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

NO: BHE/PW/PUR/ RGBBT-STG /797

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, LP PIPING WITH ASSOCIATED VALVES, HANGERS & SUPPORTS AND FINAL PAINTING ETC FOR

1X600 MW KWPCL RAIGARH PROJECT

AT

KORBA WEST POWER COMPANY LIMITED

NEAR BADE BHANDAR VILLAGE

DIST- RAIGARH (C.G)

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/ RGBBT-STG /797

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, LP PIPING WITH ASSOCIATED VALVES, HANGERS & SUPPORTS AND FINAL PAINTING ETC FOR

1X600 MW KWPCL RAIGARH PROJECT

AT

KORBA WEST POWER COMPANY LIMITED

NEAR BADE BHANDAR VILLAGE

DIST- RAIGARH (C.G)

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 :

797

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/RGBBT-STG/797 Date: 10/12/2010

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/RGBBT-STG/797**	
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, LP PIPING WITH ASSOCIATED VALVES, HANGERS & SUPPORTS AND FINAL PAINTING ETC FOR 1X600 MW KWPCL RAIGARH PROJECT AT KORBA WEST POWER COMPANY LIMITED, NEAR BADE BHANDAR VILLAGE, DIST- RAIGARH (C.G)	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :Nagpur*** ***Start : 10/12/ 2010*** ***Closes: 30/10/2010 , Time :16.00 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	*Applicable*
v	**DUE DATE & TIME**	***Date : 31/12/ 2010 , Time :15.00Hrs***	*Applicable*

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

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

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Nagpur issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at NAgpur, Sundays and second/ last Saturdays

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

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

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

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

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

	of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

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

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

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

	o Envelopes II o Envelopes III	

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

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

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

9.0 Assessment of Capacity of Bidders:

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

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

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

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

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

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

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

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

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

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

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

IV. **Explanatory note**:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

26.0 Order of Precedence

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

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

for BHARAT HEAVY ELECTRICALS LTD

AGM / Purchase

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List .
03. Annexure-3: Important Information .
04 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, LP PIPING WITH ASSOCIATED VALVES, HANGERS & SUPPORTS AND FINAL PAINTING ETC FOR 1X600 MW KWPCL RAIGARH PROJECT AT KORBA WEST POWER COMPANY LIMITED, NEAR BADE BHANDAR VILLAGE, DIST- RAIGARH (C.G)
TENDER NO	**BHE/PW/PUR/RGBBT-STG/797**

SL NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document
A	Submission of Integrity Pact duly signed (if applicable)	**NOT APPLICABLE**	
B	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	**APPLICABLE**	
C	**Technical** **c)** Bidder must have, achieved any one of the following: **c.1)** Bidder must have, in last seven years as on 30/11/2010, executed Erection, Testing and Commissioning (Upto Synchronization of the Unit or beyond) of atleast One set of Steam Turbine Generator of 190 MW or higher rating **c.2)** Bidder should have been Techno Commercially Qualified for E&C works of One Steam Turbine Generator Set of 500 MW or higher rated unit by any of the Power Sector Region of BHEL, in the last 3(Three) years as on 30/11/2010		
D 1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (Audited) of **Rs 226 Lakhs** or more over last three Financial Years (FY) i.e 2007-08, 2008-2009, 2009-2010		
2	NETWORTH Net worth of bidder based on Audited Accounts of 2009-10 should be higher than 50% of paid up capital in case of companies.		
3	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'D1 above based on latest Audited Accounts.		

E	Approval of Customer Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	**APPLICABLE**	
F	Consortium criteria (if applicable)	**NOT APPLICABLE**	
	Explanatory Notes for QR 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 2. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as given above along with all annexures ~~(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 Designation: Telephone No: Mobile No: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
		APPLICABILITY	BIDDER REPLY
5	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
6	Whether Audited profit and Loss Account for the last three years submitted	Applicable	YES/NO
7	Whether Copy of PAN Card submitted	Applicable	YES/NO
8	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	YES/NO
9	Integrity Pact	Not Applicable	Not Applicable
10	Declaration by Authorised Signatory	Applicable	YES/NO
11	Whether No Deviation Certificate submitted	Applicable	YES/NO
12	Whether Declaration confirming knowledge about Site Conditions submitted	Applicable	YES/NO
13	Whether Declaration for relation in BHEL submitted	Applicable	YES/NO
14	Whether Non Disclosure Certificate submitted	Applicable	YES/NO
15	Whether Bank Account Details for E-Payment submitted	Applicable	YES/NO
16	Capacity Evaluation of Bidder for current Tender	Applicable	YES/NO
17	Tie Ups/Consortium Agreement are submitted as per format	Not Applicable	Not Applicable
18	Whether Power of Attorney for Submission of Tender/Signing Contract Agreement submitted	Applicable	YES/NO
19	Whether Analysis of Unit rates submitted	Applicable	YES/NO

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE - 3

IMPORTANT INFORMATION

Order of Second Unit of 600 MW BTG Package of KWPCL RAIGARH Project is expected to be received by BHEL. Within the validity of the offer, BHEL may consider to award the second unit of 600 MW STG at the same terms & conditions of Unit # 1 (Subject Work) as per procedure below:

1. For award of Unit Unit # 2 BHEL shall request the next lower bidders in the order of their Price Competitiveness (i.e L-2, then L-3 and So on) to match the awarded Price/Rate of Unit # 1.

2. The Unit # 2 Work shall be awarded to the first agency who matches the awarded price/rate of Unit # 1.

3. In case none of the agencies in the order of their price competitiveness matches L-1 Awarded Price/Rate, BHEL may consider L-1 Party for the award of Second Unit also at the same terms & conditions of Unit 1. This will be solely at the discretion of BHEL.

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

Following drawings are part of tender specification. However these are not uploaded in BHEL web. Same shall be obtained from BHEL-PSWR Nagpur office.

1. PE-DG-339-100-M004 (R03)
2. PE-DG-339-100-M005 (R04)
3. PE-DG-339-100-M006 (R04)
4. PE-DG-339-100-M007 (R04)
5. PE-DG-339-100-M010 (R03)
6. PE-DG-339-100-M003 (R04)

1.0	**Project Information**			
1.1	**INTROUCTION**			
	1	OWNER	:	Korba West Power Company Ltd.
	2	PROJECT TITLE	:	1X600 MW KWPCL Raigarh Project
	3	PROJECT RATING	:	1X600 MW
	4	LOCATION	:	Vill-Bade Bhandar, Distt – Raigarh, Chattisgarh
	5	NEAREST RAILWAY STATION	:	Kirorimal Nagar Railway Station on Mumbai - Howrah rail route- 21 Km from project site
	6	NEAREST PORT	:	Paradip
	7	NEAREST AIRPORT	:	Raipur - 250 Kms
	8	MAIN ROAD HIGHWAYS	:	**National Highway**– Site is about 0.5 Km from NH-216
	9	LATITUDE	:	83016'30'' to 83017'18'' E
	10	LONGITUDE	:	21044'00'' to 21044'42'' N
1.2	**CLIMATIC CONDITIONS**			
	1	MAXIMUM TEMPERATURE	:	47°C
	2	MINIMUM TEMPERATURE	:	9°C
	3	MAXIMUM RELATIVE HUMIDITY	:	86%
	4	MINIMUM RELATIVE HUMIDITY	:	20%
	5	AVERAGE ANNUAL RAINFALL	:	1602 mm
	6	SEISMIC ZONE	:	II

2.0 SCOPE OF WORK

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

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

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

of 1X600 MW KWPCL Raigarh Project, Dist-Raigarh, Chattisgarh.

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

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

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Telephone, fax, internet, intranet, e-mail etc		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl. No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	Engineering works for construction:			
a	Providing the erection drawings for all the equipments covered under this scope	**Yes**		
b	Drawings for construction methods	**Yes**		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
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 120/250 T	1	FOR ERECTION OF DEAERATOR & FST
03	PORTAL GANTRY CRANE WITH ACCESSORIES (360 MT CAPACITY)/ STRAND JACK SYSTEM	AS PER AVAILABILITY	FOR GENERATOR STATOR HANDLING & LIFTING ONLY

NOTE:

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

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

3. Above T&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-1
1	CONDENSOR ERECTION START	1st MONTH
2	TURBINE BOX UP	14th MONTH
3	COMPLETION OF OIL FLUSHING	17th MONTH
4	BARRING GEAR	19th MONTH
5	SYNCHRONISATION	21st MONTH
6	TRIAL OPERATION COMPLETION	24th MONTH
7	PG TEST	25th MONTH

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

6.1.4

DURATION

The total contract period for completion of entire work shall be **25 (Twenty five)** 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:

		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%**	
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%		--	--			--	
	Subtotal for condenser	**85%**							

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

		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
2.15	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 Auxiliaries				**85%**				
5	**HEATERS AND DEAERATORS (11%)**								
5.1	ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS	--	--	--		27%		--	
5.2	ERECTION, TESTING & COMMISSIONING OF GLAND STEAM CONDENSER, DRAIN COOLERS	--	--	--		12%		--	
5.3	ERECTION, TESTING & COMMISSIONING OF DE-AERATOR, FEED STORAGE TANK AND ASSOCIATED APPROACH PLATFORM WITH LADDERS ETC.	--	--	--		46%		--	
	Subtotal FOR HEATERS AND DEAERATORS	**--**	**--**	**--**		**85%**		**--**	
6	**MISCELLANEOUS ITEMS (7%)**								
6.1	DEBRIS FILTERS, RE JOINTS, ME BELLOWS, DIRTY, CLEAN OIL TANKS, ENCLOSURES, CO2 & H2 CYLINDER RACKS ETC						25%		
6.2	ACW PUMPS, RELATED ITEMS	--	--	--			0%		
6.3	ERECTION, TESTING & COMMISSIONING OF CONTROL FLUID TANK, C.F. COOLERS, C.F. PUMPS, PURIFICATION UNIT ETC.	--	--	--			16%		
6.4	ERECTION, TESTING & COMMISSIONING OF FLASH TANKS & FLASH VESSELS	--	--	--			12%		

		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
6.5	ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE	--	--	--			12%		
6.6	ERECTION, TESTING & COMMISSIONING OF CONDENSER ON LOAD TUBE CLEANING PACKAGE/ CONDENSATE TRANSFER PUMPS	--	--	--			20%		
6.7	ERECTION, TESTING & COMMISSIONING OF SELF CLEANING STRAINER PACKAGE	--	--	--			0%		
6.8	ERECTION, TESTING & COMMISSIONING OF MISC.HOISTS & CHAIN PULLEY BLOCKS.						0%		
	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	**OTHER PIPING**								
8.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION TO BE PAID ALONG WITH PLACEMENT IN POSITION)								15%
8.2	PLACEMENT IN POSITION								20%
8.3	ALIGNMENT								15%
8.4	WELDING/BOLTING/FIXING								20%
8.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be clubbed with next activity)								5%
8.6	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG								5%
8.7	HYDRAULIC TEST/PNEUMATIC TEST WHERE EVER APPLICABLE								5%
	Total for Prorata (85%)	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**

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

Note:

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

8.1 TAXES, DUTIES, LEVIES

8.1.1

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

8.1.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on 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.

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

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

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

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

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

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

SPECIFIC INCLUSIONS

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

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

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

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

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

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

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

9.8
Most of the Misc. Pumps with drive motors, base frame, fittings etc will be supplied in loose parts/ dismantled condition as skid mount. These pumps along with drive and fittings shall be assembled at site. The Delivery 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**			
1	75001 /0	EMBEDMENT FOR ANCHOR POINTS	4400X1600X1000	5447
2	75003 /0	COMPONENTS FOR BASE PLATEASSEMBLY	4900X1200X600	6673
3	75004 /0	COMPONENTS OF BASE PLATE	2800X1700X600	3635
4	75101 /0	BASE PLATE FOR LP CASING	1850X1400X500	9437
5	75102 /1	LP OUTER CASING PARTS	7060X1480X2760	8085
6	75102 /2	LP OUTER CASING PARTS	7060X1480X2760	8085
7	75103 /1	LP OUTER CASING PARTS	7060X1480X2760	8085
8	75103 /2	LP OUTER CASING PARTS	7060X1480X2760	8085
9	75104 /1	LPC OUTER CASING PARTS	4570X3230X980	2500
10	75104 /2	LPC OUTER CASING PARTS	4570X3230X980	2500
11	75105 /1	LPC OUTER CASING PARTS	4570X3230X980	2500
12	75105 /2	LPC OUTER CASING PARTS	4570X3230X980	2500
13	75106 /1	COMPONENTS OF LP CASING UPPERPART	3500X300X300	495
14	75106 /2	COMPONENTS OF LP CASING UPPERPART	3500X300X300	495
15	75106 /3	L.P OUTER CASING PARTS	3450X1000X1100	900
16	75106 /4	L.P OUTER CASING PARTS	3450X1000X1100	900
17	75107	LONGITUDINAL GIRDER (LEFT)	6800X1820X1570	15182

	/1			
18	75107 /2	LONGITUDINAL GIRDER (LEFT)	6800X1820X1570	15182
19	75108 /1	LONGITUDINAL GIRDER (RIGHT)	6800X1820X1570	15182
20	75108 /2	LONGITUDINAL GIRDER (RIGHT)	6800X1820X1570	15182
21	75109 /1	LP FRONT WALL (TS)	6820X3750X910	10053
22	75109 /2	LP FRONT WALL (TS)	6820X3750X910	10053
23	75110 /1	LP FRONT WALL (GS)	6820X3750X910	10053
24	75110 /2	LP FRONT WALL (GS)	6820X3750X910	10053
25	75111 /1	LP SHAFT SEALING FRONT	1800X1700X740	2260
26	75111 /2	LP SHAFT SEALING FRONT	1800X1700X740	2260
27	75112 /1	LP SHAFT SEALING (REAR)	1800X1700X740	2260
28	75112 /2	LP SHAFT SEALING (REAR)	1800X1700X740	2260
29	75113 /1	LP SHAFT SEAL COMPENSATORASSLY.(TS)	1440X1420X520	1456
30	75113 /2	LP SHAFT SEAL COMPENSATORASSLY.(TS)	1440X1420X520	1456
31	75114 /1	LP SHAFT SEAL COMPENSATORASSLY.(GS)	1440X1420X520	1456
32	75114 /2	LP SHAFT SEAL COMPENSATORASSLY.(GS)	1440X1420X520	1456
33	75115 /1	LP JOINT COVERING	2300X1800X940	1041
34	75115 /2	LP JOINT COVERING	2300X1800X940	1041
35	75201 /0	HP/IP BRG.PED.ASSLY.	4080X2005X2126	13275

36	75202/0	HP/IP BRG.PED.PARTS	1000X600X600	400
37	75301/0	ASSEMBLY DEVICES	1000X750X750	300
38	75302/0	INSPECTION SHAFT FOR IPC	4050X600X900	1430
39	75304/0	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	3800X2500X1300	6860
40	75305/0	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	2300X2100X900	1800
41	75306/0	COMPONENTS OF ASSLY FIXTURE FOR HPT	3300X1800X1300	3350
42	75307/0	COMPONENTS FOR ASSLY FIXTUREFOR HPT	5450X4050X400	3400
43	75308/1	AUXILIARIES OF LP TURBINE	3000X1300X1000	2100
44	75308/2	AUXILIARIES OF LP TURBINE	3000X1300X1000	2100
45	75309/1	AUXILIARIES OF LP TURBINE	2000X1000X1825	1142
46	75309/2	AUXILIARIES OF LP TURBINE	2000X1000X1825	1142
47	75310/1	AUXILIARIES OF LP TURBINE	2000X1000X1825	1142
48	75310/2	AUXILIARIES OF LP TURBINE	2000X1000X1825	1142
49	75311/0	ASSEMBLY TOOLS	1700X800X400	1020
50	75312/0	AUXILIARIES OF IP TURBINE	1200X500X550	260
51	75313/0	AUXILIARIES OF IP TURBINE	1100X500X650	210
52	75314/0	AUXILIARIES OF IP TURBINE	1100X500X650	210
53	75315/0	BOLT HEATING EQUIPMENT AND BREECH NUT HEATING DEVICE	1700X900X700	150
54	75316/0	GROMMET SLINGS	1700X1700X300	625

55	75318/0	OIL FLUSHING AND PRESSURE TEST DEVICE	750X550X400	250
56	75319/0	STEAM BLOWING & HYDRAULIC TESTDEVICES	2900X2100X1200	4650
57	75320/0	TOOLS FOR GOV.SYST.&VALVES	1750X1200X1000	1500
58	75321/0	VALVE SUPPORT FOR HPT OVERHALL	1500X750X750	905
59	75401/0	IP-LP BEARING PEDESTAL ASSLY	3700X1860X2100	14500
60	75501/0	LP/GEN. PEDESTAL ASSEMBLY	3200X2280X2070	9370
61	75502/0	BEARING PEDESTAL (PARTS)	1600X800X600	1150
62	75503/0	LP1 - LP2 BEARING PEDESTAL	XX	9370
63	75504/0	OIL FLUSHING & PRESSURE TEST D	XX	250
64	75505/0	LP1-LP2 BEARING PEDESTAL PARTS	XX	1150
65	75601/1	FRONT BEARING PEDESTAL	3140X3140X2050	12386
66	75601/2	HYDRAULIC TURNING GEAR	2100X1000X600	750
67	75601/3	MAIN OIL PUMP ASSEMBLY.	1400X1200X1000	550
68	75704/1	LP CASING ASSEMBLY (FASTENERS)	1800X1700X740	2653
69	75704/2	LP CASING ASSEMBLY (FASTENERS)	1800X1700X740	2653
70	75704/3	LP CASING ASSEMBLY (PARTS)	3760X2060X860	4900
71	75704/4	LP CASING ASSEMBLY (PARTS)	3760X2060X860	4900
72	75705/1	LP-1EXTRACTION A1	4400X1620X870	1820
73	75705/2	LP-2 EXTRACTION A1	4400X1620X870	1820
74	75706/1	LP-1 EXTRACTION A1	4400X1620X850	1814

75	75706 /2	LP-2 EXTRACTION A1	4400X1620X850	1814
76	75707 /1	LP-1 EXTRACTION A1	3420X1620X870	1286
77	75707 /2	LP-2 EXTRACTION A1	950X750X750	330
78	75707 /3	LP-1 EXTRACTION A1	3420X1620X870	1286
79	75707 /4	LP-2 EXTRACTION A1	3420X1620X870	1286
80	75707 /5	LP EXTRACTION A1	XX	320
81	75707 /6	LP EXTRACTION A1	XX	320
82	75708 /1	LP-1 EXTRACTION A2	2920X2120X1370	1730
83	75708 /2	LP-2 EXTRACTION A2	2920X2120X1370	1730
84	75709 /1	LP-1 EXTRACTION A2	3420X1220X1120	1350
85	75709 /2	LP-2 EXTRACTION A2	3420X1220X1120	1350
86	75710 /1	LP-1 EXTRACTION A3	1920X1120X920	655
87	75710 /2	LP-2 EXTRACTION A3	1920X1120X920	655
88	75711 /1	LP-1 EXTRACTION A3	3120X920X870	1050
89	75711 /2	LP-2 EXTRACTION A3	3120X920X870	1050
90	75711 /3	LP EXTRACTION A3	XX	250
91	75711 /4	LP EXTRACTION A3	XX	250
92	75711 /5	LP EXTRACTION A3	XX	250
93	75711	LP EXTRACTION A3	XX	250

	/6			
94	75716 /1	L.P. EXTRACTION PIPE SHEATHING	2600X2000X1400	1290
95	75716 /2	L.P. EXTRACTION PIPE SHEATHING	2600X2000X1400	1290
96	75717 /1	INNER GUIDE PLATE OF DIFFUSER(TS)	2600X2400X1000	2118
97	75717 /2	INNER GUIDE PLATE OF DIFFUSER(TS)	2600X2400X1000	2118
98	75718 /1	DIFFUSER (TS)	4880X1730X2340	3640
99	75718 /2	DIFFUSER (TS)	4880X1730X2340	3640
100	75719 /1	DIFFUSER (GS)	4880X1730X2340	3640
101	75719 /2	DIFFUSER (GS)	4880X1730X2340	3640
102	75720 /1	LP INNER OUTER CASING (U/H)	6720X3150X2325	21750
103	75720 /2	LP INNER OUTER CASING (U/H)	6720X3150X2325	21750
104	75721 /1	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2350	30907
105	75721 /2	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2350	30907
106	75722 /1	LP INNER CASING ASSY.FASTENERS	1800X1700X740	1760
107	75722 /2	LP INNER CASING ASSY.FASTENERS	1800X1700X740	1760
108	75723 /1	LP CASING ASSEMBLY (PARTS)	450X450X250	140
109	75723 /2	LP CASING ASSEMBLY (PARTS)	450X450X250	140
110	75724 /1	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000	11722
111	75724 /2	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000	11722
112	75725 /1	INNER GUIDE PLATE OF DIFFUSER(GS)	2600X2400X1000	2118

113	75725 /2	INNER GUIDE PLATE OF DIFFUSER(GS)	2600X2400X1000	2118
114	75728 /1	STEAM INLET PIPE (LPT)	2700X1300X900	840
115	75728 /2	STEAM INLET PIPE (LPT)	2700X1300X900	840
116	75801 /1	L.P. ROTOR	7210X3300X3350	62049
117	75801 /2	L.P. ROTOR	7210X3300X3350	62049
118	75901 /0	IP ROTOR	4800X2120X1995	23132
119	75902 /0	IP OUTER CASING (U/H)	4050X3800X2650	25850
120	75903 /0	IP OUTER CASING (L/H)	3400X5250X2600	25870
121	75904 /0	IP INNER CASING (U/H)	2900X3200X1850	15200
122	75905 /0	IP INNER CASING (L/H)	2900X3200X1850	15200
123	75906 /0	IP INLET ASSEMBLY	4500X3725X1300	13550
124	75907 /0	IP SHAFT SEALING	1400X1200X900	950
125	75908 /0	IP TURBINE (PARTS)	2000X1900X1000	3125
126	75909 /0	I.P. TURBINE PARTS	1000X1000X750	475
127	76001 /1	HP TURBINE	5675X3400X2900	88650
128	76001 /2	EMERGENCY GOVERN0R	495X395X695	57
129	76002 /0	HP INLET ASSLY. & HP EXHAUSTASSLY. (PARTS)	1200X1200X500	80
130	76003 /0	HP EXHAUST ASSEMBLY	1650X1400X900	2000
131	76004	HPT RELATED PARTS	1300X1300X700	200

	/0			
132	76104 /0	ESV & CV CASING WITH VALVES	3600X3600X2500	23146
133	76105 /1	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300X1200X1200	4250
134	76105 /2	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300X1200X1200	4250
135	76107 /0	HP CONTROL VALVE SERVOMOTOR	2800X1200X2100	3280
136	76108 /0	ESV & CV CASING WITH VALVES	3600X3600X2500	23146
137	76112 /0	HP CONTROL VALVE SERVOMOTOR	2800X1200X2100	3288
138	76201 /0	SUSPENSION OF VALVE (IV)	4250X2640X750	8078
139	76202 /0	IV & CV CASING WITH VALVES	5040X4690X2770	33276
140	76203 /1	SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700X1450X1400	3965
141	76203 /2	SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700X1450X1400	3965
142	76204 /0	IP CONTROL VALVE SERVOMOTOR	3240X1240X1950	3019
143	76205 /1	FRAME FOR SUSPENSION (IV)	3400X3150X750	2026
144	76205 /2	FRAME FOR SUSPENSION (IV)	3400X3150X750	2026
145	76205 /3	LOOSE ITEMS FOR FRAME FORSUSPENSION(IV)	300X200X200	20
146	76206 /0	IV & CV CASING WITH VALVES	5040X4690X2770	33276
147	76210 /0	IP CONTROL VALVE SERVOMOTOR	3240X1240X1950	3003
148	76301 /1	SUSPENSION OF LPBP VALVE	3600X1700X800	1836
149	76301 /2	SUSPENSION OF LPBP VALVE	3600X1700X800	1836

150	76402/0	INJECTOR FOR SUC. PIPE NB 350	3300X800X800	588
151	76403/0	INJECTOR FOR SUC. PIPE NB 300	3300X1750X1200	999
152	76404/0	MAIN OIL TANK & NOZZLE ARRGT.ASSY.	6180X3260X2650	9981
153	76405/0	MAIN OIL TANK & NOZZLE ARRGT.ASSY.	4200X1200X900	402
154	76406/0	OIL STRAINERS	1500X1000X1200	228
155	76407/0	OIL STRAINERS	1500X1000X1200	228
156	76409/0	OIL STRAINERS	2050X1200X1410	470
157	76412/0	DIRTY/LEAKAGE OIL TANK	1000X1000X3000	515
158	76413/0	WASTE OIL TANK	1000X1000X3000	515
159	76414/0	VAR.ORIFICES THR.VALV.&FLUSH.PARTS	1700X700X760	255
160	76415/0	VARIABLE ORIFICE 125	400X300X200	50
161	76601/0	OBLIQUE REDUCER ASSLY. (CAP)	XX	750
162	76602/0	OBLIQUE REDUCER ASSLY. (CAP)	XX	750
163	76603/0	MANHOLE ASSLY. (CAP)	XX	1900
164	76604/0	MANHOLE ASSLY. (CAP)	XX	1900
165	76605/0	MITRE BEND ASSLY (CAP)	XX	1850
166	76606/0	MITRE BEND ASSLY (CAP)	XX	1850
167	76607/0	PIPE ASSLY. LPT1 (CAP)	XX	14500
168	76608/0	PIPE ASSLY. LPT1 (CAP)	XX	14500
169	76609	PIPE ASSLY. LPT2 (CAP)	XX	10000

	/0			
170	76610 /0	PIPE ASSLY. LPT2 (CAP)	XX	10000
171	76611 /0	SUPPORTS (CAP)	XX	1050
172	76612 /0	SUPPORTS (CAP)	XX	1050
173	76613 /0	MANHOLE INLET ASSLY. (CAP)	XX	750
174	76614 /0	MANHOLE INLET ASSLY. (CAP)	XX	750
175	76701 /0	CHANGE OVER VALVE	800X500X200	97
176	76702 /1	CRH NRV WITH SERVOMOTOR	3200X2300X2600	10528
177	76702 /2	STEAM BLOWING DEV.FOR NRV CRHLINE	2500X1600X1200	5600
178	76801 /0	RATING,COLLABORATION&COMP AN Y'SMONOGRAM PLATE	850X550X200	55
179	76901 /0	OIL STRIPPER	600X600X850	133
180	76902 /0	OIL STRIPPER	600X600X850	133
181	76903 /0	HOUSING FOR M.S STRAINER	1725X1250X730	2370
182	76904 /0	HOUSING FOR M.S STRAINER	1725X1250X730	2370
183	76908 /0	HOUSING FOR HRH STEAM STRAINER	2275X1650X1100	4480
184	76909 /0	HOUSING FOR HRH STEAM STRAINER	2275X1650X1100	4480
185	76912 /1	BLANKING ARRANGEMENT FOR MSSTRAINER HOUSING	1000X900X800	948
186	76912 /2	BLANKING ARRANGEMENT FOR HRHSTEAM STRAINER HOUSING	1600X1200X1000	2535
187	76913 /0	GASKETS FOR MS & HRH STRAINERHOUSINGS	1000X1000X600	37

188	76914 /0	COMPENSATOR	600X600X900	50
189	76915 /0	ASSY. & DISASSY. DEVICES FORMS & HRH STEAM STRAINERS	2140X1400X500	564
190	76917 /0	STEAM STRAINER (MS)	1200X900X500	350
191	76918 /0	STEAM STRAINER (HRH)	1800X1500X800	750
192	76919 /0	STEAM STRAINER (MS)	1200X900X500	350
193	76920 /0	STEAM STRAINER (HRH)	1800X1500X800	750
194	77001 /0	GOV.SYSTEM CONTROL RACK ASSLY.& TRANSPORT DEVICE	2800X1360X2750	1847
195	77002 /0	SUPPLY RACK HP VALVE-2 (RIGHT)	2300X1400X2550	1797
196	77003 /0	SUPPLY RACK HP VALVE-1 (LEFT)	2300X1400X2550	1797
197	77004 /0	SUPPLY RACK FOR IP VALVES 1 &2	2300X1400X2550	2080
198	77006 /0	GOVERNING SYSTEM PROTECTIONRACK & TRANSPORT DEVICE	2450X1300X2250	1622
199	77201 /0	TURBINE INSTRUMENTS RACKS(FRAMES)	2750X1500X800	2600
200	77202 /0	TEMP. AND PRESSURE CONNECTIONS	1700X750X750	750
201	77203 /0	IMPLUSE PIPES (CARBON STEEL)	6900X650X500	1225
202	77204 /0	GAUGES AND SENSORS	2800X1250X1250	1035
203	7205/ 0	TRANSMITTERS & J.B.OF BEARINGS	500X300X200	118
204	77206 /0	IMPULSE PIPES (ALLOY STEEL ANDS.S.)	6900X500X500	1136
			SUB TOTAL(A)	**1109210**

HARIDWAR SUPPLY				
SL	**PKG. NO**	**DESCRIPTION**	**PKG.SIZE(MM)**	**GR.WT IN KG.**
B	**GENERATOR**			
1	601/0	FOUNDATION PLATES	5950X1230X800	7800
2	602/0	FOUNDATION BOLTS	2540X655X600	1480
3	603/0	FOUNDATION ITEMS	5800X1120X520	1500
4	604/0	EMBEDDED PARTS	1000X800X400	1000
5	605/0	GENERATOR STATOR	9860X4440X3870	304000
6	606/0	GENERATOR ROTOR WITH SKIDPLATE	14125X1790X1750	84300
7	607/0	END SHIELD LOWER HALF (TE)	3900X1500X2150	8350
8	608/0	END SHIELD UPPER HALF (TE)	3900X1500X2150	7350
9	609/0	END SHIELD LOWER HALF (EE)	3900X1650X2150	8400
10	610/0	END SHIELD UPPER HALF (EE)	3900X1650X2150	7400
11	611/0	GENERATOR BEARING (EE & TE)	1390X1130X1015	1930
12	612/0	BAFFLE RING CARRIER &AIR GAP SEAL ASSY.	1930X1920X1160	1100
13	613/0	TERMINAL BUSHINGS	2200X1830X610	1427
14	614/0	TERMINAL BUSHING BOX	3500X2800X1800	7300
15	615/0	SHAFT SEALS (EE & TE) &OIL CATCHER (INNER & OUTER)	2110X1125X900	1530
16	616/0	BAFFLE RING ASSY.	1750X1750X1140	1100
17	617/0	GENERATOR ACCESSORIES	2140X2140X1240	1700
18	618/0	FLEXIBLE TERMINAL CONNECTIONS	1350X850X300	472
19	619/0	GENERATOR ACCESSORIES	2240X940X1220	1600
20	620/0	GENERATOR ACCESSORIES	1640X1140X1240	2781
21	621/0	GENERATOR ACCESSORIES	1700X1200X250	140
22	622/0	PRIMARY WATER TANK	10500X2400X1200	2600
23	623/0	PW TANK PIPE LINES	6800X2100X1000	860
24	624/0	PW TANK PIPE LINES	3000X600X500	454
25	625/0	PLATFORM FOR PW TANK	10500X1200X500	974

26	626/0	COOLER HOUSING FRAME	4290X4450X1450	21300
27	627/0	SEAL RINGS	750X750X200	90
28	628/0	CONNECTION PIECE ASSLY	1600X1050X400	862
29	629/0	COOLER AIR VENT ASSEMBLY	8300X150X100	51
30	630/0	SEALING FOR STORAGE	3950X2420X150	870
31	631/0	DRY AIR BLOWER	1100X1000X700	80
32	632/0	ERECTION PEDESTALS	5300X1500X940	5900
33	633/0	ROTOR INSERTION AND OTHERERECTION DEVICES	2460X1170X1240	3000
34	634/0	WIRE ROPES FOR ROTOR	1800X1800X400	330
35	635/0	GENERATOR ERECTION DEVICES	3300X1555X1140	1649
36	636/0	SPECIAL TOOLS AND TACKLES	800X700X300	130
37	637/0	BRUSHLESS EXCITER SET	5750X2350X3400	32928
38	638/0	BRUSHLESS EXCITER FRONT COVER	4400X3400X3100	4478
39	639/0	BRUSHLESS EXCITER REAR COVER	4400X3400X3100	4978
40	640/0	EXCITER BED PLATE ACCESSORIESAND RACK ASSEMBLY	3900X1250X1150	1741
41	641/0	EXCITER BED PLATE ACCESSORIESAND RACK ASSEMBLY(NON TEST BED)	5800X1140X1240	2925
42	642/0	EXCITER ACCESSORIES	2200X1100X1000	1111
43	643/0	EXCITER BED PLATE ACCESSORIES(NON TEST BED ITEMS)	1000X800X800	775
44	644/0	RR WHEEL AIR GUIDE COVER	2800X1500X2000	1572
45	645/0	SEAL OIL STORAGE TANK	5000X1800X1700	2500
46	646/0	PW PUMP & FILTER UNIT	4000X4000X3000	7065
47	647/0	PW INSTRUMENT RACK	1550X900X1715	875
48	648/0	SEAL OIL UNIT	6200X2500X3400	10000
49	649/0	LIQUID DETECTOR RACK	2000X1000X2100	660
50	650/0	GAS UNIT	1980X1640X2420	1205

51	651/0	CO2 VAPOURISER	1520X840X840	250
52	652/0	H2 DISTRIBUTOR	3480X1540X440	333
53	653/0	CO2 DISTRIBUTOR	4860X1240X440	353
54	654/0	N2 DISTRIBUTOR	1400X1240X440	143
55	655/0	ALKALYSER UNIT	1150X780X1900	267
56	656/0	RESINS	1200X600X600	100
57	657/0	TG SYSTEM INTEGRAL PIPING(VALVES)	2750X1400X1400	3800
58	658/0	TG SYSTEM INTEGRAL PIPING(INSTRUMENTS)	1000X940X900	180
59	659/0	CONSUMABLES	800X400X200	55
			SUB TOTAL(B)	**570104**
C	**CONDENSER**			
1	78001/1	CONDENSER (HOTWALL-TS))	13000X2100X1200	8703
2	78001/2	CONDENSER(HOTWALL-GS))	13000X2100X1200	11980
3	78004/1	BOTTOM PLATE-TS	7150X3450X625	8703
4	78004/2	BOTTOM PLATE-TS	7150X3450X625	4576
5	78005/1	BOTTOM PLATE-GS	7150X3450X625	8703
6	78005/2	BOTTOM PLATE-GS	7150X3450X625	4576
7	78010	BOTTOM PLATE (LOOSE ITEMS)	1900X700X300	550
8	78012	CONDENSER SUPPORT(TS/GS)	2000X1000X1250	15592
9	78013	CONDENSER SUPPORT(TS/GS)	2000X1000X1250	15592
10	78014	CONDENSER SUPPORT(TS/GS)	2000X1000X1250	15592
11	78015	CONDENSER SUPPORT(TS/GS)	2000X1000X1250	3785
12	78018	CONDENSER SUPPORT (LOOSE ITEM)	1600X950X950	1640
13	78020/1	FRONT WATER CHAMBER (GS)	5224X3610X360	7530

14	78020 /2	FRONT WATER CHAMBER (GS)	5224X3610X360	7530
15	78022 /1	FRONT WATER BOX GEN SIDE)	5950X3610X2585	15571
16	78022 /2	FRONT WATER BOX (GEN SIDE)	5950X3610X2585	15578
17	78023 /1	FRONT WATER CHAMBER (TS)	5224X3610X360	7615
18	78023 /2	FRONT WATER CHAMBER (TS)	5224X3610X360	7615
19	78025 /1	FRONT WATER BOX (TUR SIDE)	5950X3610X2485	15571
20	78025 /2	FRONT WATER BOX (TUR SIDE)	5950X3610X2485	15571
21	78026 /1	REAR WATER CHAMBER (GSI)	5224X3610X360	7630
22	78026 /2	REAR WATER CHAMBER (GSI)	5224X3610X360	7630
23	78028 /1	REAR WATER BOX (GEN SIDE)	4760X3610X2025	10250
24	78028 /2	REAR WATER BOX (GEN SIDE)	4760X3610X2025	10250
25	78029 /1	REAR WATER CHAMBER (TS)	5224X3610X360	7730
26	78029 /2	REAR WATER CHAMBER (TS)	5224X3610X360	7730
27	78031 /1	REAR WATER BOX (TUR SIDE)	4760X3610X2025	10250
28	78031 /2	REAR WATER BOX (TUR SIDE)	4760X3610X2025	10250
29	78032 /1	SIDE WALL (TUR.END)	7800X2000X20	2367
30	78032 /2	SIDE WALL (TUR.END)	7800X2500X20	3027
31	78033 /1	SIDE WALL (TUR.END)	7800X2200X20	2599
32	78033	SIDE WALL (TUR.END)	7800X2000X20	2367

	/2			
33	78034 /1	SIDE WALL (TUR.END)	7800X2500X20	3027
34	78034 /2	SIDE WALL (TUR.END)	7800X2200X20	2599
35	78041 /1	SIDE WALL (GEN.END)	7800X2000X20	2367
36	78041 /2	SIDE WALL (GEN.END)	7800X2500X20	3027
37	78042 /1	SIDE WALL (GEN.END)	7800X2200X20	2599
38	78042 /2	SIDE WALL (GEN.END)	7800X2000X20	2367
39	78046	SIDE WALL(GEN.END)	7800X2500X20	3027
40	78047	SIDE WALL(GEN.END)	7800X2200X20	2599
41	78048	SHELL INTERNAL DETAILS	3250X850X650	12532
42	78049	SHELL INTERNAL DETAILS	3250X850X650	7072
43	78050	SHELL INTERNAL DETAILS	3250X850X650	1410
44	78051	SHELL INTERNAL DETAILS	3250X850X650	7200
45	78055	SHELL INTERNAL DETAILS	1000X750X350	695
46	78056	SHELL INTERNAL DETAILS	4350X900X500	4500
47	78058	AIR EXTRACTION PIPING	6460X990X410	1535
48	78059	SHELL INTERNAL DETAILS	4700X3426X348	9248
49	78060	SHELL INTERNAL DETAILS	4700X3426X348	9248
50	78061	SHELL INTERNAL DETAILS	4700X3426X348	9248
51	78062	SHELL INTERNAL DETAILS	4700X3426X348	9248
52	78063	SHELL INTERNAL DETAILS	4700X3426X348	9248
53	78064	SHELL INTERNAL DETAILS	4700X3426X348	9248
54	78065	SHELL INTERNAL DETAILS	4700X3426X348	9248
55	78069	SHELL INTERNAL DETAILS	5500X940X630	9248
56	78070	SHELL INTERNAL DETAILS	4440X260X100	416
57	78071	SHELL INTERNAL DETAILS	3000X1500X500	6300
58	78072	SHELL INTERNAL DETAILS	4700X3426X348	8250
59	78075 /1	LOWER DOME WALL (TUR.END)	13000X3950X910	3168

60	78075 /2	LOWER DOME WALL (TUR.END)	13000X3950X910	3261
61	78076 /1	LOWER DOME WALL(TUR.END) LOOSE	4000X800X100	2980
62	78076 /2	LOWER DOME WALL(TUR.END) LOOSE	4000X800X100	3261
63	78077 /1	LOWER DOME WALL(TUR.END.)	13000X3950X100	3455
64	78077 /2	LOWER DOME WALL(TUR.END)	13000X3950X500	2415
65	78078	LOWER DOME WALL (TUR.END) LOOSE ITEMS	900X300X300	325
66	78103 /1	LOWER DOME WALL (GEN.SIDE)	13000X3950X910	10000
67	78103 /2	LOWER DOME WALL (GEN.SIDE)	13000X3950X910	10000
68	78104 /1	LOWER DOME WALL (GEN.END)	4000X800X100	872
69	78104 /2	LOWER DOME WALL (GEN.END)	4000X800X100	872
70	78105 /1	LOWER DOME WALL(GEN.END)	4000X800X100	872
71	78105 /2	LOWER DOME WALL (GEN.END0	4000X800X100	872
72	78106	DOME WALL (GEN.END) LOOSE ITEMS	900X300X300	325
73	78109 /1	LOWER DOME WALL (F.W/B SIDE)	7502X4446X545	8050
74	78109 /2	LOWER DOME WALL (F.W./B SIDE)	7502X4446X545	8050
75	78110 /1	LOWER DOME WALL (F.W/B SIDE)	6238X934X1155	1850
76	78110 /2	LOWER DOME WALL (F.W/B SIDE)	6238X934X1155	1850
77	78112	LOWER DOME WALL (F.W/B SIDE)	1325X1150X500	689
78	78115 /1	LOWER DOME WALL (R.W/B SIDE)	6236X1200X1160	9650
79	78115 /2	LOWER DOME WALL (R.W/B SIDE)	6236X1200X1160	9650

80	78116 /1	DOME WALL (R.W/B SIDE)	6236X1200X1160	1900
81	78116 /2	DOME WALL (R.W/B SIDE)	6236X1200X1160	1900
82	78117 /1	LOWER DOME WALL (R.W/B SIDE)	6236X1200X1160	1900
83	78117 /2	LOWER DOME WALL (R.W/B SIDE)	6236X1200X1160	0
84	78118	LOWER DOME WALL (R.W/B SIDE) LOOSE ITEMS	1300X1065X305	323
85	78121 /1	DOME INTERNAL STIFFENING	6016X200X200	1963
86	78121 /2	DOME INTERNAL STIFFENING	6016X200X200	163
87	78122 /1	DOME INTERNAL STIFFENING	6016X200X200	1963
88	78122 /2	DOME INTERNAL STIFFENING	6016X200X200	1963
89	78123	DOME INTERNAL STIFFENING	6016X200X200	900
90	78123 /1	DOME INTERNAL STIFFENING	6016X200X200	900
91	78123 /2	DOME INTERNAL STIFFENING	6016X200X200	900
92	78124 /1	DOME INTERNAL STIFFENING	6016X200X200	900
93	78124 /2	DOME INTERNAL STIFFENING	6016X200X200	900
94	78125 /1	DOME INTERNAL STIFFENING	3400X200X200	500
95	78125 /2	DOME INTERNAL STIFFENING	3400X200X200	500
96	78126 /1	DOME INTERNAL STIFFENING	3400X200X200	500
97	78126 /2	DOME INTERNAL STIFFENING	3400X200X200	500
98	78129 /1	LP HEATER NO-1 SUPPORT ARRANGEMENT	2250X1700X1070	2965
99	78129	LP HEATER SUPPORT	7125X1125X580	3665

	/2	ARRANGEMENTLOOSE ITEMS		
100	78130 /1	LP HEATER NO-1 SUPPORT ARRANGEMENT	2250X1700X1070	2965
101	78130 /2	LP HEATER SUPPORT ARRANGEMENT LOOSE ITEMS	7125X1125X580	3665
102	78132 /1	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310	1350
103	78132 /2	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310	1350
104	78133 /1	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310	1350
105	78133 /2	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310	1350
106	78136 /1	UPPER DOME WALL (F/W/B.SIDE)	5880X1930X380	3900
107	78136 /2	UPPER DOME WALL (TUR/GEN.SIDE)	5880X1930X360	3900
108	78137	UPPER DOME WALL,(LOOSE ITEMS)	5400X350X32	600
109	78139 /1	UPPER DOME WALL (RWB SIDE)	5880X1930X448	4000
110	78139 /2	UPPER DOME WALL (RWB SIDE)	5880X1930X448	4000
111	78142 /1	W/BOX REMOVAL DEVICE	2500X1000X750	3148
112	78142 /2	W/BOX REMOVAL DEVICE	2500X1000X750	3148
113	78143 /1	W/BOX REMOVAL DEVICE (CONDE.	2000X1500X500	2535
114	78143 /2	W/BOX REMOVAL DEVICE	2000X1500X500	2535
115	78150 /1	FRAME	1850X840X230	805
116	78150 /2	FRAME	1850X840X230	805
117	78151 /1	FRAME	1850X840X230	805
118	78151 /2	FRAME	1850X840X230	805
119	78154 /1	STEAM THROW DEVICE	1450X900X700	1261

120	78154 /2	STEAM THROW DEVICE	1450X900X700	1261
121	78155 /1	STEAM THROW DEVICE	1450X900X700	1261
122	78155 /2	STEAM THROW DEVICE	1450X900X700	1261
123	78157 /1	CONDENSER (LOOSE ITEMS)	850X250X250	36
124	78157 /2	CONDENSER (LOOSE ITEMS)	850X250X250	36
125	78158 /1	CONDENSER	2900X956X406	500
126	78158 /2	CONDENSER	2900X956X406	500
127	78159 /1	CONDENSER LOOSE ITEMS	1000X500X500	350
128	78159 /2	CONDENSER LOOSE ITEMS	1000X500X500	350
129	78165	LOOSE ITEMS (TOOLS & TACKLES)	1000X600X500	30
130	78166 /1	STAND PIPE NO.1	2750X420X400	110
131	78166 /2	STAND PIPE NO.1	2750X420X400	110
132	78167	CONDENSER STAND PIPE	3150X350X330	216
133	78169 /1	STAND PIPE NO.2	2750X420X390	110
134	78169 /2	STAND PIPE NO.2	2750X420X390	110
135	78175	CONDENSER INSTRUMENTRATION	1500X1000X1000	950
136	78176	CONDENSER INSTRUMENTATION	1000X500X500	140
137	78177	CONDENSER INSTRUMENTATION	1400X800X700	96
138	78301	GLAND STEAM CONDENSER	1015X1180X1400	1040
139	78304	LOOSE ITEMS OF GSC (FRAGILE)	600X800X400	120
140	78305	LOOSE ITEMS GSC(NON FRAGILE)	1500X650X450	360
141	78315 /1	LP.HEATER NO.1	11650X1250X1750	15000
142	78315 /2	LP.HEATER NO.1	11650X1250X1750	15000

143	78316 /1	LOOSE ITEMS OF LPH-1	500X400X400	300
144	78316 /2	LOOSE ITEMS OF LPH-1	500X400X400	300
145	78317 /1	LP HEATER NO.1 STAND PIPE	2200X700X500	65
146	78317 /2	LP HEATER NO.1 STAND PIPE	2200X700X500	65
147	78318 /1	LPH1 PANAL MOUNTED INSTRUMENT	2600X500X400	80
148	78318 /2	LPH1 PANAL MOUNTED INSTRUMENT	2600X500X400	80
149	78319 /1	LOOSE ITEMS LP HEATER NO.1	700X500X500	200
150	78319 /2	LOOSE ITEMS LP HEATER NO.1	700X500X500	200
151	78320 /1	TROLLEY FOR LP HEATER NO.1	1150X1050X250	400
152	78320 /2	TROLLEY FOR LP HEATER NO.1	1150X1050X250	400
153	78401	TUBRINE OIL COOLER	4650X1650X1980	9100
154	78405	TUBRINE OIL COOLER	4650X1650X1980	9100
155	78406	TOC (LOOSE ITEMS)	750X500X200	98
156	78407	TOC (LOOSE ITEMS)	800X600X600	70
157	78424	HYDROGEN COOLER	4600X1450X800	3135
158	78425	HYDROGEN COOLER	4600X1450X800	3135
159	78428	(HYDROGEN COOLERS	1300X1000X600	2550
160	78431	EXCITER AIR COOLER	3780X920X830	2280
161	78432	EXCITER AIR COOLER	3780X920X830	2280
162	78436	CONTROL FLUID COOLER	3300X850X1030	2901
163	78437	CONTROL FLUID COOLER	3300X850X1030	1791
164	78438	LOOSE ITEM (CFC)	600X600X500	127
			SUB TOTAL(C)	**649712**
D	**ACG**			
1	12001	STARTER CABINET FOR DC SEAL	1230x 1060x	675

		MOTOR	2550	
2	12002	GENERATOR INSTRUMENTATION CABINET	1230x 1060x 2550	675
3	12003	LOOSE ITEMS	600x 600x 400	65
4	12004	LOOSE ITEMS	1000x 800x 600	76
6	12006	STARTER CABINET FOR DC EMERGENCY OIL MOTOR	1230x 1060x 2550	675
			SUB TOTAL (D)	**2166**
			TOTAL(A+B+C+D	**2331192**

Bhopal Supply

S. N	DESCRIPTION	QTY	SIZE (MM)	Unit Wt (Kg.)	Total Wt (Kg.)
A.	**RE JOINTS**				
1	RE Joint OUTLET Assy.	1	3500 (L) X 3500 (W) 3500 (H)	16500	16500
2	RE Joint INLET Assy.	1	6200 (L) X 3200 (W) 6500(H)	17000	17000
				SUB TOTAL	**33500**
B.	**FLASH TANKS**				
1	H.P. F/Tank	1	3000 (OD) X 5300 (L)	8150	8150
2	L.P. F/TANK	1	3000 (OD) X 5300 (L)	8150	8150
3	Unit Flash Tank	1	2000 (OD) X 2500 (L)	1800	1800
				SUB TOTAL	**18100**
C.	**MISC TANKS**				
1	Clean Oil Tank.	1	3300 (L) X 6300 (W) X 4400 (H)	10540	10540
2	Dirty Oil Tank.	1	3300 (L) X 6300 (W) X 4400 (H)	10540	10540
3	Oil Unloading Vessel	1	2250 (L) X 1200 (W) X	590	590

			900 (H)		
4	DMCW Tank	1	7200 (L) X 2000 (W) X 2500 (H)	6000	6000
				SUB TOTAL	**27670**
D.	**BF VALVES**				
1	1800 Dia	4	2800 (L) X 2000 (W) X 750 (H)	5450	5450
2	500 Dia	5	1300 (L) X 800 (W) X 350 (H)	580	580
3	500 Dia	2	1300 (L) X 800 (W) X 350 (H)	550	550
4	450 Dia	13	1300 (L) X 800 (W) X 350 (H	550	550
5	450 Dia	10	1300 (L) X 800 (W) X 350 (H	550	550
				SUB TOTAL	**7680**
E.	**MOTORS**				
1	MD BFP MOTOR 12000KW	1	4500 x 4700 x 3000	25000	25000
2	CEP MOTOR 900KW	3	2600 (H) X DIA 2100	6000	6000
3	DMCW-SG Motor	2	2000 x 1600 x 2500	6000	6000
4	DMCW-TG Motor	3	2000 x 1600 x 2500	6000	6000
				SUB TOTAL	**43000**
TOTAL(A+B+C+D+E)					**129950**

Hyderabad Supply					
S.No	**Description**	**Total Qty**		**Unit WT(in Kg)**	**PACKING SIZE (mm) (L x W x H)**
		TD BFP-2NOS	**MD BFP-1NO**		
B.	**BOILER FEED PUMPS**				
01	Motor Driven Boiler Feed Pump (MD BFP) with Base Plate & Tubing	NA	1	11500	3200 x 2000 x 3100
02	Turbine Driven Boiler Feed	2	NA	11100	3200 x 2000 x

	Pump (TD BFP) with Base Plate & Tubing				3450
03	Motor Driven Boiler Feed Booster Pump (MD BP) with Base Plate & Tubing	NA	1	4600	2200 x 1900 x 3000
04	Turbine Driven Boiler Feed Booster Pump (TD BP) with Base Plate & Tubing	2	NA	4710	2200 x 1900 x 3000
05	BFP + Booster Pump Mech.seal skid	2 + 2	1 + 1	1000	1600 x 1300 x 1700
06	MD BFP + Hydraulic Coupling Grillage	NA	1	3800	6400 x 2700 x 400
07	MD BFP Motor + BP Grillage	NA	1	3710	6100 x 2700 x 400
08	Hydraulic Coupling	NA	1	11000	3700 x 2800 x 3900
09	HC L.O & W.O Oil Coolers & accessorie	NA	1 SET	3285	3900 x 2000 x 2150
10	Recirculation Valve	2	1	900	1000 x 1000 x 2800
11	Conical Suction Strainer at BFP suction	2	1	1200	3100 x 1000 x 1000
12	Basket type Suction Strainer at BP suction	2	1	2350	1500 x 1500 x 1600
13	Local Gauge Rack (LGB)–1,2&3	6	3	400(EACH)	1100 x 900 x 2200
14	Local instrument Transmitter Rack(LIR)	1(For 2 BFPs)	NA	250	2000 x 650 x 2150
15	Local instrument Transmitter Rack(LIR)	NA	1	150	1050 x 650 x 1500
				SUB TOTAL	**59955**
C.	**CONDENSATE EXTRACTION PUMP**				
01	Condensate Extraction Pump		3	6220	10,000 x 1700 x 1800
02	Foundation Frame		3	580	1600 x 1600 x 300
03	Canister		3	2700	7600 x 1300 x 1300

04	Basket type Suction Strainer at CEP suction	3	1350	1600 x 1600 x 1700
05	Local Gauge Rack	3	300	1300 x 900 x 2000
06	LIR Rack for Pr.Transmitters	1 (Common for 3 pumps)	250	2000 x 650 x 2150
07	LIR Rack for Diff.Pr.Transmitters	1 (Common for 3 pumps)	150	1050 x 650 x 1500
			SUB TOTAL	**11550**
D.	**DRAIN COOLER**			
1	DRAIN COOLER ASSLY	1	5800	L 6200 x W 1050 x H 1500
			SUB TOTAL	**5800**
E.	**DEAERATOR**			
1	Header	1	29500	L 10800 x W 3400 x H 3700
2	Storage Tank Sec-1	1	27000	L 13350 x W 3700 x H 4350
3	Storage Tank Sec-2	1	26600	L 12500 x W 3700 x H 4350
4	Storage Tank Sec-3	1	26550	L 13200 x W 3700 x H 4350
			SUB TOTAL	**109650**
F.	**LP HEATER**			
1	L.P. HEATER 2	1	26000	L 14500 x W 1900 x H 2200
2	L.P. HEATER 3	1	27500	L 13800 x W 1900 x H 2200
			SUB TOTAL	**53500**
G.	**HP HEATER**			
1	H.P.HEATER 5A/B	1	32500	L 11300 x W 1900 x H 2300
2	H.P.HEATERS 6A/B	1	47300	L 13100 x W 1750 x H 2300
			SUB TOTAL	**79800**
H.	**BFPDT Twin oil Cooler**			
1	Per Cooler	2	5700	Ø 508 x H

				5000
			SUB TOTAL	**5700**
	TOTAL (A+B+C+D+E+F+G+H)			**325955**

HARDWAR BOI's				
A	**GENERATOR & AUXILARIES**			
SN	**ITEM ID**	**ITEM DESCRIPTION**	**QTY**	**UNIT**
1	BG001	EMPTY H2 CYLINDER	180	NO
2	BG002	EMPTY CO2 CYLINDER	60	NO
3	BG003	EMPTY N2 CYLINDER	12	NO
4	BG005	MOISTURE MEASURING SYSTEM	1	ST
5	BG007	VAPOUR EXHAUSTER	2	NO
6	BG009	H2 GAS ANALYSER CABINET	1	NO
7	BG011	REFRIGERATION GAS DRYER	2	NO
8	BG018	STARTING RESISTOR FOR DC S.O MOTOR	1	NO
9	BG019	SOUND ABSORBING LINING FOR EXCITER COVER & COUPLING COVER	1	ST
10	BG021	GROUNDING BRUSH MONITOR	1	ST
11	BG023	CONTINUOUS ON-LINE PARTIAL DISCHARGE MONITORING SYSTEM	1	ST
12	BG066	GENERATOR END WINDING VIBRATION MONITORING EQUIPMENT FOR TURBOGENERATOR	1	ST
13	BG079	PRIMARY WATER COOLER (PLATE TYPE)	2	NO

14	BG080	STROBOSCOPE	1	NO
15	BG090	GENERATOR INTEGRAL PIPING	1	ST
16	BG091	HYDROGEN COOLERS PIPING	1	ST
B	**CONDENSER & HEAT EXCHANGERS**			
1	BH001	WELDED AUSTENITIC S.S. TUBES GR.304 (FOR CONDENSOR)	1	ST
2	BH010	CONDENSOR AIR EVACUATION PACKAGE(VACUUM PUMP)	4	NO
3	BH012	AIR EXHAUSTER WITH MOTOR (GSC AIR EXHAUSTER)	2	NO
C	**TURBINE & AUXILARIES**			
1	BT001	LIFTING BEAM	1	NO
2	BT002	JACKING OIL PUMPS	1	ST
3	BT003	AOP	1	ST
		EOP	1	ST
4	BT004	DUPLEX FILTER (LUB.OIL)	1	NO
5	BT005	DUPLEX FILTER (JACKING OIL)	1	NO
6	BT006	BUTTERFLY VALVES	1	ST
7	BT007	THREE WAY TEMP. CONTROL VALVE	1	ST
8	BT008	DOUBLE THREE WAY VALVES	1	ST
9	BT009	NRV WITH ALUMINIUM FLAP	1	ST
10	BT010	PRESSURE LIMIT VALVE	2	NO
11	BT011	OIL PURIFICATION UNIT (OIL CENTRIFUGE)	1	NO
12	BT012	OIL VAPOUR EXHAUSTER	2	NO
13	BT013	LEAD DIAPHRAGM	8	NO
14	BT014	SPRAY NOZZLES	1	ST
15	BT015	DIRT CATCHERS	1	NO
16	BT016	DAMPER	1	ST
17	BT017	VARIABLE LOAD SPRING CAGES	1	ST
18	BT018	FLEXIBLE BENDS	1	ST
19	BT020	THERMAL INSULATION OF TURBINE	1	NO
20	BT021	THERMAL INSULATION OF TIP	1	ST
21	BT022	TURBINE CLEADING	1	NO
22	BT023	TURBINE OIL	99	QM
23	BT024	DRY AIR PRESERVATION SYSTEM	1	NO
24	BT025	OIL PURIFICATION SYSTEM (CENTRAL)	1	NO
25	BT027	TURBINE INTEGRAL PIPING	1	ST
26	BT028	H & S FOR TURBINE INTEGRAL PIPING	1	ST

27	BT029	CALIBRATED FLOW NOZZLE ASSLY.	1	ST
28	BT031	THROUGH PORT GATE VALVE	1	ST
29	BT032	GLOBE VALVE	2	NO
30	BT033	SPRING LOADED NRV	1	ST
31	BT035	CONTROL FLUID PUMP	2	NO
32	BT036	CONTROL FLUID VAPOUR EXHAUSTER	2	NO
33	BT037	CONTROL FLUID PURIFICATION UNIT	1	NO
34	BT038	CONTROL FLUID TANK (SS)	1	NO
35	BT039	ON LINE CONTROL FLUID HEATER	1	NO
36	BT040	REMOTE TRIP SOLENOID VALVE	1	NO
37	BT043	CONTROL FLUID (FRF)	32	QM
38	BT044	CDEGEAR PUMPS	1	ST
39	BT046	LP BYPASS STOP & CONTROL VALVE WITH EHA AND WATER INJECTION VALVE	1	ST
40	BT067	HYDRAULIC ACCUMULATORS ALONG WITH FILLING & GAUGING DEVICE	1	ST
41	BT068	POWER CABLES FOR 24 V SOLENOID VALVES (5x2.5mm2)	1	ST
42	BT074	VACUUM BREAKER VALVE WITH PNEUMATIC ACTUATOR	1	NO
43	BT075	SEAL STEAM SUPPLY & LEAKAGE STEAM CONTROL VALVE WITH PNEUMATIC ACTUATOR	1	ST
44	BT081	HPT STEAM EVACUATION VALVE	1	NO
		TOTAL WEIGHT(HARDWAR BOI's)- 518509.5KGS		

PEM BOI	
S. No	**PACKAGE**
1	CONTROL VALVES INCLUDING SMART POSITIONER
2	FLOW ELEMENTS
3	MISCELLANEOUS PUMPS-HORIZONTAL (DMCW PUMPS)
4	PLATE HEAT EXCHANGERS
5	CONDENSER ON LOAD TUBE CLEANING SYSTEM
6	AUXILARY PRDS

7	CHEMICAL DOSING SYSTEM
8	LUBE OIL TRANSFER PUMPS
9	ME BELLOWS
10	CONDENSATE POLISHING UNIT
11	BONDED MIN.(R)WOOL MATTRESSES & PIPE SECTIONS OR ONLY BONDED MIN.(R)WOOL MATTRESSES
12	ALUMINIUM SHEETS/G.I. SHEETS
13	ANCILLIARY MATERIAL
14	VALVES
15	BALL VALVES
16	BF VALVES (WATER SYSTEMS)
17	BF VALVES (STEAM SERVICE)
18	CI GATE GLOBE & NRV
19	STEEL GATE/GLOBE/NRV
20	(POWER CYCLE) STEEL GATE/GLOBE/NRV
21	GUN METAL VALVES
22	AIR TRAP
23	STEAM TRAPS
24	VIS FOR BFP FOUNDATIONS
TOTAL WEIGHT(PEM BOI's)-522072.0 KGS	

PC CHENNAI SUPPLY

LP PIPING

SL NO	Package	PGMA	DESCRIPTION	WT/Kgs)	IBR
1	LP	80412	CONDENSATE TRANSFER	16200	N
2	LP	80463	TG AUX COOLING WATER	145800	N

3	LP	80468	MAIN CIRCULATION WATER PIPING	180000	N
4	LP	80473	DEMINERALISED WATER SYSTEM	22500	N
5	LP	80477	SERVICE WATER PIPING	99000	N
6	LP	80610	SERVICE AIR-COMP SUCT & DIS TO RECEIVER	22500	N
7	LP	80614	INST AIR COMP SUC & DIS TO RECEIVER	22500	N
8	LP	80933	H & S FOR LP PIPING	24300	N
			TOTAL(LP PIPING)	**532800**	

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.

S.N.	EQUIPMENT / PACKAGE	GR.WT (IN KG.)	APPROX. WT. (IN MT)
1	STEAM TURBINE	1109210.0	1109.2
2	GENERATOR	570104.0	570.1
3	CONDENSER	649712.0	649.7
4	ACG	2166.0	2.2
5	RE JOINTS	33500.0	33.5
6	FLASH TANKS	18100.0	18.1
7	MISC TANKS	27670.0	27.7
8	BUTTERFLY VALVES	7680.0	7.7
9	MOTORS	4300.0	4.3
11	BOILER FEED PUMPS	59955.0	60.0
12	CONDENSATE EXTRACTION PUMPS	11550.0	11.6
13	DRAIN COOLER	5800.0	5.8
14	DEAERATOR	109650.0	109.7
15	LP HEATERS	53500.0	53.5
16	HP HEATERS	79800.0	79.8
17	BFPDT COOLER	5700.0	5.7
18	HARIDWAR BOI	518509.5	518.5
19	PEM BOI	522072.0	522.1
20	LP PIPING	532800.0	532.8
TOTAL		**3788979.0**	**4321.8**

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-II
PROPOSED PAINTING SCHEME FOR TG AREA

NOTE:

- Painting scheme is attached below and shall form a part of tender specification.
- 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.

SECTION VII

APPENDIX - VI

PAINTING SCHEME

BASED ON BHEL EXPERIENCE

सामग्री सूची संख्या का अधिक्रमित करता है । INVENTORY NO. SUPERSEDES

INSTRUCTIONS FOR PAINTING AND PRESERVATION OF CONDENSERS (KWU DESIGN) AT HARDWAR

				नाम NAME	दिनांक एवं हस्ताक्षर SIGN. & DATE
			अनुवादक TRANSLATED BY		
TSX	S. NATH		निर्माणकर्ता WORKED BY	R.RAWAT	12-01-04
QAX	A.S.CHANDNA	20/1/04	परीक्षणकर्ता CHECKED BY	R.RAWAT	12-01-04
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	K.N.MEHTA	14-01-04

हस्ताक्षर एवं दिनांक SIGN & DATE 27/1/04

सामग्री सूची संख्या INVENTORY NO. P-55550

स्वीकृति : APPROVED : V.K.SAXENA / AGM (HXE) 22-1-04

HE 6.20

Rev No. 01

24-01-04

निर्माण : PREPARED	जारी : ISSUED	दिनांक : DATE
HXE	HXE, HARDWAR	04-12-01

INSTRUCTIONS FOR PAINTING AND PRESERVATION OF CONDENSERS (KWU DESIGN)

CONTENTS

1.0 General : These instructions provide standard guidelines towards painting and preservation of all components / assemblies of KWU design condensers manufactured in the shops or by sub-contractors.

The treatment prescribed shall be adopted as normal practice and in case where customers desire specific deviations, these shall be done as per the instructions of Engineering.

1.1 The final painting of the condenser and its assemblies is to be done after its complete erection at site.

2.0 Preservation materials: The list of preservatives and other materials to be used for condenser in HEEP are given as under:

2.1 Anti corrosive priming paint as per AA56101.
Code no's : Primer - AA 5610001013 ; Thinner – AA 5670001001/AA 56701

2.2 Temporary rust preventive paint as per AA 55151
(Steam washable paint) (HE 1712)
Code no's : HW 5510051000

2.3 Mobilux Grease – 2 from M/S IOC
Code no. : HW 5740099005

2.4 Waxed paper as per AA 51407
Code no.: HW 5141507998

2.5 Mineral turpentine oil as per IS: 1745
Code no. : HW 5670095014

2.6 Water proof abrasive paper grit 220

2.7 Cellulose stopper as per AA 55306
Code no. : AA 5530006000

2.8 DTE Medium oil as per AA 5710004006/ AA 57104

2.9 Epoxy based Zinc rich primer paint as per AA 56114
Code no. : HW 5610014000

2.10 High Build Intermediate epoxy paint as per AA 56112
Code no. : HW 5610012996

2.11 Polyurethane finishing paint as per AA 56142
Code no. : HW 5610042992

2.12 High build black coal tar epoxy paint as per AA 5610035554

Code no. : Base - AA 5610035554
Accelerator - AA 5610035600
Thinner - AA 5670008006 / AA 56708

3.0 Tools and equipments: For operations on these instructions the following tools and equipments are required:

3.1 Shot blasting equipment.
3.2 Hoses for blowing the air.
3.3 Steel brushes, files, portable grinder.
3.4 Hand lamp
3.5 Viscosity- meter
3.6 Stop watch
3.7 Spray gun
3.8 Metallic or rubber knife for filling putty
3.9 Different brushes
3.10 Gloves
3.11 Gas mask
3.12 Containers and buckets
3.13 Sieve (metallic or nylon)
3.14 Funnels
3.15 Thickness meter/ coat gauge

4.0 Painting and preservation:

4.1 Proper painting and preservation of sub-assemblies and parts of condenser and heat exchangers is very much essential to protect the surfaces against corrosion.

4.2 Proper preparation of the surfaces before applying the coating is of vital importance in order to have effective protection of parts against corrosion. The surface of the part to be painted should be uniform, clean from corrosion, oil, and dirt. It should be dry and free from burns. Even the slight dirt left over the surface may later on cause destruction of the coating fills and subsequent corrosion of metals.

4.3 The surface of the parts prepared for painting should be prevented from the atmospheric action of moisture and dirt etc. and shall have metallic shine.

4.4 Painting or preservation of parts must be done not later than 8-10 hrs after cleaning and degreasing.

4.5 The parts to be painted should be at room temperature and painting should be done in well ventilated room.

4.6 The paints and primer should be diluted to working viscosity with the thinner as given in the suppliers catalogues or as mentioned under clause 6.2.

4.7 Surfaces can be coated with paint/ varnish by spray gun, brush or by dipping.

4.8 Conservation grease can be put on the surface either in cold or hot condition by hair brush or spatula.

4.9 The parts conserved by grease should be additionally protected by waxed paper.

4.10 The protective surface coat must be applied very carefully so as to have a uniform layer thickness without any pores. Discontinuity or break in layer and air inclusions are not permitted.

4.11 Each individual coating will be well dried before applying the next coat. Before applying the second/ subsequent coat it should be ensured that the surface is free from paint cracks, molten pearls and other foreign impurities.

4.12 Quality of painted surfaces should be checked by visual inspection. Any observed defect should be immediately rectified. Special attention should be paid for painting of those parts which are inaccessible.

4.13 All anticorrosive materials (paints, varnishes, grease etc.) are inflammable and therefore it is necessary to store them in special places which are reliably fire-proof.

4.14 Freshly painted parts should not be stored immediately before drying. These should not press against the floor and in no case rain water is allowed to drop.

4.15 All the paints prepared should be consumed before the expiry of its pot life. Outaged paints should never be applied. The primer is to be utilised within the time specified in the container by the manufacturer of the primer.

4.16 All pipes which can not be painted from inside should be thoroughly cleaned and dried from inside and blanked by plastic or wooden plugs.

5.0 Special instructions:

5.1 Machined surfaces as well as threads are not to be painted. These are to be given a coat of Mobilux grease.

5.2 Edges requiring welding later are to be left unpainted upto 80 mm from the edges.

5.3 Surfaces damaged during the storage and handling in plant should be checked immediately and coated with the same paint after preparation of the damaged surface.

5.4 Loose items of the assemblies/ sub-assemblies mentioned in table-1 are to be painted as per the instructions given on the respective drawings.

5.5 Both the primer and its thinner should be compatible to each other.

6.0 Technological process of painting:

6.1 **Surface preparation:** It is necessary that the surface to be painted is free from loose dust, mill scale, rust, grease, oil, old film etc. Surface cleaning and preparation is to be done as per CS AA 0674101.

6.2 **Preparation of paint (AA 56101) :** Before application, any skin formed on the paint in the tin shall be carefully removed and any settled pigment broken up and loosened. The paint shall be thoroughly stirred to ensure complete and uniform mixing of the constituents. Care shall be taken to avoid entraining air into the paint while stirring.

The priming paint (AA 56101) shall be used at the consistency given below if not specified by the paint supplier.

Process	Flow time of the paints in Ford Cup no. 4 (IS: 101)
Spraying	30 ± 2 sec.
Brushing	60 – 70 sec

These consistencies shall be adjusted using thinner and these flow times shall be maintained independently of temperature within normal shop variations.

6.3 Application of paints:

6.3.1 Application of first coat AA 56101: Over the cleaned surface one coat of Anticorrosive priming paint to AA 56101 at the appropriate consistency shall be applied by spraying or brushing as specified.

6.3.2 Drying: The painted surface shall be allowed to air dry for a minimum period of 12 hours.

6.3.3 Repair of damage to the first coat: Any local damage which has been caused to the first primer coat shall be repaired by cleaning with water proof abrasive paper and then by applying a coat of primer AA 56101 and allow it to dry for a minimum period of 12 hours.

6.3.4 Application of cellulose stopper: Cellulose stopper shall be applied if required, to fill up dents and scratches and allowed to air dry for a period of 4 to 5 hours. The cellulose surface shall then be rubbed down with water roof abrasive paper no. 220. Loose dust shall be washed with water where ever possible and the surfaces allowed to dry completely. Usually this takes about 2 to 3 hours. Where water washing is not possible the loose dust shall be wiped off by a blast of air or dry clean cloth.

6.3.5 Application of second primer coat AA56101: Immediately before the application of second coat, the surface shall be cleaned with mineral turpentine oil where necessary.
The priming paint AA 56101shall be then applied over the surface in accordance with clause 6.3.1 .

6.3.6 Application of High Build Black Coal Tar Epoxide paint AA56135: Process of application of this primer shall conform to AA 0674104.

6.3.7 Application of Priming Paint AA 56114: Process of application of this primer shall conform to AA 0674123.

6.3.8 Application of High Build Intermediate Epoxy paint AA56112: Process of application of this primer shall conform to AA 0674123.

6.3.9 Application of Polyurethane finish paint AA56142: Process of application of this primer shall conform to AA 0674123

6.3.10 Drying: The painted surface shall be allowed to air dry for a minimum period of 12 hours.

7.0 Quality checks:

7.1 Quality control should inspect the various paints and putties received in stores according to relevant specifications.

7.2 The QC/shop should ensure that complete technological process of painting is followed and all the operations are carried out fully.

7.3 The viscosity of the paints/ primers should be checked after adding the solvent/ thinner for each mixture in viscosity meter.

7.4 The QC department shall visually inspect the finished component for various paint film defects such as gloss, uniformity of shade, wrinkles, orange peel effect, blistering etc.

7.5 The thickness of the dried painted film, when measured by using suitable instruments for the non-destructive measurement of the coats as detailed in IS: 6012, shall be as follows:

Paint (coat)	No. of coats	Dry Film thickness
Primer as per AA 56114	2	70 microns
Intermediate as per AA 56112	1	70 microns
Final as per AA 56142	2	60 microns
Primer as per AA 56101	2	70 microns
Final as per AA 56135	2	200 microns

8.0 List of cross referred specifications/standards :

AA 56101, AA 55151, AA 56112, AA 56114, AA 56135, AA 56708, AA 57104, AA 55306, AA 0674101, AA 0674104, AA 0674123, IS 101, IS 6012

Rev No. 01

Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks
1	2	3	4	5	6	7	8
1.0	**Bottom Plate, Dome walls, Side walls, Hot well**				160-11 to 160-17 160-21 160-22 160-25	Spray or Brush	Edges subjected to welding after painting should be left uncoated (Approx. 80 mm)
1.1	**Outer Surface**						
	Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2	160-26 160-45		Process of application AA0674123
	Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1			
	Finish paint coat	- Polyurethane finish paint	AA56142	2			Finish paint coat to be done at site.
		(Total DFT of primer, intermediate & finish paint shall be at least 180 microns)					
1.2	**Inner Surface (steam space)**	Steam washable paint	AA55151	2	-- do –	--do –	
2.0	**Main tube plate blanks(before drilling). All over**	DTE Medium oil & covered with polythene sheet.	AA57104	1	160-18 160-19 160-23 160-24	--do –	DTE Medium Oil to be sprayed after shot blasting.
3.0	**Support tube plate blanks (before drilling) All over**	DTE Medium oil & covered with polythene sheet.	AA57104	1	160-28	--do –	DTE Medium Oil to be sprayed after shot blasting.

निर्माणकर्ता Worked by	जांचकर्ता Checked by
R.RAWAT	K.N.MEHTA

उत्पाद मानक

PRODUCT STANDARD

HEAT EXCHANGER ENGINEERING

HE 77001

Rev No. 01

Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks
1	2	3	4	5	6	7	8
4.0	**Support tube plate blanks (after drilling) All over**	Steam washable paint	AA55151	2	160-28	Spray or Brush	Paint should cover all tube holes
5.0	**Front and Rear water chambers (end sections)**						
5.1	Outer surfaces						
	Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2	160-18 160-24	--do—	Process of application AA0674123
	Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1	160-29		
	Finish paint coat	- Polyurethane finish paint (Total DFT of primer, intermediate & finish paint shall be at least 180 micron)	AA56142	2			Finish paint coat to be done at site
5.2	Inner surfaces (steam space side) including tube plate on both sides	Steam washable paint	AA55151	2		--do—	Steam washable paint should cover tube holes also.
5.3	Inner surface (Cooling water side) excluding tube plate						
5.3.1	Sea water applications	Anti corrosive Priming paint	AA56101	2		--do—	Specific instructions to be given in the drawing for sea water application.
5.3.2	Inland water	- Epoxy based zinc rich primer paint	AA56114	2		--do—	Process of application AA0674123
		- High build black coal tar epoxide paint. (Total DFT of the primer & final paint shall be at least 250 microns)	AA56135	2		Brush	Process of application AA0674104
5.4	Machined flanges	Mobilux grease –2 with waxed paper	M/s IOC HW57400 99005				

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Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks
1	2	3	4	5	6	7	8
6.0	**Water boxes, CW inlet/outlet nozzles.**				160-31 160-32 160-34 160-35	Spray or Brush	
6.1	Outer surfaces excluding machined surfaces						
	Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2			
	Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1			Process of application AA0674123
	Finish paint coat	- Polyurethane finish paint	AA56142	2			
		(Total DFT of primer, intermediate & finish paint shall be at least 180 microns)					Finish paint coat to be done at site
6.2	Inner surfaces excluding machined surfaces.						Specific instruction to be given in the drawing for lining.
6.2.1	Sea water applications	Anti corrosive Priming paint.	AA56101	2	--do—	--do—	
6.2.2	Inland water	- Epoxy based zinc rich primer paint	AA56114	2		--do—	Process of application AA0674123
		- High build black coal tar epoxide paint. (Total DFT of the primer & final paint shall be at least 250 microns)	AA56135	2		Brush	Process of application AA0674104
6.3.	Machined flanges including the threaded/ unthreaded holes on it.	Mobilux grease –2 with waxed paper	M/s IOC HW57400 99005	--	--do—	--do—	
7.0	**Air suction piping (outer surfaces)**	Steam washable paint	AA55151	2	160-36	--do—	
8.0	**Shell internals & baffles including stiffening rods & pipes. (outer surfaces)**	Steam washable paint	AA55151	2	160-28	--do—	

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Rev No. 01	Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks
	1	2	3	4	5	6	7	8
	9.0	**Dome internals. (outer surfaces)**	Steam washable paint	AA55151	2	160-29	Spray or Brush	
	10.0	**LP Heater support structure. (All over)**	Steam washable paint	AA55151	2	160-38	--do—	
	11.0	**Steam throw device.**						
	11.1	Outer surfaces						
		Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2	160-49	--do—	Process of application AA0674123
		Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1			
		Finish paint coat	- Polyurethane finish paint	AA56142	2			Finish paint coat to be done at site.
			(Total DFT of primer, intermediate & finish paint shall be at least 180 micron)					
	11.2	Inner surfaces.	Steam washable paint	AA55151	2	--do—	--do—	
	12.0	**Hinge and Hinge support assembly.**						
	12.1	Unmachined surfaces						
		Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2	160-51 160-37	--do—	Process of application AA0674123
		Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1			
		Finish paint coat	- Polyurethane finish paint	AA56142	2			Finish paint coat to be done at site.
			(Total DFT of primer, intermediate & finish paint shall be at least 180 micron)					
	12.2	Machined surfaces	Mobilux grease-2 with waxed paper	M/s IOC HW57400 99005				

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Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks
1	2	3	4	5	6	7	8
13.0	**Sole plate and packers for spring assemblies. All over**	Steam washable paint	AA55151	2	160-71	Spray or Brush	
14.0	**Springs . All over**	--	--	--	160-71	--	
15.0	**Springs cages. All over.**						
	Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2	160-71	Spray or Brush	Process of application AA0674123
	Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1			
	Finish paint coat	- Polyurethane finish paint	AA56142	2			Finish paint coat to be done at site.
		(Total DFT of primer, intermediate & finish paint shall be at least 180 microns)					
16.0	**Stand pipes.**						
	Outer surfaces						
	Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2	160-72	--do—	Process of application AA0674123
	Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1			Finish paint coat to be done at site.
	Finish paint coat	- Polyurethane finish paint	AA56142	2			
		(Total DFT of primer, intermediate & finish paint shall be at least 180 microns)					
17.0	**Stay rods and similar other components. All over.**	Steam washable paint	AA55151	2	160-51 160-28	--do—	

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11 GENERAL

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

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

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

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

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

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

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

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, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/pickings/lubricants for replacement will be provided by BHEL free of cost.

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

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

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

13.7
All racks or assembled units like Governing Rack, Seal Oil Unit, Gas Unit, Seal Oil Valve Rack, Gas Cylinder Racks etc supplied from manufacturing units will be tested in BHEL/ Customer stores or at site. This may require transportation, filling of oil, water etc in these racks for carrying out testing of these racks. Defects noticed during testing of these racks will have to be rectified by the contractor free of charges. Further, any pipeline / flanges / fittings not found assembled properly, the same have to be rectified / corrected by the contractor free of charges.

14 PIPING INSTALLATION

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

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

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

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

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

14.3

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**

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

16.1.2

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

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

16.2 HANDLING OF HEAVIER EQUIPMENTS

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

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

16.3 DEAERATOR INSTALLATION

16.3.1

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

16.3.2

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

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.

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 deacrator/ 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 BOI's, though not listed above but required for completion
4. ST-TG auxiliaries including, but not limited, to heat exchangers, pumps, tanks and vessels and other equipments
5. TG integral piping including condensate and extraction system piping

23.2

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