. These two sets of bogies are connected by a carrier beam, which carries the load of the stator. In the event of non availability of special wagon the stator may be transported by road using special trailer.
The contractor shall have to lift the generator stator from the above transport arrangement outside the machine hall.

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 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 DEAERATOR INSTALLATION

16.3.1

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

necessary temporary platform / approach including providing the materials as per requirement as part of scope of work.

16.3.2
Erection of permanent approach platform and ladders etc for de-aerator and FST, GSC, flash tanks, lubes oil / control oil tanks, HP/LP by pass valves, ESVS/ IVS, hot / electric monorail hoists, local platforms for various inaccessible valves and equipment etc are in the scope of work. The structural steel and other members will be supplied in random length/size & will have to be cut to required size and profile as incidental to work.

16.3.4
Hot/monorail hoist including monorail beam / crane to be erected commissioned for various areas indicated below -

(a) Vacuum pumps.
(b) Butterfly valves.
(c) Control fluid room.
(d) Central lube oil system room
(e) Other equipment covered under TG package

## 17 HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS

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

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

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

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

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

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

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

17.6

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

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

## 18 PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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

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

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

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

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

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

(f) Manual/mechanical cleaning of Oil tanks, 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

part of the scope of work. Temporary installations shall be dismantled by contractor and returned to BHEL stores as specified elsewhere in this technical specification.

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

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

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

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

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

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

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

18.10
During the stages of commissioning, and till Unit is handed over, if any part of TG and auxiliaries need repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim if any, for such repair/rectification/rework/ replacement etc for reasons not attributable to the contractor will be governed by relevant clauses of 'General Conditions of Contract'. The parts to be replaced shall however, be provided by BHEL free of cost.

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

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

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

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

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

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

18.16

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

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

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

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

## 19.1 WELDING AND HEAT TREATMENT

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

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

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

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

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

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

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

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

19.1.9

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

19.1.24

Joint fit up will be a stage for inspection.

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

## 19.2 RADIOGRAPHY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

20.7

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

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

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

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

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

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

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

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

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

## 21 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

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

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

21.3
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/

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

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

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

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

21.16
Normally, use of welding generators only is permitted for welding. The use of welding transformers will be subject to prior approval of BHEL.

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

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

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

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

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

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

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

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

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

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

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

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

## 23 LINING AND INSULATION

23.1

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

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

23.2

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

23.3

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

23.4

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

23.5

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

23.6

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

23.7

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

23.7

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

23.8

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

23.9

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

23.10

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

23.11

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

23.12

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

23.13

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

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

23.14

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

23.15

Wastage allowances for the material issued are envisaged as follows:

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

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

23.16

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

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

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

23.17

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

23.18

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

23.19

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

## 24 FINAL PAINTING

24.1

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.

24.6

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

24.7

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

24.8

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

24.9

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

24.10

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

24.11

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

24.12

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

24.13

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

24.14

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

24.15

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