TENDER SPECIFICATION
BHEL PSSR SCT 1463

ERECTION, TESTING AND COMMISSIONING OF STEAM TURBINE, GENERATOR AND ITS AUXILIARIES FOR UNIT 1&2 OF 2X600MW

at

JINDAL INDIA THERMAL POWER, DERANG, ANGUL, ORISSA

VOLUME-I BOOK - I

TECHNOCOMMERCIAL BID (Book I & II)

Book-I consists of

- Notice Inviting Tender,
- Volume-IA : Technical Conditions of Contract

Book-II consists of

- 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 – Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector, Southern Region
690, Anna Salai, Nandanam, Chennai – 35

Tender Specification No. BHEL: PSSR: SCT: 1463

for

BHEL PSSR SCT 1463 Handling at site stores storage yard Transportation to site of work Pre assembly Erection Testing and Commissioning of Steam Turbine Generator and auxiliaries and other BOI Including Supply and Application of Final Painting for Unit-1&2 of 2x600 MW sets at Jindal India Thermal Power Limited, Derang, Angul, Orissa

One set of Tender documents consisting of Volume-I and Volume II

BOOK SLNO_____
Issued to
M/s

Refer NIT for Last date of submission

Please note this tender document is not transferable

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED

ADDL GENERAL MANAGER / CONTRACTS

Place: Chennai -35
Date:

Rev 00
6th July
2010

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

NOTICE INVITING TENDER (NIT)

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

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BHEL PSSR SCT 1463 DT: 23.06.2011

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	BHEL PSSR SCT 1463	
ii	Broad Scope of job	Handling at site stores / storage yard, Transportation to site of work, Pre-assembly, Erection, Testing and Commissioning of Steam Turbine, Generator and auxiliaries, and other BOI Including Supply and Application of Final Painting for Unit-1&2 of 2x600 MW sets at Jindal India Thermal Power Limited, Derang, Angul, Orissa	
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(F&P)*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	Issue of Tender Documents	*1. Sale from BHEL PSSR Regional office at :Chennai* *Start : 23/062011* *Closes: 12/07/2011* 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 OF OFFER SUBMISSION	*Date : 13 /07/ 2011 , Time :15.00Hrs* *Place : BHEL PSSR :Chennai* Tenders can be submitted through representative/in person at SCT Dept, BHEL PSSR, Chennai	*Applicable*

vi	OPENING OF TENDER	*Date : 13 /07/ 2010 , Time :15.30Hrs* *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 2 000/- (Rupees Two Thousands Only)*	*Applicable*
ix	LAST DATE FOR SEEKING CLARIFICATION	*At least 7 days before the due date of offer submission or two days before the scheduled date of prebid meeting whichever is earlier* *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: 06/07/2011,11.00hrs at BHEL PSSR*	*Applicable.*
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)	Bidders shall enter into an **Integrity Pact (IP)** with BHEL as per format given at Volume 1D Formats of this tender. The bidders are required to return this Integrity Pact (IP) along with Techno Commercial Bid duly signed and stamped by the authorized signatory who signs the bid. It may be noted that only those bidders who have entered into such an IP with BHEL would be competent to participate against this tender .i.e. entering into this pact is a preliminary qualifications for the bidders. The Independent External Monitor against this NIT shall be ……	*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 only in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendum) 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 Chennai 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 Chennai, 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 Chennai. 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)
- One set of each document shall be retained by THE BIDDER for their reference.

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: (Shall be applicable for all Bid Evaluation from 1st Jul 2011)

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

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

i). Number of Similar Jobs

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

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

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

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

i). Ratings by Power Sector Region:

a) PS ER's Rating 'Rer' = ($X_1 + X_2 + .. + X_n$) divided by Ner
b) PS WR's Rating 'Rwr' = ($X_1 + X_2 + .. + X_n$) divided by Nwr
c) PS SR's Rating 'Rsr' = ($X_1 + X_2 + .. + X_n$) divided by Nsr
d) PS NR's Rating 'Rnr' = ($X_1 + X_2 + .. + X_n$) divided by Nnr
e) Over all Power Sector Region Rating 'R_{BHEL}'= (Rer+ Rwr+ Rsr+ Rnr) divided by (Ner+ Nwr+ Nsr+ Nnr)

(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 as detailed in the scope 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 Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of 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 Mode of Award of work for Unit-1 and Unit-2

(i) There are two units of 600 MW each at Jindal India Thermal Power Limited. Tender SCT1463 is for Unit 1 – 600 MW only. The quantity indicated in the price bid is for Unit 1 only and the quantity for Unit 2 is also same.

(ii) The L1 bidder against this quote will be awarded the contract for one unit of Jindal India Thermal power Limited.

(iii) BHEL reserves the right to award the contract for other Unit of Jindal India Thermal Power Limited on the same terms and conditions of SCT1463 to the next lowest bidder in the order of competitiveness who should match his rates / price with awarded price / rate for awarded Unit.

(iv) Thus the work for Units 1 and 2 will be awarded to two agencies i.e. Unit-1 work for one agency and Unit 2 work for the other agency. However, of the two units, which unit to be awarded to which agency is subject to BHEL's discretion.

(v) In case the other bidders in their order of competitiveness do not accept to match their rates/Price with awarded price / rate of first awarded Unit, then BHEL reserves the option to consider the L1 bidder, for award of next Unit work also at the same rate / Price and at the same Terms & Conditions of first awarded Unit. This will be solely at the discretion of BHEL and the L1 bidder, who is awarded the work of one Unit, shall not have any claim for award of the other Unit work to him, on conditions whatsoever.

(vi) Incase BHEL, at its discretion opts to go for re-tendering for award of work for second Unit, then the L1 bidder who is awarded with first Unit work shall not be considered for second Unit work.

(vii) Each unit will be treated as a separate contract.

27.0 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 (SCT)

Enclosure

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

ANNEXURE – 1

PRE QUALIFYING CRITERIA

JOB	Handling at site stores / storage yard, Transportation to site of work, Pre-assembly, Erection, Testing and Commissioning of Steam Turbine, Generator and auxiliaries, and other BOI Including Supply and Application of Final Painting for unit-1&2 of 2x600 MW sets at Jindal India Thermal Power Limited, Derang, Angul, Orissa
TENDER NO	BHEL PSSR SCT 1463

SL NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document
A	Submission of Integrity Pact duly signed (if applicable)	~~Applicable~~/Not applicable	
B	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	Shall be applicable for Bid Evaluation from 1st Jul 2011	
C	Technical The bidders would have executed erection and commissioning of **STG works** for atleast one unit of 190MW or above in any Power Plant in the last seven years preceding the scheduled date of Bid submission. Note: The term executed in the above QR means "the unit is synchronized".		
D 1	Financial TURNOVER The bidders should have a minimum average financial turnover of Rs 148 Lakhs in last three financial years ending on 31st March 2010		
2	NETWORTH The bidder should have should have positive net worth as on 31.03.2010		
3	PROFIT The bidder should have earned profit in any one of the last three financial years ending on 31.03.2010		
4	Notwithstanding the above, BHEL reserves the right to reject any or all the tenders for the reasons whatsoever beyond our control and the decision of BHEL is final		

E	Approval of Customer (if applicable) Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	APPLICABLE	
F	Consortium criteria (if applicable)	NOT APPLICABLE	
	Explanatory Notes for QR 'A' 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		

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT (copies of Work order / LOI / LOA and work completion certificate) IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

ANNEXURE – 2 CHECK LIST

NOTE: - Tenderers are required to either fill in or submit separately the following details.

1	Name and Address of the Tenderer			
2	Details about type of the Firm / Company			
3a	Details of Contact person for this Tender: Name : Mr / Ms Designation: Telephone No: Mobile No: Fax No: E-mail ID:			
3b	Details of alternate Contact person for this Tender: Name : Mr / Ms Designation: Telephone No: Mobile No: Fax No: E-mail ID:			
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER		
5	Validity of offer	To be valid for six months from due date		
			APPLICABILITY	BIDDER REPLY
6	Whether the format for compliance with PRE QUALIFICATION CRITERIA is understood and filled with proper supporting documents referenced in the specified format		Applicable / Not applicable	YES / NO

7a	Audited profit and Loss Account for the last three years submitted	Applicable / Not applicable	YES/NO
7b	Audited profit and Loss Account of backup guarantor for the last three years submitted	Applicable / Not applicable	YES/NO
8	Copy of PAN Card submitted	Applicable / Not applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable / Not applicable	YES/NO
10	Integrity Pact	Applicable / Not applicable	YES/NO
11	Declaration by Authorised Signatory	Applicable / Not applicable	YES/NO
12	No Deviation Certificate	Applicable / Not applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable / Not applicable	YES/NO
14	Declaration for relation in BHEL	Applicable / Not applicable	YES/NO
15	Non Disclosure Certificate	Applicable / Not applicable	YES/NO
16	Bank Account Details for E-Payment	Applicable / Not applicable	YES/NO
16	Capacity Evaluation of Bidder for current Tender	Applicable / Not applicable	YES/NO
17	Tie Ups / Consortium Agreement are submitted as per format	Applicable / Not applicable	YES/NO
18	Power of Attorney for Submission of Tender / Signing Contract Agreement	Applicable / Not applicable	YES/NO
19	Analysis of Unit rates	Applicable / Not applicable	YES/NO
20	Unquoted price bid submitted or not	Applicable / Not applicable	YES/NO

NOTE: STRIKE OFF ‘YES’ OR ‘NO’, AS APPLICABLE

Date:

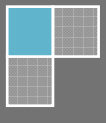
AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Rev 00
6th July
2010

VOLUME – IA
Part I & II
TECHNICAL CONDITIONS OF CONTRACT (TCC)

(Document No PS:MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED



CONTENTS

Volume 1A Part-1 Chapter -I PROJECT INFORMATION

JINDAL INDIA THERMAL POWER LIMITED 2 X 600 MW

1	PROJECT NAME	**JINDAL INDIA THERMAL POWER LIMITED**
2	NO OF UNITS X CAPACITY	2X600 MW
3	PROJECT SETTING UP BY	JINDAL INDIA THERMAL POWER LIMITED
4	LOCATION AND APPROACH	VILLAGE –DERANG, DISTRICT: ANGUL, STATE: ORISSA
5	NEAREST RAILWAY STATION	TALCHER
6	NEAREST MAJOR TOWN & DISTANCE	40 KM FROM ANGUL
7	NEAREST AIRPORT & DISTANCE	160 KM FROM BHUBANESWAR.
8	NEAREST HIGHWAY & DISTANCE	20 KM FROM NH 23
9	**TEMPERATURE (DRY BULB)** ABSOLUTE MIM. ABSOLUTE MAX. AVERAGE	 9.7 DEG C 45 DEG C 35 DEG C
10	**RELATIVE HUMIDITY** MAXIMUM MINIMUM	 75% 54%
11	ANNUAL RAIN FALL	1287 MM
12	ANNUAL MEAN WIND SPEED	19-28 KM/HR FOR 240 DAYS CALM FOR 125 DAYS
13	**TRANSPORT** BY RAIL BY ROAD	 BG RAILWAY LINE OF EASTERN RAILWAY DISTRICT HIGHWAY
14	SEISMIC DATA	ZONE II AS DEFINED IN IS 1893:2002

Volume 1A Part-1 Chapter -II Scope of Works

1.2.0 SCOPE OF WORK IN GENERAL:

The scope of work shall comprise but not limited to the following

1.2.1 Handling at site stores / storage yard, Transportation to site of work, Pre-assembly, Erection, Testing and Commissioning of Steam Turbine, Generator and auxiliaries, and other BOI Including Supply and Application of Final Painting for unit-1&2 of 2x600 MW sets at Jindal India Thermal Power Limited, Derang, Angul, Orissa

Volume 1A Part-1 Chapter- III Facilities in the scope of Contractor/BHEL

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.3.1	**ESTABLISHMENT**			
1.3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)	Yes		
b	Open space for storage (as per availability)	Yes		
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	
1.3.1.2	**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	
1.3.2.0	**ELECTRICITY**			**On chargeable basis**
1.3.2.1	**Electricity for construction purposes of Voltage 415/440 V**	**yes**		Refer the relevant clauses for applicable charges
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	
1.3.2.2	**Electricity for the office, stores, canteen etc of the bidder**			Refer the relevant clauses for applicable charges
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	
1.3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**			
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	
1.3.3.0	**WATER SUPPLY**			
1.3.3.1	**For construction purposes**			
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	
1.3.3.2	**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	
1.3.3.3	**Water supply for Living Purpose**			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Telephone, fax, internet, intranet, e-mail etc		Yes	
1.3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
1.3.7.0	**Demobilization of all the above facilities**		Yes	
1.3.8.0	**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 1.3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.3.9.1	Engineering works for construction:			
a	Providing the erection drawings for all the equipments covered under this scope	Yes		
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		**YES**	"
d	Shipping lists etc for reference and planning the activities	Yes		"
e	Preparation of site erection schedules and other input requirements		Yes	"
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	"
g	Weekly erection schedules based on Sl No. e	yes	Yes	"
h	Daily erection / work plan based on Sl No. g	yes	Yes	"

Sl.No	Description PART II 1.3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		NA	
L	Arranging the materials required for preassembly		YES	

1.3.10 OPEN SPACE:

Open space for building of temporary office shed and contractor's stores shed(s) will be provided free of charges. Contractor has to make his own arrangements for labour colony.

1.3.11 ELECTRICITY:

The construction power will be provided on chargeable basis at the rate of **Rs3.45 per unit +applicable taxes** at a single point and the further distribution with necessary isolator / LCB etc to be arranged by the bidder at his cost.

The required energy meter for measuring power consumption will be provided by BHEL and to be installed by the contractor.

Any dispute regarding consumption, the BHEL engineer decision is final

1.3.11.1 Contractor shall make his own arrangement for alternative source of power supply through deployment of adequate number of DG sets at their cost during the power breakdown / failure and during the initial stages. No separate payment shall be made for this contingency.

1.3.11.2 BHEL is not responsible for any loss or damage to the contractor’s equipment as a result of variations in voltage / frequency or interruptions in power supply.

1.3.12 WATER:

Contractor to make his own arrangements for the construction water and further distribution shall be arranged by the contractor at his cost.

1.3.13 CONSUMABLES:

1.3.13.1 Any special electrodes / consumables supplied by the manufacturing units for the respective packages will be issued free of cost. All other consumables, filler wires, electrodes, gas, paint etc. are to be arranged by the contractor at his cost.

1.3.14 WATER DISTRIBUTION:

Distribution of water for construction purpose and as well as drinking purpose to various work-fronts shall be contractor's responsibility at his cost.

1.3.15 ELECTRICITY DISTRIBUTION:

Provision of distribution of electrical power from the given single central point to the required places with proper distribution boards, cables etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor. Necessary "Capacitor Banks to improve the Power factor as stipulated by customer shall be provided by the contractor at his cost as per customer requirement. Penalty if any levied by customer on this account will be recovered from contractor's bills.

1.3.16 POSSESSION OF GENERATORS

As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction sites, suitable extension of time, if found necessary only be given and contractor is not entitled for any compensation. It shall be the responsibility of the tenderer / contractor to provide, and maintain the complete installation on the load side of the supply with due regard to safety requirements at site. It shall be responsibility of the contractor to have at least (2 to 4) diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by tenderers. This may also be noted while quoting.

1.3.17 LIGHTING FACILITY:

Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, pre assembly yard and contractors material storage area etc. at his cost.

1.3.18 POWER REQUIREMENT:

For the purpose of planning, contractor shall furnish along with tender the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

1.3.19 CONTRACTOR'S OBLIGATION ON COMPLETION:

On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

1.3.20 GASES:

1.3.20.1 All the required gases like Oxygen / Acetylene / argon / Nitrogen required for construction work shall be supplied by the Contractor at his cost. It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of these gases. Non availability of gases cannot be considered as reason for not attaining the required progress.

1.3.20.2 BHEL reserves the right to reject the use of any gas in case required purity is not maintained.

1.3.20.3 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

1.3.20.4 The contractor shall ensure safe keeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.

1.3.20.5 All the integral lube and control oil pipelines required TIG welding operations are to be purged with Nitrogen Gas / Argon Gas for the purpose of creating inert atmosphere in the pipelines during the process of TIG welding. Nitrogen, Argon gas required for this purpose shall have to be arranged by the contractor at his cost.

1.3.21 ELECTRODES SUPPLY AND STORAGE

1.3.21.1 It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement regarding, suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.

1.3.21.2 Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate.

1.3.21.3 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at his own cost by the contractor.

1.3.21.4 All low hydrogen electrodes shall be baked / dried in the electrode drying oven (range 375 deg. C - 425 deg. C) to the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by contractor at his cost.

1.3.21.5 Incase of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the contractor's first subsequent bills at market value plus departmental charges of BHEL communicated from time to time. Postponement of such recovery is not permitted.

1.3.21.6 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.

Volume 1A Part-1 Chapter- IV T&Ps provided by BHEL

1.4.0 THE FOLLOWING T & Ps ARE PROVIDED BY BHEL PER UNIT TO MEET THE MILE STONE ACTIVITY

1.4.1 List of Tools & Plants to be made available by BHEL to contractor free of hire charges on sharing basis.

S.No	Description	Qty
01	EOT Cranes at TG Hall (105 T / 15 T) without operator	01
02	Portal Gantry Crane 360T without operator (For Generator Stator Placement)	01
03	Higher capacity crane (250T/150T/135T) for FST/ Deaerator erection	01
04	Suitable crane for erection & dismantling of Portal crane	01
05	Slings for Stator Lifting	As required
06	Hydro Test pumps(400-600Kg/cm^2 for HP lines)	01

BHEL will provide crane operators free of charges for the cranes in the scope of BHEL except EOT &Portal gantry cranes.

Note -

1. All the above T&Ps shall be given to the contractor on sharable basis and the allotment is made by BHEL/Site-in charge on need basis and to be shared with other contractors.

2. For handling at store and transportation, contractor shall make his own arrangement

3. EOT Crane – Allotment will be made only on need basis. Trained operators are to be arranged by the contractor within the quoted rates. Contractor has to plan the activities on item wise where the EOT crane is required to be used and submit to BHEL site for approval. In case the erection can be carried out by using other T&Ps, contractor shall make his own arrangement. The decision of BHEL Site I/c on this will be final and binding.

4. Higher capacity crane will be provided for Pre-assy. & Erection of FST & Deaerator.

5. BHEL may provide either BHEL owned cranes or hired cranes at the discretion of BHEL.

   Bidder to note the following:-

   <u>In the event of providing BHEL Cranes:</u>

   Fuel has to be arranged by the bidder.

In the event of providing hired cranes:

The fuel charges shall be recovered as given below:

For 75 T crane: Rs 120/hr
For 100 to150 T crane: Rs 200 /hr
For Heavy duty crane above 150T capacity: Rs 250 /hr

6. Portal Gantry Crane will be issued in parts/components and are to be assembled at site by the contractor as per the instruction of the BHEL Engineers/Installation manual. The scope includes receipt of the materials from BHEL store, transporting to site, servicing of components/ drives/ pulleys etc., checking, lubricating wire ropes/drives, assembly, preparation of foundation & erection, cabling, pre commissioning and commissioning of drives, load testing/overload protection, etc., It is also the responsibility of the contractor to provide a qualified/experienced operator within the quoted rate. The Electric power consumption for the Portal Crane will be charged as mentioned elsewhere in the tender. As soon as the erection of Generator Stator is over, the crane has to be dismantled by the contractor, in the sequence as instructed by BHEL, apply preservatives/touch-up paints wherever required and return the same to store in a good condition. Required consumables, T&Ps including gas, welding M/c shall be provided by the contractor. The following facilities only will be provided by BHEL.

   a) A suitable mobile crane for erection & dismantling of the portal crane on free of hire charges
   b) Lubricants for drives & wire rope.
   c) Supervision for servicing / assy./ commissioning
   d) Required Loads for testing

7. Fill pump shall be arranged by the contractor, wherever required. For testing LP lines necessary Hydraulic Test pumps/ Hand pumps are to be arranged by the contractor

8. Any Loss/Damage of tools by the contractor, the same shall have to be replaced by the contractor or otherwise cost thereof shall be recovered from the contractor.

9. Apart from the above mentioned tools, any other tools and plants including suitable **Jacks / Hydraulics jacks** required for satisfactory completion of the work has to be arranged by the contractor.

10. Providing manpower assistance required for free movement of trailing cable of EOT Crane is included in the scope of this contract.

11. Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

Volume 1A Part-1 Chapter V

Time Schedule

1.5.1 TIME SCHEDULE

1.5.1.1 The entire work of erection testing and commissioning of STG including Supply & Application of Final Painting, as detailed in the Tender Specification shall be completed within 16 (sixteen) months per unit from the date of commencement of work at site. Unit-2 work shall commence with a phase shift of maximum 3 months from the start of unit-1 work.

1.5.1.2 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

1.5.1.3 The erection work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

1.5.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy the decision of BHEL engineer is final.

1.5.3 MOBILISATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIOING ETC.,

The activities for erection, testing etc shall be started as per directions of Construction manager of BHEL.

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

TENTATIVE SCHEDULE

Sl.No	Mile stone	From Start of Condenser erection
01	Commencement of Condenser erection	
02	Commencement of TG erection	1 month
03	Turbine Box-up	12 month
04	Completion of Oil Flushing	13 month
05	Barring Gear	14 month
06	Rolling & Synchronization	15 month
07	Trail Operation & Handing over	16 month

1.6.1 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 on the instructions of BHEL.

CONTRACT PERIOD

1.6.2 The contract period for completion of entire work under scope shall be 16 (sixteen) months from the "COMMENCEMENT OF CONTRACT PERIOD" as specified earlier for completion of the entire work per unit.

1.6.3 In case any requirement is there to compress the schedule of activities to achieve project completion, then the additional expenses if any incurred will be discussed mutually and settled. BHEL decision in this regard is final and the issue is not arbitrable.

1.6.4 GUARANTEE PERIOD FOR EACH UNIT

The guarantee period of twelve months shall commence from the date of handing over of the Unit to Customer or six months from the date of first synchronisation of the set, whichever is earlier (Provided all erection, testing, and commissioning works are completed in all respects).

Volume 1A Part-1 Chapter VI

Terms of Payment

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

		COND - 2NOS (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS AND DEAERATORS (5)	MISCELLANEOUS ITEMS (6)	INTEGRAL PPG (7)	
	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%)**								
1.6.1	**CONDENSER-2nos (weightage 20%)**								
1.6.1.1	PREPARATION OF FOUNDATION	2%			--			--	
1.6.1.2	PLACEMENT, ALIGNMENT, ASSEMBLY AND WELDING OF BOTTOM PLATE SEGMENTS, HOT WELL, NDT AND SPRING ELEMENTS PLACEMENT &	10%			--			--	

	GROUTING.								
1.6.1.3	ASSEMBLY AND POSITIONING OF WATER CHAMBER, SIDE PLATES, BOTTOM PLATES, WELDING AND NDT INCLUDING HINGE ASSY	12%		--	--			--	
1.6.1.4	ASSEMBLY, ALIGNMENT AND WELDING & NDT OF TUBE SUPPORT PLATES AND INTERNALS LIKE BAFFLE PLATES, AIR EVACUATION PIPES ETC.	13%		--	--			--	
1.6.1.5	ASSEMBLY, WELDING & NDT OF DOME WALLS AND DOME STIFFENERS, EXTRACTION PIPING AND STEAM THROW DEVICE, LPH-1 SUPPORT ETC.	10%		--	--			--	
1.6.1.6	INSERTION, EXPANSION, CUTTING ETC. OF CONDENSER TUBES	15%		--	--			--	
1.6.1.7	HYDRO TEST OF STEAM AND WATER SIDE	10%		--	--			--	

1.6.1.8	WELDING OF CONDENSER NECK JOINT AND NDT& COMPLETION OF BALANCE WORKS	10%		--	--			--	
1.6.1.9	ERECTION, COMMISSIONING, LOAD TESTING OF CONDENSER WATER BOX HANDLING SYSTEM	3%		--	--			--	
	Subtotal for condenser	**85%**							
1.6.2	**TURBINE (18 %)**							--	
1.6.2.1	PREPARATION OF FOUNDATION, PLACEMENT, ALIGNMENT AND GROUTING OF BASE PLATES OF LPC AND BEARING PEDESTALS	--	7%		--			--	
1.6.2.2	PLACEMENT AND ALIGNMENT OF LP OUTER CASING BOTTOM PORTION AND CENTRE GUIDE KEYS	--	5%		--			--	
1.6.2.3	PLACEMENT OF LP ROTOR AND ALIGNMENT WITH INNER CASING AND CHECKING OF BLADE CLEARANCE	--	9%		--			--	
1.6.2.4	ASSEMBLY, ALIGNMENT & WELDING OF LP OUTER	--	9%		--			--	

	CASING UPPER HALF								
1.6.2.5	PLACEMENT AND ALIGNMENT OF IP TURBINE OUTER CASING AND INNER CASING (LOWER HALVES)	--	2%		--			--	
1.6.2.6	PLACEMENT AND ALIGNMENT OF IP ROTOR WITH LOWER CASING AND BOXING UP OF INNER & OUTER CASING (UPPER HALVES) & ROLL CHECK	--	5%		--			--	
1.6.2.7	FINAL BOX UP OF IP TURBINE	--	0%		--			--	
1.6.2.8	BOXING UP OF LP INNER-INNER & INNER- OUTER AND ROLL CHECK	--	5%		--			--	
1.6.2.9	PLACEMENT OF HP TURBINE, LOWERING OF HP ROTOR ON BEARINGS AND CHECKING OF CLEARANCES, COUPLING, HP TURBINE SWING CHECKS ETC.	--	5%		--			--	
1.6.2.10	ALIGNMENT OF ALL ROTORS INCLUDING REAMING, HONING AND		9%						

	FIXING OF COUPLING BOLTS								
1.6.2.11	ASSEMBLY OF GOVERNING SYSTEM / EQUIPMENT		5%						
1.6.2.12	INSTALLATION OF ESVS, IVS, LPBP VALVES, MS STRAINERS (INTERNALS), HRH STRAINERS (INTERNALS)	--	9%		--			--	
1.6.2.13	ERECTION, ALIGNMENT AND WELDING OF CROSS AROUND PIPING	--	5%		--			--	
1.6.2.14	FINAL BOX-UP OF LP TURBINE	--	5%		--			--	
1.6.2.15	ASSEMBLY AND PREPARATION OF HYDRO-TEST, STEAM BLOWING DEVICES AND NORMALISATION ETC.	--	0%		--			--	
1.6.2.16	FINAL BOXING UP OF PEDESTALS AFTER OIL FLUSHING COMPLETION	--	5%		--			--	
	Subtotal for Steam Turbine		**85%**						
1.6.3	**TURBO GENERATOR (15%)**	--		--	--			--	

1.6.3.1	PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES	--		5%				--	
1.6.3.2	LIFTING, LEVELLING AND ALIGNMENT OF STATOR (including erection and dismantling of portal crane if used for stator lifting)			23%				--	
1.6.3.3	FIXING OF END SHIELDS ON TO FOUNDATION BEAMS	--	--	6%				--	
1.6.3.4	ROTOR INSERTION	--	--	6%				--	
1.6.3.5	BOXING UP OF GENERATOR AND ASSEMBLY OF HYDROGEN SEALS	--	--	11%				--	
1.6.3.6	ALIGNMENT OF GENERATOR ROTOR WITH LP TURBINE ROTOR, RUN-OUT CHECKS AND REAMING, HONING OF COUPLING HOLES AND FIXING OF COUPLING BOLTS	--	--	9%				--	

1.6.3.7	ERECTION OF EXCITATION EQUIPMENTS & ALIGNMENT OF GEN.-EXCITER ROTORS INCLUDING SWING CHECK AND COMPLETION OF BALANCE WORKS	--	--	10%				--	
1.6.3.8	INSTALLATION OF ENCLOSURES OF GENERATOR/EXCITER WITH ALL AUXILIARIES	--	--	5%				--	
1.6.3.9	GROUTING OF GEN BEARING PEDESTALS AND EXCITOR	--	--	5%				--	
1.6.3.10	FINAL GAS TIGHTNESS TEST OF STATOR WITH COMPLETE SYSTEM	--	--	5%				--	
	Subtotal for Generator			**85%**					
1.6.4	**PUMPS AND AUXILIARIES (13 %)**	--	--		--			--	
1.6.4.1	ERECTION / TESTING and commissioning OF MAIN OIL PUMP, JOP, EOP, AOP, CENTRALISED LUBE OIL PURIFICATION SYSTEM, ALONG WITH ALL AUXILLIARIES	--	--		12%			--	

1. 6.4.2	ERECTION / TESTING and commissioning OF ONE MOTOR DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				10%				
1.6.4.3	ERECTION / TESTING and commissioning of TWO NOS TURBINE DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				30%				
1.6.4.4	ERECTION, TESTING, GROUTING ETC. OF Miscellaneous (including Vacuum pumps) PUMPS	--	--	--	13%			--	
1.6.4.5	ERECTION, TESTING, GROUTING ETC. OF CONDENSATE EXTRACTION PUMPS	--	--	--	20%			--	
	Subtotal for pumps and Auxilliaries				**85%**				
1.6.5	**HEATERS AND DEAERATORS (11%)**								
1.6.5.1	ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS	--	--	--		27%		--	

1.6.5.2	ERECTION, TESTING & COMMISSIONING OF GLAND STEAM CONDENSER, DRAIN COOLERS, CF COOLERS, MOT,GENERATOR COOLERS	--	--	--		12%		--	
1.6.5.3	ERECTION, TESTING & COMMISSIONING OF DE-AERATOR, FEED STORAGE TANK AND ASSOCIATED APPROACH PLATFORM WITH LADDERS ETC.	--	--	--		46%		--	
	Subtotal FOR HEATERS AND DEAERATORS	**--**	**--**	**--**		**85%**		**--**	
1.6.6	**MISCELLANEOUS ITEMS (7%)**								
1.6.6.1	RE JOINTS, ME BELLOWS, DIRTY, CLEAN OIL TANKS, CO2/H2 CYLIDER RACKS ETC						30%		
1.6.6.2	ERECTION, TESTING & COMMISSIONING OF CONTROL FLUID TANK, C.F. COOLERS, C.F. PUMPS, PURIFICATION UNIT ETC.	--	--	--			20%		

1.6.6.3	ERECTION, TESTING & COMMISSIONING OF FLASH TANKS & FLASH VESSELS	--	--	--			10%		
1.6.6.4	ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE	--	--	--			10%		
1.6.6.5	ERECTION, TESTING & COMMISSIONING OF MISC. HOISTS & CHAIN PULLEY BLOCKS.						15%		
1.6.6.6	--	--	--	--	--	--	--		
1.6.6.7	--	--	--	--	--	--	--		
1.6.6.8	--	--	--	--	--	--	--		
	Subtotal for MISCELLANEOUS ITEMS						**85%**		
1.6.7	**INTEGRAL PIPING (16%)**	--	--	--				--	

1.6.7.1	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%**	
1.6.8	**PIPING**								
1.6.8.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION TO BE PAID ALONG WITH PLACEMENT IN POSITION)	NA	NA	NA	NA	NA	NA	NA	
1.6.8.2	PLACEMENT IN POSITION	NA	NA	NA	NA	NA	NA	NA	
1.6.8.3	ALIGNMENT	NA	NA	NA	NA	NA	NA	NA	
1.6.8.4	WELDING/BOLTING/FIXING	NA	NA	NA	NA	NA	NA	NA	

1.6.8.5	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be clubbed with next activity)	NA	NA	NA	NA	NA	NA	NA	
1.6.8.6	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	NA	NA	NA	NA	NA	NA	NA	
1.6.8.7	HYDRAULIC TEST/PNEUMATIC TEST WHERE EVER APPLICABLE	NA	NA	NA	NA	NA	NA	NA	
	Total for Prorata (85%)	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	**85%**	
1.6.9	**STAGE/MILESTONE PAYMENTS (15%)**								
1.6.9.1	Boiler Light Up	0%	0%	0%	0%	0%	0%	0%	
1.6.9.2	ABO	0%	0%	0%	0%	0%	0%	0%	
1.6.9.3	Steam Blowing	0%	0%	0%	0%	0%	0%	0%	
1.6.9.4	Safety Valve Floating	0%	0%	0%	0%	0%	0%	0%	
1.6.9.5	Oil Flushing (TG)	1%	1%	1%	1%	1%	1%	1%	
1.6.9.6	Barring Gear (TG)	1%	1%	1%	1%	1%	1%	1%	
1.6.9.7	Rolling and Synchronisation	3%	3%	3%	3%	3%	3%	3%	
1.6.9.8	Coal Firing	0%	0%	0%	0%	0%	0%	0%	

1.6.9.9	Full Load	2%	2%	2%	2%	2%	2%	2%	
1.6.9.10	Trial Operation of Unit	2%	2%	2%	2%	2%	2%	2%	
1.6.9.11	Painting (including arrow marking, nomenclature, etc)	2%	2%	2%	2%	2%	2%	2%	
1.6.9.12	Area cleaning, temporary structures cutting/removal and return of scrap	1%	1%	1%	1%	1%	1%	1%	
1.6.9.13	Punch List points/pending points liquidation	1%	1%	1%	1%	1%	1%	1%	
1.6.9.14	Submission of 'As Built Drawings'								
1.6.9.15	Material Reconciliation	1%	1%	1%	1%	1%	1%	1%	
1.6.9.16	Completion of Contractual Obligations	1%	1%	1%	1%	1%	1%	1%	
	Total for Milestone/Stage payments (15%)	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	
	Total of I & II	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	

1.6.10 BHEL at discretion may further split up the above percentage and effect payment to suit the site conditions, cash flow requirements, according to the progress of work.

Note for terms of payment:

As TG is lumpsum contract, the compensation as per clause 2.12.2 of GCC shall be worked out @ 10% on balance lumpsum value to be executed on the end of original contract period.

Volume 1A Part-1 Chapter VII

Taxes and Duties

Value Added Tax (VAT) for the works

1.7.1 **Price quoted shall be inclusive of VAT except service tax.**

1.7.2 Notwithstanding the fact that this is only an erection service contract not involving any transfer of materials whatsoever and not attracting VAT liability, being labour oriented job work, for the purpose of VAT the contractor has to maintain the complete data relating to the expenditure incurred towards wages etc. in respect of the staff/workers employed for this work as also details of purchase of materials like consumables, spares etc., inter alia indicating the name of the supplier, address and VAT Registration No. and VAT paid for the purchases, etc

1.7.3 The bidder shall get registered with State VAT authorities and the registration certificate shall be forwarded to BHEL immediately after commencement of work. In case the bidder had already registered under respective State VAT, they must quote their registration Number and forward copy of Registration Certificate while submitting this tender.

1.7.4 The monthly/quarterly VAT return, duly incorporating the erection income from BHEL as turnover, should be submitted to BHEL at regular intervals with all annexure and details of payment of VAT (WCT).

1.7.5 You have to obtain VAT Clearance Certificate from the on concerned authorities as per the provisions of local VAT act, on completion of the project and submit along with the final bill.

1.7.6 The bidder shall quote very competitive price after taking into consideration of above points.

1.7.7 **Service Tax**

1.7.7.1 Price quoted shall be exclusive of Service Tax. The service tax as statutorily leviable and payable by the bidder under the provisions of service tax Law / Act shall be paid by BHEL as per bidder claim through various running bills. The bidder shall furnish proof of service tax registration with Central Excise Department specifying the name of services covered under this contract. Registration Certificate should also bear the endorsement for the premises from where the billing shall be done by the bidder on BHEL for this project. The bidder shall obtain prior consent of BHEL before billing the service tax amount.

1.7.8. **Other Taxes & Levies**

1.7.8.1 Any other taxes and duties (except VAT & Service Tax) if any, as applicable, viz. Entry Tax, Octroi, Licenses, Deposits, Royalty, Stamp Duty, other charges / levies, etc. prevailing / applicable on the date of opening of technical bids and any variation thereof during the tenure of the contract are in the scope of bidder. In case BHEL is forced to pay any such taxes, BHEL shall have the right to recover the same from the bidder either from running bills or otherwise as deemed fit.

1.7.9 **New Levies / Taxes**

1.7.9.1 In case Government imposes any new levy / tax after award of the work during the tenure of the contract, BHEL shall reimburse the same at actual on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract..

1.7.10 **Statutory variations**

1.7.10.1 Statutory variations are applicable only in the cases of Value Added Tax and Service Tax. The changes implemented by the Central / State Government in the VAT Act / Service Tax during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract .

1.7.11 **Direct Tax**

1.7.12 BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act.

Volume 1A Part-1 Chapter VIII Other Conditions

1.8.1 IMPORTANT CONDITIONS FOR PAYMENT

It may be noted that the first running bill will be released only on production of the following.

1. PF Regn. No.
2. Labour Licence No.
3. Workmen Insurance Policy No.
4. Un Qualified Acceptance for Detailed L.O.I.
5. Initial 50% Security Deposit as per CL 1.10 of GCC.
6. Rs. 100/- Stamp Paper for Preparation of contract agreement

1.8.2 All payments due to the contractor shall be made only through "e-Payment", including return of EMD amount to unsuccessful tenderers. The tenderer has to furnish details of his Bank account as certified by the concerned Banker in the format furnished to enable e-payment.

1.8.3 PROVIDENT FUND & MINIMUM WAGES

1.8.3..1 The contractor is required to extent the benefit of Provident Fund to the labour employed by you in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, you are hereby required to get yourself registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to you by the Provident Fund authorities within one month from the date of issue of this letter of intent. Incase you are exempted from such remittance an attested copy of authority for such exemption is to be furnished. Please note that in the event of your failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to us by the customer or paid to statutory authorities by us, such amount will be recovered from payments due to you.

1.8.3..2 The contractor shall ensure the payments of minimum labour wages to the workmen under him as per the rules applicable from time to time in the state.

1.8.3.3 The final bill amount would be released only on production of clearance certificate from PF/ESI and labour authorities as applicable.

1.8.4.0 OTHER STATUTORY REQUIREMENTS

1) The Contractor shall submit a copy of Labour License obtained from the Licensing Officer (Form VI) u/r25 read with u/s 12 of Contract Labour (R&A) Act 1970 & rules and Valid WC Insurance copy or ESI Code (if applicable) and PF code no alongwith the **first** running bill.

2) The contactor shall submit monthly running bills along with the copies of monthly wages (of the preceding month) u/r78(1)(a)(1) of Contract Labour Rules, copies of monthly return of PF contribution with remittance Challans under Employees Provident Fund Act 1952 and copy of renewed WC Insurance policy or copies of monthly return of ESI contribution with Challans under ESI Act 1948 (if applicable) in respect of the workmen engaged by them.

3) The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of Wages. Incase of "Non-compliance of Sec 21 or non-payment of wages" to the workmen before the expiry of wage period by the contactor, BHEL will reserve its right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.

4) The Contractor shall submit copies of Final Settlement statement of disbursal of retrenchment benefits on retrenchment of each workmen under I D Act 1948, copies of Form 6-A(Annual Return of PF Contribution) along with Copies of PF Contribution Card of each member under PF Act and copies of monthly return on ESI Contribution – Form 6 under ESI Act1948 (If applicable) to BHEL along with the Final Bill.

5) In case of any dispute pending before the appropriate authority under I D act 1948, WC Act 1923 or ESI Act 1948 and PF Act 1952, BHEL reserve the right to hold such amounts from the final bills of the Contractor which will be released on submission of proof of settlement of issues from the appropriate authority under the act.

6) In case of any dispute prolonged/pending before the authority for the reasons not attributable to the contractor, BHEL reserves the right to release the final bill of the contractor on submission of Indemnity bond by the contractor indemnifying BHEL against any claims that may arise at a later date without prejudice to the rights of BHEL.

Volume 1A **PART –II TECHNICAL SPECIFICATIONS**

Chapter -1 General

The scope of work shall comprise but not limited to the following

2.1.1 Handling at stores transporting to site, inspection, preparation of foundation, erection, leveling, centering, alignment, grouting & final alignment of Steam turbine, Turbo generator and auxiliaries including BOI identified, pre-assembly, erection, alignment, welding, NDT, fixing hangers & supports, chemical cleaning/pickling, oil flushing, water flushing, hydro testing, & steam blowing of integral piping/oil piping, H2/CO2/Water cooling system, Pre assembly, erection, welding, NDT of water cooled Condenser, feed water storage tank, de-aerator, LP/HP heaters, GSC & other coolers, flash tanks etc., CW piping from condenser to outside “A” row column, erection and commissioning of Motor Driven & Turbo Driven Boiler feed pumps, Motor driven Condensate Extraction Pumps, surface finish, supply & application of primer & finish paints / Anti corrosive / steam wash paints including labeling on equipments, & piping, pre-commissioning, commissioning, trial operation & handing over of Units 1&2 of 2x600 MW Jindal India Thermal Power Limited - Steam Turbine, Generator and Auxiliaries.

2.1.2 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

2.1.3 Contractor shall erect all the equipments as per the sequence prescribed by BHEL at site. The sequence of erection and methodology will be decided by the BHEL Engineers depending upon the availability of materials, fronts and other inputs etc., No claim for extra payment from contractor will be entertained on the grounds of deviation from the methods of erection adopted in erection of similar STG set in other places.

2.1.5 The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely operation of equipment installed. The contractor 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.

Volume 1A **PART –II Chapter -2 Foundations and Grouting**

2.2.0 CIVIL WORKS

2.2.1 Foundations of all equipments and plants and necessary civil works shall be provided by BHEL/customer. The dimensions of the foundations and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further top elevation of foundations shall be checked with respect to bench mark etc. All minor adjustments upto 25 mm of foundation level, dressing, chipping of foundation surface enlarging the pockets in foundations and grouting of equipments etc. as may be required for the erection of equipments / plants shall be carried out by the Contractor. All the materials like cement and cleaning consumables shall also be arranged by the contractor at his cost. The required special cement like PAGA, CONBEXTRA – GP2 and SHRINKOMP etc or its equivalent grade free flow cement for grouting of all the equipments of Turbine Generator shall also be arranged by the contractor including the required nos. of mixing machines and vibrators at their cost.

2.2.2 The contractor shall ensure perfect matching of packer plates with foundation by dressing the foundation and between the packer plates and the base plate of structural column / equipment to the satisfaction of BHEL Engineer. Machining / matching of packer shall be carried out by the Contractor at his cost.

2.2.3 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange, a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous expenditure for this activity. BHEL will not pay any service and incidental charges for arranging the supplier representative. The contractor to take note of this aspect and quote accordingly.

2.2.4 Contractor has to carry out the grouting as per the work instructions for grouting available at site.

2.2.5 Grouting of equipments is included in the scope of contractor. Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., de-watering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form/shuttering work are within the scope this work. All grouting materials like cement, including special cements such as non-Shrinkable **free flow cements** etc. (as recommended by BHEL), sand, gravel etc., shall be arranged by the contractor at his quoted rate**.**

Volume 1A **PART –II Chapter -3**

2.3.0 ERECTION

2.3.1 Preparation of foundation: Providing necessary skilled and other labour to BHEL/Customer for checking of dimensional accuracy, axis, elevation, levels etc., with reference to bench marks of foundations and anchor bolts pits. Also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments, up to 25mm depth, as per BHEL Engineers instructions, should be done by the contractor as a part of work. Contractor should log before taking over the foundations for erection.

2.3.2 Contractor shall carry out scrapping and blue matching of embedment plates/packers of rotating equipments so as to achieve prescribed percentage of contact. Chipping and bedding of concrete surfaces, finely dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of the work. The fine dressing of concrete shall be with blue matching checks.

2.3.3 BHEL will provide only shims and packer plates (either machined or plain), which will go as permanent parts of the equipment at free of cost. Certain packer plates and shims over and above the quantity received as part of supplies have to be cut out from steel plates/sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by chiseling, grinding, machining and filing the burr in the packers. Machining of Packers to meet the requirement is in their scope of the contractor. Raw materials required for the above will be arranged by BHEL free of cost.

2.3.4 Packer plates are to be blue matched with foundation, with foundation frame and inter-packers contact surfaces & etc., by Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions. Shims and packer plates required for temporary use are to be arranged by the contractor within the quoted rate.

2.3.5 **Bolt stretching fixtures** for TG anchor bolts are to be arranged by the contractor.

2.3.6 Brief list of equipments/sub-assemblies to be erected by the contractor & approximate weight and size of individual heavy components are given in the appendices and is meant for giving general idea to the tender only about magnitude of the work involved. The components are sent in parts for convenient transportation. They are to be cleaned, assembled in stage by stage, fastened/welded, erected and aligned as per the drawing dimensions/tolerance and instructions of BHEL Engineers.

2.3.7 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain 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, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Surface Grinder and Lathe m/c required for the above works are to be made available at TG Floor by the contractor at their cost.

2.3.8 Normally weld neck valves will have prepared edges for welding. It may be occasionally necessary to prepare new edges, re-prepare the edges to suit site conditions, which shall be done by the contractor at no extra cost. All fittings like elbows, tees, reducers, flanges, inserts etc., shall be matched with pipes for welding which may require re-edge preparation, grinding etc., The valves will have to be checked, lapped or overhauled in full or in parts before erection/after chemical cleaning/during commissioning. Experienced technicians for the same shall be arranged by the contractor at his own cost.

2.3.9 AOP / JOP/ EOP etc., and their motors will be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions of BHEL Engineer including placement on foundation.

2.3.10 For skid mounted equipment, dismantling if any, for the convenience of erection/commissioning, checking and re-alignment required at site is in the scope of work.

2.3.11 All rotating machineries and equipments shall be cleaned, lubricated checked for their smooth rotation, if necessary by dismantling and re-fitting before erection by the contractor. In the opinion of the BHEL engineer, the equipment is to be further checked at any stage of the work, contractor shall provide necessary skilled manpower, complete facilities like T&Ps and consumables etc., for dismantling, cleaning & refitting within the quoted rate.

2.3.12 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.

2.3.13 All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect.

The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints assembly and other components as per instruction of BHEL Engineer during erection. The Contractor has to arrange necessary paints within the quoted rates

2.3.14 All the bearings, Gearboxes etc., of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing/gear boxes etc., with kerosene or some other agent if necessary by dismantling some of the parts of the equipment during erection and shall arrange for re-greasing/ lubricating them with recommended lubricants and assembling back. Lubricants will however be supplied by BHEL at free of cost.

2.3.15 The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered.

2.3.16 Sand / shot blasting of condenser / turbine components is to be carried out by the contractor wherever necessary as instructed by BHEL Engineer. Contractor has to arrange Sand / shot blasting machine, compressor required consumables, etc. at his cost.

2.3.17 Certain instruments like pressure switches, gauges, air filters, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismantle such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.

2.3.18 All the motors/pumps shall be opened, thoroughly serviced with proper care and re-assembled properly before erection by the contractor. During servicing, pre-commissioning & commissioning, if any deficiency is observed the same should be taken up with BHEL Engineer at site and rectified at site without any delay.

2.3.19 All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints.

2.3.20 For gas tightness test of gas system of stator the contractor has to arrange Mercury Mono-meter at his cost.

2.3.21 All the lubricant oil for flushing and during trial run of the equipment including first fill up, chemicals for detergent flushing, acid pickling/cleaning/trail run etc., will be arranged by BHEL at free of cost. Required manpower shall be provided by the contractor for

handling, filling, emptying and re-filling etc., as part of the work without any extra cost, till the unit is handed over. Transportation of all the above shall be arranged by the contractor from BHEL store/yard to work site and returning of the empty barrels/drums to stores at their cost. Care should be taken to avoid any spillage/wastage.

2.3.22 The contractor shall also carry out erection, testing, and commissioning of the oil centrifuge within their quoted rate.

2.3.23 Transportation of CO2 & H2 cylinders from the store and filling of Gas in the generator stator cooling systems, etc., as and when required till the unit is commissioned and handed over shall be the responsibility of the contractor.

2.3.24 **Generator Stator Lifting:** 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 and placing in position using portal gantry crane is in the scope of this specification. Portal Gantry crane will be issued by BHEL on free of hire charges. It will be in parts/ components and the same shall be transported from BHEL store, assembled, erected, commissioned and on completion of stator lifting work, dismantling the same & returning to BHEL as per the instructions of BHEL Engineer are in the scope of the Bidder at his cost. Providing skilled operator for the operation of portal crane is by the contractor at his cost. The Electric power consumption for the operation of Portal Crane will be charged as per the relevant clause elsewhere in this specification

2.3.25 Erection, testing & commissioning of BFP along with mechanical seal, end chambers cooling lines, lube oil & working oil lines are also included in the scope of contractor.

2.3.26 All the filters in the system are to be cleaned, as and when required during flushing / commissioning till the unit is handed over to customer is within the scope this contract.

2.3.27 The Contractor shall carry out the reaming and honing of coupling holes with his own reamers, honing machine and honing accessories etc. at his own cost.

2.3.28 BFP drive turbines & its auxiliaries will be supplied in parts consists of turbine assy, governing valve assy, lube oil console, oil pumps, gear box, couplings, coolers etc., which are to be assembled at site and erected.

2.3.29 Wherever equipment are supplied in pre-fabricated assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.

2.3.30 The condenser will be supplied in components / parts and contractor shall have to carry out assembly and erect on the condenser foundation. This includes complete fabrication of shell out of steel plates, welding of hot well with bottom plates, assembly of water chambers and welding with side walls, bottom plates and dome wall, assembly of water chambers, assembly of support plates, baffles and stiffening structures etc.. While carrying out the assembly stitch welding shall be done only after the due approval from BHEL Engineer. Final welding shall have to be carried out by step back seam method to ensure minimum deformation within acceptable limits of the welding parts.

2.3.31 The condenser will be dispatched to site from works with surface protection. Wherever the surfaces damaged/ rusted and primer got removed / peeled off, the same shall be made good suitably by Sand / shot blasting or with steam mixed with caustic soda and coated with same paint as per the instructions of the BHEL Engineer before erecting the same.

2.3.32 All the weld seams shall be properly ground and subjected to radiographic examination as per manufacturer’s recommendation. If any paint or rust (other than steam washable paints) noted in the steam side of the condenser parts, are to be removed either by Sand / shot blasting or buffing method.

2.3.33 The contractor shall have to carry out the condenser tubes insertion and expansion at site after the installation of condenser on their foundation. Before insertion of tubes the contractor shall check for absence of any dents, mechanical damages or any other defects of tubes caused during storage or transportation. Tube should be thoroughly cleaned. Only fine emery paper shall be used for cleaning the tubes at the ends where expansion has to be carried out.

2.3.34 Before insertion of tubes the contractor shall clean the surface of the holes in the tube plates and tube support plates for paint / corrosion spots, oxide scales etc., using chemical cleaning agent like carbon tetra chloride.

2.3.35 The tube shall be inserted such that it shall project 2 to 3 mm beyond the tube plate outer surface. The tube shall be expanded using an automatic electronic torque control tube expanding unit or pneumatic tube expander so as to get the % thinning of the tube

walls and elongation of tube ends as recommended by the supplier/ Drg./ Tube expansion procedure. The length of expansion in no case shall exceed a length of 70 to 80% of the tube plate thickness. Finally, proper trimming of the excess length of the tube shall be carried out and flare-up / bell mouthing has to be done by the contractor at his cost.

2.3.36 The contractor shall carry out the condenser neck welding with LP casing. It shall be ensured that all spring supports are evenly loaded and the gap between the condenser and the different spring supports is within 1.0 mm. The clearance between the condenser neck and the LP exhaust hood should be within 3 mm by suitably lifting the condenser. Machined packers of suitable thickness are to be used under the spring supports and condenser load is to be gradually transferred on these packers. The neck welding shall be subjected to non-destructive testing.

2.3.37 The hydrostatic testing of steam space with the condenser vacuum system and hydraulic testing of water space with the circulating water lines after assembly of water boxes are also included in the scope of the contractor.

2.3.38 Water boxes inside Carbon steel surfaces are to be Sand / shot blasted before hydraulic testing. After hydraulic testing of CW side the water boxes and the water chambers are to be thoroughly cleaned for removal of all traces of dirt, grease, oil, rust etc., it shall be dry and free from burns and shall have a metallic surface. The (Sand/shot) Blasting machine and accessories and also the required consumables shall be arranged by the contractor within the quoted rate.

2.3.39 Condenser handling equipment & Structures shall be erected by the contractor within the quoted rate.

2.3.40 The condenser steam space shall be surface protected at least two coats of suitable steam washable paint. Before the painting is taken up, the contractor shall clean the surfaces thoroughly by sand / shot blasting or with steam mixed with caustic soda. Painting should be carried out by the contractor before tube insertion.

2.3.41 Supply & application of paints & required consumables etc. are in the scope of contractor and is to be within the quoted rate.

2.3.42 Floating of foundation of BFP’s & Condenser and readjusting of spring is covered in this scope of work.

2.3.43 The contractor shall carryout the erection of rubber expansion bellows, stretching bolt assembly and connected joints within the quoted rate.

2.3.44 The feed water storage tank will be supplied in three sections with feed pipe, heating steam header, spray nozzles, supports etc., in loose components. These are to be erected, aligned & welded in position. Welding, NDT & heat treatment if required shall be carried out by the contractor within quoted rate. IBR / statutory requirements, if any, shall be in the scope of contractor and necessary drawing/ details only will be given by BHEL.

2.3.45 Erection of platform and supporting structures around FST / De-aerator is covered in the scope of contract and shall be erected by the contractor within the quoted rate.

2.3.46 LP Heater No. 1 is to be erected inside the condenser in rear side, for which contractor has to cut open the condenser dome plate already erected. After erection, condenser plates have to be strengthened / stiffened as per the instruction of BHEL Engineer.

2.3.47 The foundation deck of BFP's is supported with Imported Vibration Isolation Springs, which will be erected by the civil contractor. The final adjustments of springs and floating of springs to be done by the contractor within quoted rate by providing required man power, T & P's etc.,

2.3.48 For other agencies, such as Power Cycle Piping, Cabling, instrumentation etc., to commence their work from/on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence/continue the work so as to keep the overall project schedule.

2.3.49 All dimensions/elevations refers to centerline of pipe unless otherwise specified, the pipe routing shall be carried out as per the drawing. Wherever the dimensions are not specified / shown as approximate the same may be routed as per site requirement / convenience as per site engineer's advice. For pipes nominal size 2" and below routing shall not be shown in piping layouts or in isometrics and the same to be routed / connected as shown in schematics. For the above size if the routing is shown in layouts it is only for guidance and the same shall be routed and supported as per site requirement / convenience as per site engineer's advice.

2.3.50 Slope of 1:500 shall be maintained towards drain point unless otherwise specified.

2.3.51 All site-fabricated pipes will be issued in running meters as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. All the attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor. Fittings like bends, tees, elbow, miter bends, reducers, flanges etc., will be supplied as loose items.

2.3.52 Erection of all the piping systems supplied along with turbine, generator, pumps and other auxiliaries covered in this contract, is to be erected by the contractor within the quoted rate.

2.3.53 Carrying out piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification or not, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, welding, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, within the quoted rate. IBR/ statutory requirements, if any, shall be in the scope of contractor and necessary drawing/details only will be given by BHEL.

2.3.54 Contractor should fabricate bends of </=2” diameter size from running meters of pipe.

2.3.55 Certain adjustments in length may be necessary while erecting pipelines of STG & Auxiliaries and the contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh and adopting specified NDT, Heat Treatment procedure, are in the scope of work.

2.3.56 Minor adjustment like removal of ovalities in pipes and opening or closing of the fabricated bends by process of heat correction or any other method approved by BHEL Engineer to suit the layout, with specified heat treatment procedure within the quoted rate.

2.3.57 Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing.

2.3.58 Contractor shall arrange all the equipments, alignment bolts, tools, consumables like welding electrodes (all type), TIG wires (all type) and argon gas cylinders etc. for welding of pipes at his cost. Consumables like jute, cotton waste, hacksaw blades, petrol, Kerosene oil etc. are in contractor’s scope.

2.3.59 Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., by gouging/ grinding and not by hammering. Any burrs left on the equipments/piping, after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.

2.3.60 All the weld joints on equipments and piping shall be ground or filed on completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,

2.3.61 Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.

2.3.62 Flame cutting of piping shall be strictly done as per BHEL Engineer's instructions and in his presence only.

2.3.63 All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope.

2.3.64 Wherever elbows of 45 deg or any other angle. (> 2" dia pipe) are required, the same shall be cut from 90 deg. elbow supplied and used. No extra cost shall be paid.

2.3.65 The work on piping systems (air, water, oil, steam, gas etc.) will include laying, edge preparation, fixing and welding of the elbows / fittings / valves etc. welded on the lines, fixing and adjustment of supports / hangers / shock absorbers and carrying out all other activities / works to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineer's instructions and / or as per approved drawings/documents.

2.3.66 Flow nozzles, orifice, spray nozzles forming part of the system irrespective of the supplier shall be mounted / erected after chemical and / or steam blowing/ oil flushing at site.

2.3.67 Erection of flow switches, steam traps, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL / Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

2.3.68 Contractor shall also weld small length of piping with root valve for pressure, temperature, flow and level tapping points on piping or flow nozzles/orifices/ metering elements fixed on piping as per the instructions of BHEL Engineer.

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

2.3.70 Contractor should fabricate bends at site from running meters of piping for the above and cut, edge prepare and lay the piping as per BHEL Engineer's instructions.

2.3.71 Fixing / fitting / welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc. (including PG Test requirements) forming part of the system irrespective of the supplier on different lines / equipments are within the scope of this contract. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system is within the scope of this specification.

2.3.72 The contractor shall conduct non-destructive tests like Radiography, Ultrasonic, Dye penetrant, Magnetic particle tests, etc. on welds, castings, valve bodies & other equipments etc. and Ultrasonic test for finding thickness of materials as per BHEL Engineer's instructions.

2.3.73 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor. Other supports namely Hangers, U-clamps etc. shall be supplied by BHEL duly bent and threaded. Assembly and necessarily cutting work etc. shall be carried out at site by contractor within the quoted rate.

2.3.74 Contractor shall arrange the necessary clearance from the statutory authorities (IBR, Electrical Inspectorate, etc.,) as required for installation of the plant and equipment and render all assistance, service required in this regard. Inspection fee and any statutory fees will be paid by BHEL.

2.3.75 Wherever hanger and support materials of piping are not received from manufacturing unit in time, to suit the erection schedule contractor shall erect the piping system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports. The above work is within the scope of this contract.

2.3.76 All Operating / Approach platforms, cross over, canopies, ladders etc., shall have to be fabricated from raw materials supplied by BHEL and are to be erected as per instruction of BHEL, by the contractor within the quoted rate.

2.3.77 Contractor shall be supplied with two extra blue prints of the layout & isometrics. Contractor to incorporate in one of the blue prints with red ink all the changes/deviations/alterations etc. carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

Volume 1A **PART –II Chapter -4**
Preservation and Touch painting

2.4.0 PRESERVATION OF COMPONENTS

2.4.1 It shall be the responsibility of the contractor to apply touch up painting on all equipments before erection. All Paint and thinner shall be arranged by the bidder and it shall be contractor's responsibility to arrange for required labour, brush etc. for carrying out touch up painting. The quoted rates shall be inclusive of above work.

2.4.2 The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts, then and there for their protection.

2.4.3 Any failure on the part of contractor to carry out work according to above clauses will entail BHEL to carry out the job from any other party and recover the cost from contractor.

2.4.4 Due to atmospheric conditions erected materials are likely to get rusted more frequently. It is the responsibility of the contractor to preserve the erection materials drawn from stores for erection till these are commissioned and handed over to customer. The required consumables for this purpose like paint, thinner, rust converter compound (Ruskill or Ferropro) or any other equivalent shall be arranged by bidder. However, the contractor should also arrange other consumables like wire brushes, emery paper, cotton waste, cloth etc. at their cost. The contractor should ensure that the materials are not rusted on any account till they are handed over to customer. The decision of the BHEL Engineer is final with regard to frequency of application of paint and rust converter compound.

Volume 1A **PART –II Chapter -5**

Progress of Work

2.5.0 PROGRESS OF WORK

2.5.1 Refer forms F14,F15,F16,F17,F18 in volume I Book II. Plan and review will be done as per the formats.

2.5.2. Contractor is required to draw mutually agreed monthly erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

2.5.3 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

2.5.4 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer as per the format enclosed with this tender document.

2.5.5 The monthly report ending on 24th of every month shall be submitted in a spiral bounded book and shall contain the following details:-

a) Colour Progress photographs to accompany the report should be submitted.

b) Erection progress in terms of tonnage and welding joints, radiography and stress relieving completed as relevant to the respective work areas against planned.

c) Site Organization chart of engineers & supervisors as on 24th of the month with further mobilization plan

d) Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operations and helpers. Data will be spilt up under the work area of Boiler

e) Consumables report giving consumption of all types of gases and electrodes during the previous month.

f) Availability report of cranes

g) Safety implementation report in the format

h) Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

2.5.6 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

2.5.7 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.

2.5.8 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.

2.5.9 The contractor shall maintain a record in the form as prescribed by BHEL for all operations carried out on each weld and maintain a record indicating the number of welds, the name of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejections if any, percentage of rejection, etc. and submit copies of the same to the BHEL Engineer as required.

Volume 1A **PART –II Chapter -6**
Welding and NDT

2.6.0 WELDING, HEAT TREATMENT, RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

2.6.1 All necessary preheating, post heating of welds and stress relieving operation of welds are part of the erection work and shall be performed by the contractor in accordance with the relevant regulations and standards of BHEL practice and to the satisfaction of BHEL Engineer and in accordance with the drawings and specifications.

2.6.2 Erection of equipment involves good quality of Welding, Heat treatment and Non Destructive Testing. Wherever required, 100% dye penetration tests have to be carried out as per instructions of BHEL Engineer. Contractor's Engineers, Supervisors, Technicians and workers engaged should have adequate knowledge on the above works.

2.6.3 The pressure parts piping's shall be erected in conformity with the provision of Indian Boiler Regulations and as may be directed as per any other standard/specification in practice in BHEL. The method of welding (viz.) Arc, Gas, TIG or other methods are indicated in the detailed drawings. BHEL Engineer will have the option of changing the method of welding as per site requirements.

2.6.4 Welding of high pressure parts shall be done by certified High Pressure Welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The high pressure welders who possess necessary certificate shall appear well in advance before the expiry of the validity of their certificate for re-qualification test as per relevant provision of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates has expired shall have to be suspended forthwith.

2.6.5 All welders deployed on this work shall be tested and approved by BHEL Engineer before they are actually engaged on work though they may possess the IBR certificate. BHEL reserves the right to reject any welders without assigning any reason.

2.6.6 BHEL Engineer is entitled to stop any welder from the work, if his work is unsatisfactory for any technical reasons or there is a high percentage of rejection of joints welded by him, which in the option of the BHEL Engineer will adversely affect the quality of the welding, though the welder has earlier passed the tests prescribed by BHEL Engineer. The welders having passed qualification tests does not relieve the contractor of a contractual obligation to check on the welder's performance.

2.6.7 All charges towards testing of welders for destructive and non-destructive testing and approval of welders for engaging in the erection work shall be borne by the contractor.

2.6.8 All radiographs shall be free from mechanical / chemical process marks to the extent they shall not confuse the radiographic image and defect finding penetrometer. As per ASME / SI shall be used for all exposures.

2.6.9 All welded joints shall subject to acceptance by BHEL Engineer.

2.6.10 Preheating, post weld heating and stress relieving after welding are part of erectors work and shall be performed by the contractor in accordance with the instructions of BHEL Engineer. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for labour, all heating elements thermocouples etc. insulating materials like mineral wool, asbestos, clothes, ceramic beads, asbestos ropes etc., required for heat treatment and stress relieving works.

2.6.11 The contractor shall maintain a record in the format as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final. All site welds shall be subject to acceptance of BHEL / Customer Engineers.

2.6.12 The contractor shall carry out the edge preparation of weld joints at site in accordance with details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting will be allowed only for edge preparation. Some extra lengths in various fabricated pipes given as erection allowance shall have to be cut and edges prepared to suit the site conditions at no extra cost.

2.6.13 Lead numbers, letters (Generally of 6 mm size) are to be used for identification of radiographs. Contract number, joint identification, source used, welders identification, SFD used are to be noted down on the paper cover of radiograph. Lead intensifying screens for front and back of the film shall be used as per the instruction of BHEL Engineer.

2.6.14 The weld joint is to be marked with permanent mark A, B, C, etc. to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the downstream side of the weld. For multiple exposures on pipes an overlap of about 25 mm of film shall be provided.

2.6.15 Heat treatment may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all arrangements including labour required for the work as per directions of BHEL.

2.6.16 All the data such as heating temperatures, heating rate, soaking time, maximum temperature reached during heat treatment shall be properly recorded and documented which will be property of BHEL.

2.6.17 Oxy-acetylene flame heating or exo-thermic chemical heating for stress relieving is not permitted. Heating shall be by means of Electric Induction coil or Electric resistance coil. Potentiometric type recorders shall only be used for temperature recording purposes.

2.6.18 Radiography work of the welds connected with this contract shall be arranged by the contractor including provisions of services of technicians and necessary equipment and consumables like Isotope camera, X-Ray films, chemicals and other dark room facilities etc. Also contractor has to provide necessary labour required such as Riggers, Helpers etc. to assist the technicians for carrying the above radiography work and making other arrangements. Such as providing scaffolding, approaches, platform lighting arrangements at his cost as per the instructions of BHEL. It may please be noted that invariably the radiography will be carried out after the normal working hours only.

2.6.19 Radiography inspection of welds shall be performed in accordance with the requirements and recommendation of BHEL Engineer. The Minimum extent of radiographic inspection shall be as per BHEL Drgs./ provision of IBR Regulations. They may however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer/Boiler inspection authority.

2.6.20 If the contractor does not carry out radiography work in time due to non-availability of film, chemicals etc. BHEL shall get the work done departmentally or through some other agency at the risk and cost of the contractor.

2.6.21 Wherever radiographs are not accepted on account of exposure, joints shall be re-radiographed and new films submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defects persist after first repair as per radiograph, carrying out radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable the same shall be cut, re-welded and re-radiographed at contractors cost.

2.6.22 Contractor has to make his own arrangements for air conditioned dark room to process the radiographs.

2.6.23 Quantum of radiography (percentage of joints) shall be enforced as per specifications and as per the drawings.

2.6.24 BHEL Engineer reserves the right to alter the quantum of radiography of joints. The decision of the BHEL Engineer in this regard is fixed and final and binding on the contractor. Any defects as pointed out by BHEL Engineer shall have to be rectified by the contractor at his cost. All X-Ray films of joints radiographed at site in connection with work shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.

2.6.25 All field joints shall be subjected to dye penetrant examination as specified in the respective drawings and shall have to be accepted by BHEL Engineer. Any rectifications required shall have to be done by the contractor at his cost.

2.6.26 For carrying out ultrasonic testing of welds including large size tubes and pipes it will be necessary to prepare the surface by grinding to a smooth finish and contour as desired by BHEL Engineer. The contractor's scope of work includes such preparation and no extra charges are payable to this.

2.6.27 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. The tenderers shall take all this into account and quote the price inclusive of all such work and radiography.

2.6.28 The welded surface irrespective of place of welding shall be cleaned of slag and painted with primer paint to prevent corrosion at no extra cost towards this.

2.6.29 The contractor shall have to do root run by TIG process, wherever required as per the instruction of BHEL Engineer.

2.6.30 Welding of Hangers, supports, stubs and impulse pipings to be carried out by the contractor as per drawing specification and as per BHEL Engineer's instructions. According to drawing specifications and as per BHEL Engineer's instructions preheating, post-heating, stress relieving, etc. have to be carried out by the contractor wherever necessary.

Volume 1A **PART –II Chapter -7**

2.7.0 HYDRAULIC TEST, PRE-COMMISSIONING & COMMISSIONING:

2.7.1 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The servicing, installation, electrical connection, erection, testing and dismantling and returning to BHEL Stores, etc., shall be carried out by the contractor as part of this work without any extra charges. For LP lines contractor has to arrange Hydraulic Test pump / Hand Pump for HT at his cost. The Electric power consumption for the operation of HT Pumps will be charged as per relevant clause elsewhere in this tender.

2.7.2 All pressure parts and some of the Low Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall supply necessary labour and other services and make necessary arrangements to carry out the required tests as per the instructions and directions of the BHEL Engineers.

2.7.3 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL.

2.7.4 The hydraulic testing of the equipment and piping, covered under this scope of work including vacuum system testing by water filling has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Filling pump shall be arranged by the contractor at his cost.

2.7.5 All the above tests shall be repeated till all the equipment satisfy the requirement of BHEL to their customer. As far as the hydraulic pressure test is concerned and same shall be conducted to the satisfaction of Boiler Inspector wherever applicable. Any rectifications required shall have to be done / redone by the contractor at his cost.

2.7.6 Lube oil, seal oil, governing oil, pipelines to ST, STG, Pumps, etc. shall be oil flushed. Contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected has been erected by the contractor or not. Decisions of BHEL Engineer in this regard will be final and binding on the contractor.

2.7.7 Cleaning of oil tank by sand/shot blasting or other method as per instructions of BHEL Engineer before and after oil flushing is the responsibility of the contractor.

2.7.8 Replacing/changing of mechanical seal/other seals and removal, cleaning or replacing of filters etc. during pre-commissioning / commissioning stage is within the scope of work.

2.7.9 Overhauling, Cleaning, Servicing of tanks, pumps, equipments, barring gear, valves, governing system during erection and commissioning stages are in the scope of work. Gaskets, packing for replacement will be provided by BHEL free of cost.

2.7.10 Contractor shall lay the temporary pipelines with fittings, accessories and erection & commission of pumps, tanks and other installations as instructed by BHEL Engineer for the purpose of chemical cleaning/alkali flushing/steam blowing/ steam washing/ steam flushing/water flushing/ water washing/oil flushing etc., of piping and other equipments are within the scope of work. Necessary materials for this will be provided by BHEL. Overhauling / cleaning / revisioning /servicing of valves, fittings in temporary system and acid cleaning tanks for re-commissioning activities / operation like water flushing / steam blowing / washing / flushing / passivation / chemical cleaning etc. and also over hauling / revisioning of the pumps & equipments and also to carry out the repairs to attend leaks etc. in the temporary piping & equipments, prior & while carrying out the above operations/activities. All the above works are within the scope of work. All the chemicals will be supplied by BHEL free of cost.

2.7.11 Chemical cleaning (Acid cleaning of piping/alkali flushing) will involve the installation of temporary piping, valves, cutting of some of the existing valves, placing the rubber, wedges in the valves, gagging of valves, and installation of temporary tanks for chemical and for mixing. Necessary temporary access platforms to mixing tank are to be made by the contractor. The dissolving tank, neutralizing tank etc. required for acid pickling will have to be carried out by the contractor. Required materials will be provided by BHEL free of cost. Chemicals for chemical Cleaning will be provided by BHEL. All other consumable are to be provided by the contractor.

2.7.12 Pre commissioning of oil lines includes oil flushing of the pipelines till the entire system and the pipelines are accepted as satisfactorily cleaned after inspection of centrifuge bowl for sediments and laboratory tests of the oil samples taken from the system. After declaration of complete oil flushing of system, oil tank, coolers & the system shall be completely drained, thoroughly cleaned and refilled with fresh oil for putting the system in operation. The contractor shall provide requisite Man-power like skilled/semi skilled workmen in three shifts during oil flushing as a part of this contract without any extra charges. Before commissioning of oil system the pipelines should be hydraulically tested using the hydraulic test pump to the required pressure.

2.7.13 Contractor shall lay all necessary electric cables, switches, etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.

2.7.14 Steam blowing of system piping if required will involve laying of temporary pipe lines, valves, etc and dismantling & restoration of piping. The required steam shall be provided at a central point by BHEL.

2.7.15 During the initial stages of work, trenches for draining water may not be available after Leak test, Hydro test, Flushing or mass flushing. For discharging/ emptying the equipment, system and piping, necessary low point drains and temporary piping upto safe location are to be erected by the contractor at his cost. The materials will be provided by BHEL.

2.7.16 After acid cleaning / pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing of lubricating systems as per instructions of BHEL Engineer shall be carried out. Cleaning of all tanks of lubricating oil system of ST, STG and rotating machineries before and after oil flushing is in the scope of work.

2.7.17 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. Checking all the valves for any accumulation of foreign materials, welding the valves & pipes which were cut and cleaning & re-fixing as per BHEL Engineer’s instructions is within the scope of work/ specification.

2.7.18 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces. All shaft journals and bearings of ST, STG, motor and other rotating machines shall be periodically inspected and preserved as per BHEL Engineer's instructions/BHEL quality instruction manuals.

2.7.19 Raw materials for all temporary piping necessary for conducting Hydraulic test, Chemical cleaning, Steam blowing, Flushing, effluent disposal, etc. will be provided by BHEL free of cost. However, fabrication, servicing, erection and dismantling the same and return of the temporary piping, flanges, valves etc. to BHEL stores is the responsibility of the contractor without any extra charges.

2.7.20 The contractor shall carryout the required tests on the equipments & pipelines, such as gas tightness test/air tightness test, kerosene test, hydrostatic test and rectify all the defects caused due to contractor's fault at his own cost. Contractor may have to replace old/damaged gaskets / packing etc. of equipments and the same shall be carried out by contractor as per requirement. Compressed air for pneumatic testing is to be arranged by contractor. The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition, checking, aligning and coupling the motor to the respective driven equipment. Before starting the motor IR values of insulation shall be recorded and if found necessary dry out to be done by the contractor to improve the IR value at no extra cost.

2.7.21 In case any erection defect is detected during various tests / operations, trial runs as detailed above, such as loose components, undue noises, vibration, strain on connected equipment, steam/oil/water leakage, etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and realignments are necessary the same shall be done as per BHEL Engineer's instructions. If any part needs repairs rectification and replacement the same shall be done by the contractor at no extra cost. The parts to be replaced shall be provided by BHEL free of cost. If insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

2.7.22 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 / draining points with valves as per BHEL Engineer’s instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL. Contractor shall cut steel blanks from steel provided without charging extra. 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 Engineer’s instructions.

2.7.23 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.

2.7.24 Main Steam Line & Hot Reheat Line Strainers bodies are erected first before steam blowing of the lines. After Hydraulic Test, the strainer elements are fixed. During trial operation, if required the strainers are removed for inspection of derbies & cleaning. Contractor has to carry out the work as part of his work without any extra cost.

2.7.25 For conducting Hydro test of MSL, HRH, LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH NRV internals are to be removed, Hydro Test devices are to be fixed and after Hydro Test the internals are to be re-assembled by the contractor as instructed by BHEL without any additional cost.

2.7.26 For steam blowing of MSL, HRH, LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH NRV internals are removed and Hydro Test devices are fixed by the contractor. After Hydro Test the internals are to be reassembled as instructed by BHEL without any additional cost.

2.7.27 The Contractor shall carry out the air tightness test on generator stator to the satisfaction of BHEL Engineers. The necessary arrangements for testing with dry clean air shall be made by the contractor. Also the contractor has to arrange the mercury manometer and mercury at his cost.

2.7.28 The contractor shall assist to carry out the following tests in generator within the quoted value:

a. High voltage test of bushings
b. Measurement of DC resistance of rotor and stator.
c. Impedance test of rotor.
d. Measurement of IR values of stator – rotor – RTD Thermocouples etc.

2.7.29 The contractor shall carryout kerosene test of all the bearing housing of turbine, generator, pumps & other equipments and do the repair work if any. The contractor at his cost shall also arrange kerosene.

2.7.30 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

2.7.31 Temporary blinds/lugs/caps of piping and associated equipments like tanks, pumps etc required for oil flushing / alkali cleaning / acid cleaning of piping & other equipments during erection & pre-commissioning shall be erected by contractor within the quoted rate.

2.7.32 In case any malfunctioning and/or defect is found during tests/trials runs such as loose components, undue noise or vibrations, strains etc. on equipment, the contractor shall immediately attend to these defects/malfunctioning and take necessary corrective measures. If any readjustment and re-alignment are necessary the same shall be done as per BHEL Engineer's instructions as part of work at no extra cost.

2.7.33 During the stages of pre-commissioning / commissioning / post commissioning, if any part of the ST, STG, and auxiliaries need repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor.

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

2.7.35. Contractor shall cut open the works if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning, opening of valves, changing of gaskets, attending to leakages, minor modification/ rectification works may arise. The

contractor has to carry out these works at his cost by providing required manpower in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.

2.7.36 Contractor to provide necessary commissioning assistance from pre-commissioning stage onwards and up to continuous operation of Steam turbine, STG and Auxiliaries. The category of personnel to be deployed shall be as per site requirement and to meet the various pre-commissioning and commissioning program made to achieve the schedule agreed with customer.

2.7.37 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part of commissioning assistance till handing over of sets to customer.

2.7.38 After rolling of turbine, the commissioning activities and trial operations will continue upto handing over. It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers as per the work requirement along with supervisors including necessary consumables, tools, etc. during this period. The rate quoted shall include all these contingencies also. The various categories of workers required for pre-commissioning, commissioning and post–commissioning activities are as follows.

a. Pipe fitters
b. Mill Wright Fitters
c. HP / Structural welders
d. Riggers
e. Unskilled workers
f. Supervisors
g. Electricians
h. Any other category of workers as may be required

Further in addition to the above, contractor has to arrange the following manpower exclusively for assisting BHEL commissioning engineers during stabilization and trial operation period. This manpower will be directly controlled by BHEL commissioning engineers only.

1. One supervisor per shift for three shifts
2. Two fitters per shift for three shifts
3. Two helpers per shift for three shifts.

It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors.

2.7.40 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.

2.7.41 It is the responsibility of the contractor to provide necessary manpower, tools, tackles and consumable till the completion of work under these specifications including for trial operation, commissioning of STG and the other equipments, even though the delay reasons are not attributable to the contractor.

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2.8.0 FINAL PAINTING

2.8.1 The scope of work shall include supply and application of final painting as required and specified for the components of TG and its auxiliaries, TG Integral piping and CW piping erected under your scope.

2.8.2 The enclosed Painting scheme/schedule is indicative. Final painting to be applied as per the approved painting schedule.

2.8.3 Support tube plates, shell internals, dome internals, steam throw off device (steam side), air extraction piping etc., inside the condenser shall be painted with steam washable paints if required.

2.8.4 The interior surfaces of water boxes & water side surface of water chambers excluding tube plates are to be painted as per the procedure /approved painting schedule given by BHEL Engineer/ Mfg. unit.

2.8.5 Required paints, thinner other consumable such as wire brush, brush etc shall have to be arranged by the contractor at their own cost.

2.8.6 In the case of steel fabricated items, raw steel after fabrication has to be cleaned by Sand / shot blasting by and subsequent painting to be carried out. Sand / shot blasting equipment as required has to be arranged by the contractor at his cost.

2.8.7 All the exposed metal parts of the equipments including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface to be protected, are to be first painted with at least one coat of suitable primer, which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease, oil and other foreign materials by wire brushing, scrapping and chemical cleaning and the same being inspected and approved by BHEL Engineers for painting. Afterwards the above parts shall be painted with intermittent and final coating as specified in the Painting Specification and as per the instructions of BHEL / Customer official. If needed and insisted either by BHEL engineer or the BHEL client, in certain cases, spray painting has to be done wherever brush painting is not accessible, by the contractor, within the quoted rates. Contractor has to carryout painting as per the procedure lay down by the customer.

2.7.8 Before applying the subsequent coats as per specification the thickness of each coat shall be measured and recorded with BHEL/Customer. The instrument for checking the thickness of coat is to be procured by the contractor and should be calibrated after periodical intervals.

2.7.9 The quality of the finish paint shall be as per the standards of ISI or equivalent and the colors as approved by BHEL/Customer.

2.7.10 The actual color to be applied shall be intimated to the contractor before starting of actual painting work. The quoted rate shall include final painting also. The scope of painting includes application of color bands, lettering the names of the systems/ equipments, tag nos of valves, marking the directions of flow and other data required by BHEL within the quoted rate.

2.7.11 Primer & finish coat shall be of reputed paint supplier approved by BHEL/Customer. The batch certificates of paints to be submitted to BHEL Engineer before using the same.

2.7.12 GI, Stainless steel, brass, aluminum, copper and other non-ferrous materials shall not be painted unless otherwise specified.

2.7.13 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and un-coated spots. Each coat (Primer, intermediate, finish) shall have a minimum DFT as specified in the approved painting schedule. No paint shall be applied when the surface temp is above 55 deg. Centigrade or below 10 deg. Centigrade and when the humidity is greater than 90%.

Annexure-1

BRIFE LIST OF EQUIPMENTS/COMPONANTS TO BE ERECTED IN PER UNIT

1. STEAM TURBINE:

- Steam Turbine Consisting of 4 cylinders (HP/IP/LP 1 & LP 2) including the following
- Base plates, Anchor plates and Foundation Holding Bolts with Nuts.
- Bearing Pedestals
- ESV&CV, IV&CV, LPBP Valves with servomotors & Suspensions
- LP BP water injection Valves
- Steam Strainer Housing & Strainer Elements for Main Steam & Re-Heat Steam Lines
- Hydraulic Turning Gear *along with hand barring*
- Electro-Hydraulic Governing System backed-up with mechanical System
- Governing Rack, LP By-Pass racks and solenoid, test Valve racks & Pr transducers rack.
- Cross around Piping between IP&LP 1 and LP 2 Casing
- Blanking Device/Fixtures for ESVs, IVs LPBP, CRH NRVs etc., for hydraulic testing and steam blowing
- Oil Supply Units & Oil piping for HPBP Valves & Spray valve (Trichy Supply Under PG 22)
- Lube Oil System consists of oil tanks, injector assy, centrifuge, *MOP*,AOP, JOP, EOP, Leak & Dirty oil tank with pumps, Duplex Filter, vapour fans and auxiliaries, clean oil tank, oil unloading tank, connected oil piping, valves, H&S etc.,
- Control Fluid tank, Oil equipment, piping, Valves, H&S etc.,

2. TURBO GENERATOR:

- Hydrogen Cooled Main Generator Consisting of the following
  - Stator
  - Rotor
  - End Shields & Bearing
  - Exciter
  - Seal Oil System
  - Primary Water System
  - H_2 Cooling System
  - CO_2 System
  - Seal Oil Tank
  - PW Tank & Alkaliser Unit
  - Generator package piping
  - Other Accessories

3. HEAT EXCHANGERS:

- Condenser 2 nos. mainly comprising of the following parts
  - Bottom Plate
  - Hot Well
  - Turbine & generator End side plate
  - Dome Walls
  - Front & Rear Water Chambers with Tube Plates
  - Support Plates
  - Springs
  - Steam Through device
  - Air Extraction Pipe & Baffle
  - Stiffening/Support Pipes/Rods, Bars etc.,
  - Misc Fittings & Loose items
  - Instruments
  - **WELDED AUSTENITIC SS TUBE GR. 304 (27410 Nos)**

- Gland Steam Cooler
- LP Heater 1, 2 &3
- HP Heaters 5(A&B), 6(A&B) & 7(A&B)
- Drain Coolers
- FST & Deareators
  (FST in Sections)
- Lube Oil & Seal Oil Coolers
- Primary Water Coolers
- Hydrogen Coolers
- Exciter Air Coolers
- CF Coolers

4. PUMPS & MOTORS:

- Boiler Feed Pumps (1 Motor Driven & 2 Turbo Driven)
- 2 Drive Turbine for TD BFP Consists of
  - Turbine Assembly
  - Governing Valve Assembly
  - Oil Pumps
  - Lube Oil Console
  - Gear Box
  - Connecting Couplings
  - Oil Coolers etc.,

- Motor for MD BFP
- Booster Pumps for BFP
- Lube Oil Piping, Cooling Systems & other Accessories for BFP, Drive Turbine & Motor-2nos
- Condensate Extraction Pump-3nos
- Motors for CEP-3nos

5. BOUGHT OUT ITEMS:

- Turbine Integral Piping Consists of
  - Lube Oil Piping
  - Control Oil Piping
  - Seal Oil Piping
  - Gland Seal Piping
  - Equipment Drains & Vents
  - Cross Around Piping
  - Air & Gas System Piping
  - ACW piping for H_2 Coolers
  - Other Misc System Piping Etc.,

- Condenser Tubes(WELDED AUSTENITIC S.S. TUBES GR.304)
- Vacuum Pumps & Air evacuation System
- Oil Centrifuge & Associated System
- CF Purification Unit with pumps, Vapour exhauster etc.,
- 3 Way Control Valves
- Drain Valves
- Hangers & Supports
- Pumps with Accessories (JOP, AOP, EOP)
- Springs & Hanger supports
- Dampers(Vacuum Breaking Device)
- H2 & CO2 Cylinders, N2 Cylinders
- Fixing of Pick-Ups, Probes & Accessories for Vibration Monitoring System
- Bearing Vapour Exhauster
- Coupling Covers
- RE Joints & Stretching Bolt Assembly
- Flash Tanks
- Butterfly Valves
- ME Bellows
- LP dosing sys for ECW
- Portable Lube Oil Purification Unit
- Misc pumps
- Control valves
- Rota meter

6. CW Piping:

CW piping between 2.0 M from 'A' row col. outside and condenser including RE joints, butterfly valves and associated equipments.

- CS Pipe – Approx. Size NB 1800 mm

Note:

1. The Information furnished in this section is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components/ items / systems according to the site requirements/ customer requirements to complete various systems in all respects.

2. Any other systems / components which are the integral to equipment supplied by the manufacturing units shall also be erected and commissioned by the contractor within the quoted /accepted rate.

Volume 1A **PART –II *ANNEXURE – 2***

WEIGHT SCHEDULE FOR ONE UNIT

SNo	EQUIPMENT/PACKAGE	APPROX. WT (in MT)
01	Steam Turbine & Aux.	**1009.0**
02	Turbo Generator & Aux	**527.0**
03	Condenser	**697.0**
04	LP & HP Heaters	**409.0**
05	BFP, Booster Pumps, Turbo drive & Motors	**278.0**
06	CEP with Motors & Frames	**52.0**
07	Deaerator, FST & Drain Cooler	**116.0**
08	Piping & Bought out items etc.,	**525.0**
09	CW Piping & Fittings	**148.0**
10	RE Joints & Butter fly valves	**141.0**
	Total	**3902.0**

Note:

1. The weight indicated above is approximate and there may be a variation in weight of equipment/Package.

2. Puddle flanges/ welded end pipe of CW piping (80-468) are already erected at site by other / civil contractor. Scope of this specification not only covers to match the line with puddle flange/ weld end pipe but also any activities connected with these are to be carried out by the contractor within the quoted rate.

Weight in Detail in Turbine, Condenser & Generator

CONDENSER PACKAGES					
SL NO	**PKGNO**	**DESCRIPTION**	**PACKING SIZE**	**GROSS WEIGHT (KG)**	**NET WEIGHT (KG)**
1	78001/1	CONDENSER (HOT WALL-TS)	11300x2100x1300	6140	6140
2	78001/2	CONDENSER (HOT WALL-GS)	11300x2100x1300	6120	6120
3	78004/1	FRONT END BOTTOM PLATE	7100x3350x625	6750	6750
4	78004/2	FRONT END BOTTOM PLATE	7100x3350x625	6750	6750
5	78005/1	REAR END BOTTOM PLATE	7100x3350x625	6750	6750
6	78005/2	REAR END BOTTOM PLATE	7100x3350x625	6750	6750
7	78006/1	MIDDLE BOTTOM PLATE-1	7100x3250x625	6025	6025
8	78006/2	MIDDLE BOTTOM PLATE-1	7100x3250x625	6025	6025
9	78007/1	MIDDLE BOTTOM PLATE-2	7100x3250x625	6025	6025
10	78007/2	MIDDLE BOTTOM PLATE-2	7100x3250x625	6025	6025
11	78010/0	BOTTOM PLATE (LOOSE ITEMS)	1900x700x600	900	830
12	78012/1	SPRING ELEMENT(CONDENSER SUPPORT)	2000X1000X1250	5200	5200
13	78012/2	SPRING ELEMENT(CONDENSER SUPPORT)	2000X1000X1250	5200	5200
14	78013/1	SPRING ELEMENT(CONDENSER SUPPORT)	2000X1000X1250	5200	5200
15	78013/2	SPRING ELEMENT(CONDENSER SUPPORT)	2000X1000X1250	5200	5200
16	78014/1	SPRING ELEMENT(CONDENSER SUPPORT)	2000X1000X1250	5200	5200
17	78014/2	SPRING ELEMENT(CONDENSER SUPPORT)	2000X1000X1250	5200	5200
18	78015/1	SPRING ELEMENT(CONDENSER SUPPORT)	2000X1000X1250	5200	5200
19	78015/2	SPRING ELEMENT(CONDENSER SUPPORT)	2000X1000X1250	5200	5200
20	78018/1	LOOSE ITEMS(CONDENSER SUPPORT)	1600X950X950	6590	6400
21	78018/2	LOOSE ITEMS(CONDENSER SUPPORT)	1600X950X950	6590	6400
22	78020/1	FRONT WATER CHAMBER(GS)	5224X3620X340	5970	5820
23	78020/2	FRONT WATER CHAMBER(GS)	5224X3620X340	5970	5820
24	78022/1	FRONT WATER BOX(GS)	5950X3620X2485	14260	14110
25	78022/2	FRONT WATER BOX(GS)	5950X3620X2485	14260	14110
26	78023/1	FRONT WATER CHAMBER(TS)	5224X3620X340	5970	5820
27	78023/2	FRONT WATER CHAMBER(TS)	5224X3620X340	5970	5820
28	78025/1	FRONT WATER BOX(TUR.SIDE)	5950X3620X2485	14260	14110
29	78025/2	FRONT WATER BOX(TUR.SIDE)	5950X3620X2485	14260	14110
30	78026/1	REAR WATER CHAMBER(GEN.SIDE)	5224X3500X340	4820	4670
31	78026/2	REAR WATER CHAMBER(GEN.SIDE)	5224X3500X340	4820	4670
32	78028/1	REAR WATER BOX (GEN.SIDE)	4770X3370X1950	8300	8150
33	78028/2	REAR WATER BOX (GEN.SIDE)	4770X3370X1950	8300	8150
34	78029/1	REAR WATER CHAMBER(TUR.SIDE)	5224X3500X340	4820	4670
35	78029/2	REAR WATER CHAMBER(TUR.SIDE)	5224X3500X340	4820	4670
36	78031/1	REAR WATER BOX (TUR.SIDE)	4770X3370X1950	8300	8150
37	78031/2	REAR WATER BOX (TUR.SIDE)	4770X3370X1950	8300	8150
38	78032/1	SIDE WALL (TUR.END)	5248X2480X32	3290	3290
39	78032/2	SIDE WALL (TUR.END)	5248X2480X32	3290	3290
40	78033/1	SIDE WALL (TUR.END)	5248X1705X32	2185	2185
41	78033/2	SIDE WALL (TUR.END)	5248X1705X32	2185	2185
42	78034/1	SIDE WALL (TUR.END)	5248X2480X16	1645	1645
43	78034/2	SIDE WALL (TUR.END)	5248X2480X16	1645	1645
44	78041/1	SIDE WALL (TUR.END)	5248X2480X32	3290	3290
45	78041/2	SIDE WALL (TUR.END)	5248X2480X32	3290	3290
46	78042/1	SIDE WALL (TUR.END)	5248X1705X32	2185	2185
47	78042/2	SIDE WALL (TUR.END)	5248X1705X32	2185	2185
48	78046/1	SIDE WALL (TUR.END)	5248X2480X16	1645	1645
49	78046/2	SIDE WALL (TUR.END)	5248X2480X16	1645	1645
50	78047/0	SIDE WALL (LOOSE ITEMS)	5850X700X450	2828	2728

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
51	78048/1	SHELL INTERNAL DETAILS	3650X1000X800	2798	2548
52	78048/2	SHELL INTERNAL DETAILS	3650X1000X800	2798	2548
53	78049/1	SHELL INTERNAL DETAILS	3650X1000X800	2798	2548
54	78049/2	SHELL INTERNAL DETAILS	3650X1000X800	2798	2548
55	78050/1	RODS (SHELL INTERNALS)	3650X1000X800	2798	2548
56	78050/2	RODS (SHELL INTERNALS)	3650X1000X800	2798	2548
57	78051/1	RODS (SHELL INTERNALS)	3650X1000X800	2798	2548
58	78051/2	RODS (SHELL INTERNALS)	3650X1000X800	2798	2548
59	78055/1	SHELL INTERNAL DETAILS	3700X850X350	758	608
60	78055/2	SHELL INTERNAL DETAILS	3700X850X350	758	608
61	78056/1	SHELL INTERNAL DETAILS	3700X850X500	4390	4240
62	78056/2	SHELL INTERNAL DETAILS	3700X850X500	4390	4240
63	78058/1	AIR EXTRACTION PIPING	5460X990X410	1200	1065
64	78058/2	AIR EXTRACTION PIPING	5460X990X410	1200	1065
65	78059/1	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
66	78059/2	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
67	78060/1	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
68	78060/2	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
69	78061/1	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
70	78061/2	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
71	78062/1	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
72	78062/2	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
73	78063/1	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
74	78063/2	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
75	78064/1	SHELL INTERNAL DETAILS	4700X3426X348	3892	3660
76	78064/2	SHELL INTERNAL DETAILS	4700X3426X348	3892	3660
77	78065/1	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
78	78065/2	SHELL INTERNAL DETAILS	4700X3426X348	4092	3860
79	78069/1	SHELL INTERNAL DETAILS	5500X940X750	9265	8698
80	78069/2	SHELL INTERNAL DETAILS	5500X940X750	9265	8698
81	78070/1	SHELL INTERNAL DETAILS	5500X940X630	4150	3583
82	78070/2	SHELL INTERNAL DETAILS	5500X940X630	4150	3583
83	78071/1	SHELL INTERNAL DETAILS	5500X940X630	5258	4691
84	78071/2	SHELL INTERNAL DETAILS	5500X940X630	5258	4691
85	78072/1	SHELL INTERNAL DETAILS	5500X940X630	4427	3860
86	78072/2	SHELL INTERNAL DETAILS	5500X940X630	4427	3860
87	78074/1	LOWER DOME WALL (TS)	8632X2386X430	5899	5799
88	78075/1	LOWER DOME WALL (TS)	10963X2500X650	7474	7374
89	78075/2	LOWER DOME WALL (TS)	7051X584X257	872	822
90	78076/1	LOWER DOME WALL (TS)	9093X617X550	1447	1397
91	78076/2	LOWER DOME WALL (TS)	10963X2500X257	7432	7332
92	78077/1	LOWER DOME WALL (TS)	7024X350X200	656	606
93	78077/2	LOWER DOME WALL (TS)	9006X2500X257	6561	6461
94	78078/1	LOOSE ITEMS (LOWER DOME WALL-TS)	XXX	1000	1000
95	78078/2	LOOSE ITEMS (LOWER DOME WALL-TS)	XXX	1000	1000
96	78102/2	LOWER DOME WALL (GS)	8520X2236X650	5618	5518
97	78103/1	LOWER DOME WALL (GS)	7051X584X257	872	822
98	78103/2	LOWER DOME WALL (GS)	10963X1550X300	5238	5138
99	78104/1	LOWER DOME WALL (GS)	10963X2500X257	7432	7332
100	78104/2	LOWER DOME WALL (GS)	9804X2065X500	4735	4635

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
101	78105/1	LOWER DOME WALL (GEN.END)	9006X2500X257	6561	6461
102	78105/2	LOWER DOME WALL (GEN.END)	7024X350X200	656	606
103	78106/1	LOOSE ITEMS (LOWER DOME WALL GS)	XXX	1000	1000
104	78106/2	LOOSE ITEMS (LOWER DOME WALL GS)	XXX	1000	1000
105	78109/1	LOWER DOME WALL (F.W/B SIDE)	6300X3000X310	4820	4720
106	78109/2	LOWER DOME WALL (F.W/B SIDE)	6300X3000X310	4813	4713
107	78110/1	LOWER DOME WALL (FRONT W/BOX SIDE)	7100X3010X550	5849	5749
108	78110/2	LOWER DOME WALL (FRONT W/BOX SIDE)	7100X3010X550	5849	5749
109	78111/1	LOWER DOME WALL (FRONT W/BOX SIDE)	5548X350X200	546	496
110	78111/2	LOWER DOME WALL (FRONT W/BOX SIDE)	5548X350X200	596	496
111	78112/1	LOOSE ITEMS (LOWER DOME WALL FRONT W/BOX SIDE)	XXX	1000	1000
112	78112/2	LOOSE ITEMS (LOWER DOME WALL FRONT W/BOX SIDE)	XXX	1000	1000
113	78114/1	LOWER DOME WALL (REAR W/BOX SIDE)	5932X1970X550	2647	2547
114	78114/2	LOWER DOME WALL (REAR W/BOX SIDE)	5932X1970X550	2658	2558
115	78115/1	LOWER DOME WALL (REAR W/BOX SIDE)	7100X1577X550	3454	3354
116	78115/2	LOWER DOME WALL (REAR W/BOX SIDE)	7100X1577X550	3463	3363
117	78116/1	LOWER DOME WALL (REAR W/BOX SIDE)	6648X2696X1350	4918	4818
118	78116/2	LOWER DOME WALL (REAR W/BOX SIDE)	6648X2696X1350	4918	4818
119	78117/1	LOWER DOME WALL (REAR W/BOX SIDE)	5550X350X200	549	499
120	78117/2	LOWER DOME WALL (REAR W/BOX SIDE)	5550X350X200	549	499
121	78118/1	LOOSE ITEMS(LOWER DOME WALL REAR W/BOX SIDE)	XXX	1000	1000
122	78118/2	LOOSE ITEMS(LOWER DOME WALL REAR W/BOX SIDE)	XXX	1000	1000
123	78121/1	DOME INTERNAL STIFFENING	6016X200X200	2921	2921
124	78121/2	DOME INTERNAL STIFFENING	6016X200X200	900	900
125	78122/1	DOME INTERNAL STIFFENING	6016X200X200	1529	1529
126	78122/2	DOME INTERNAL STIFFENING	6016X200X200	900	900
127	78123/1	DOME INTERNAL STIFFENING	6016X200X200	222	222
128	78123/2	DOME INTERNAL STIFFENING	6016X200X200	900	900
129	78124/1	DOME INTERNAL STIFFENING	6016X200X200	2023	2023
130	78124/2	DOME INTERNAL STIFFENING	6016X200X200	900	900
131	78125/1	DOME INTERNAL STIFFENING	3400X200X200	868	868
132	78125/2	DOME INTERNAL STIFFENING	3400X200X200	500	500
133	78126/1	DOME INTERNAL STIFFENING	3400X200X200	918	918
134	78126/2	DOME INTERNAL STIFFENING	3400X200X200	500	500
135	78129/1	LP HEATER NO SUPPORT ARRANGEMENT	2150X1800X1150	3350	3000
136	78129/2	LP HEATER NO SUPPORT ARRANGEMENT	2150X1800X1150	3350	3000
137	78130/1	LP HEATER NO SUPPORT ARRANGEMENT	5950X1125X580	3250	2950
138	78130/2	LP HEATER NO SUPPORT ARRANGEMENT	5950X1125X580	3250	2950
139	78132/1	UPPER DOME WALL (TUR/GEN SIDE)	6870X1660X300	3573	3573
140	78132/2	UPPER DOME WALL (TUR/GEN SIDE)	6870X1660X300	3573	3573
141	78133/1	UPPER DOME WALL (TUR/GEN SIDE)	6870X1660X300	3575	3575
142	78133/2	UPPER DOME WALL (TUR/GEN SIDE)	6870X1660X300	3575	3575
143	78136/1	UPPER DOME WALL (FWB SIDE)	6000X3600X450	6393	6393
144	78136/2	UPPER DOME WALL (TUR/GEN SIDE)	6000X3600X450	6393	6393
145	78137/0	UPPER DOME WALL(LOOSE ITEMS)	5400X350X32	600	600
146	78139/1	UPPER DOME WALL (FWB SIDE)	6000X3580X300	6152	6152
147	78139/2	UPPER DOME WALL (FWB SIDE)	6000X3580X300	6152	6152
148	78142/1	FRONT W/BOX HINGE ARRANGEMENT	2500X1000X750	1830	1682
149	78142/2	FRONT W/BOX HINGE ARRANGEMENT	2500X1000X750	1830	1682
150	78143/1	LOOSE ITEMS(W/B HINGE ARRANGEMENT)	2000X1500X500	778	643

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
151	78143/2	LOOSE ITEMS(W/B HINGE ARRANGEMENT)	2000X1500X500	778	643
152	78150/0	FRONT& REAR W/BOX HINGE ARRANGEMENT	1670x1040x480	914	914
153	78150/1	FRONTW/BOX HINGE ARRANGEMENT	2810X840X230	650	595
154	78150/2	FRONTW/BOX HINGE ARRANGEMENT	2810X840X230	650	595
155	78151/0	FRONT& REAR W/BOX HINGE ARRANGEMENT	1670x1040x480	914	914
156	78154/1	STEAM THROW DEVICE	5500X940X630	15593	15026
157	78154/2	STEAM THROW DEVICE	5500X940X630	15593	15026
158	78157/1	CONDENSER (LOOSE ITEMS)	850X250X250	36	30
159	78157/2	CONDENSER (LOOSE ITEMS)	850X250X250	36	30
160	78158/1	CONDENSER (LOOSE ITEMS)	2900x956x406	500	500
161	78158/2	CONDENSER (LOOSE ITEMS)	2900x956x406	500	500
162	78159/1	CONDENSER (LOOSE ITEMS)	1000x500x500	350	300
163	78159/2	CONDENSER (LOOSE ITEMS)	1000x500x500	350	300
164	78165/0	CONDENSER (LOOSE ITEMS)	1000x600x500	30	25
165	78166/1	STAND PIPE NO.1	2750X420X400	110	100
166	78166/2	STAND PIPE NO.1	2750X420X400	110	100
167	78167/0	CONDENSER STAND PIPE	3150X350X330	216	200
168	78169/1	STAND PIPE NO.2	2750X420X390	110	100
169	78169/2	STAND PIPE NO.2	2750X420X390	110	100
170	78175/0	CONDENSER INSTRUMENTATION	1500x1000x1000	950	900
171	78176/0	CONDENSER INSTRUMENTATION	1000x500x500	140	100
172	78177/0	CONDENSER INSTRUMENTATION	1400x800x700	96	80
173	78301/0	GLAND STEAM CONDENSER	1750x1700x1700	1610	1510
174	78304/0	LOOSE ITEMS OF GSC	700x300x200	60	34
175	78305/0	LOOSE ITEMS GSC (FRAGILE)	600x500x350	35	10
176	78315/1	L.P.HEATER NO.1	11650x1250x1750	15000	14500
177	78315/2	L.P.HEATER NO.1	11650x1250x1750	15000	14500
178	78316/1	LOOSE ITEMS OF LPH 1	500x400x400	300	250
179	78316/2	LOOSE ITEMS OF LPH 1	500x400x400	300	250
180	78317/1	L.P.HEATER NO.1 STAND PIPE	2200X700X500	65	60
181	78317/2	L.P.HEATER NO.1 STAND PIPE	2200X700X500	65	60
182	78318/1	LPH 1 PANEL MOUNTED INSTRUMENT	2600X500X400	80	50
183	78318/2	LPH 1 PANEL MOUNTED INSTRUMENT	2600X500X400	80	50
184	78319/1	LOOSE ITEMS LP HEATER NO.1	700X500X500	200	150
185	78319/2	LOOSE ITEMS LP HEATER NO.1	700X500X500	200	150
186	78320/1	TROLLEY FOR LP HEATER NO.1	1150X1050X250	400	400
187	78320/2	TROLLEY FOR LP HEATER NO.1	1150X1050X250	400	400
188	78401/0	TURBINE OIL COOLER	5850x1700x2300	13250	12450
189	78405/0	TURBINE OIL COOLER	5850x1700x2300	13250	12450
190	78406/0	LOOSE ITEMS(TOC)	800x800x500	130	120
191	78424/0	HYDROGEN COOLER	4700x1250x1200	3667	3232
192	78425/0	HYDROGEN COOLER	4700x1250x1200	3667	3232
193	78428/0	LOOSE ITEMS (HYDROGEN COOLERS)	2100X1200X350	640	540
194	78431/0	EXCITER AIR COOLER	3600X1000X830	1980	1450
195	78432/0	EXCITER AIR COOLER	3600X1000X830	1980	1450
196	78436/0	CONTROL FLUID COOLER	3300x850x1030	1506	1315
197	78437/0	CONTROL FLUID COOLER	3300x850x1030	1506	1315
198	78438/0	LOOSE ITEMS(CFC)	600x600x500	103	86
				721913	**697060**

TURBINE PACKAGE

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
1	75001	EMBEDMENT FOR ANCHOR POINTS	4400X1600X1000	5447	4388
2	75003	COMPONENTS FOR BASE PLATE ASSEMBLY	4900 x 1200 x 600	6673	5920
3	75004	COMPONENTS OF BASE PLATE	2800 x 1700 x 600	3635	3058
4	75101	BASE PLATE FOR LP CASING	1850 x 1400 x 500	9437	8640
5	75102/1	LP OUTER CASING PARTS	7060 x 1480 x 2760	8085	8070
6	75102/2	LP OUTER CASING PARTS	7060 x 1480 x 2760	8085	8070
7	75103/1	LP OUTER CASING PARTS	7060 x 1480 x 2760	8085	8070
8	75103/2	LP OUTER CASING PARTS	7060 x 1480 x 2760	8085	8070
9	75104/1	LPC OUTER CASING PARTS	4570x 3230 x 980	2500	2455
10	75104/2	LPC OUTER CASING PARTS	4570x 3230 x 980	2500	2455
11	75105/1	LPC OUTER CASING PARTS	4570x 3230 x 980	2500	2455
12	75105/2	LPC OUTER CASING PARTS	4570x 3230 x 980	2500	2455
13	75106/1	COMPONENTS OF LP CASING UPPERPART	3500 x 300 x 300	495	405
14	75106/2	COMPONENTS OF LP CASING UPPERPART	3500 x 300 x 300	495	405
15	75106/3	LP OUTER CASING PARTS	3450 x 1000 x 1100	900	478
16	75106/4	LP OUTER CASING PARTS	3450 x 1000 x 1100	900	478
17	75107/1	LONGITUDINAL GIRDER (LEFT)	6800 x 1820 x 1570	15182	15107
18	75107/2	LONGITUDINAL GIRDER (LEFT)	6800 x 1820 x 1570	15182	15107
19	75108/1	LONGITUDINAL GIRDER (RIGHT)	6800 x 1820 x 1570	15182	15107
20	75108/2	LONGITUDINAL GIRDER (RIGHT)	6800 x 1820 x 1570	15182	15107
21	75109/1	LP FRONT WALL (TS)	6820 x 3750 x 910	10053	9878
22	75109/2	LP FRONT WALL (TS)	6820 x 3750 x 910	10053	9878
23	75110/1	LP FRONT WALL (GS)	6820 x 3750 x 910	10053	9878
24	75110/2	LP FRONT WALL (GS)	6820 x 3750 x 910	10053	9878
25	75111/1	LP SHAFT SEALING (FRONT)	1800 x 1700 x 740	2260	1801
26	75111/2	LP SHAFT SEALING (FRONT)	1800 x 1700 x 740	2260	1801
27	75112/1	LP SHAFT SEALING (REAR)	1800 x 1700 x 740	2260	1801
28	75112/2	LP SHAFT SEALING (REAR)	1800 x 1700 x 740	2260	1801
29	75113/1	LP SHAFT SEAL COMPENSATORASSLY (TS)	1440 x 1420 x 520	1456	1351
30	75113/2	LP SHAFT SEAL COMPENSATORASSLY (TS)	1440 x 1420 x 520	1456	1351
31	75114/1	LP SHAFT SEAL COMPENSATORASSLY (GS)	1440 x 1420 x 520	1456	1351
32	75114/2	LP SHAFT SEAL COMPENSATORASSLY (GS)	1440 x 1420 x 520	1456	1351
33	75115/1	LP JOINT COVERING	2300 x 1800 x 940	1041	841
34	75115/2	LP JOINT COVERING	2300 x 1800 x 940	1041	841
35	75201	HP/IP BEARING PEDESTAL ASSLY.	4080 x 2005 x 2126	13275	12100
36	75202	HP/IP BRG.PED.PARTS	1000 x 600 x 600	400	300
37	75301	ASSEMBLY DEVICES	1000 x 750 x 750	311	221
38	75302	INSPECTION SHAFT FOR IPC	4050X600X900	1430	1130
39	75304	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	3800 x 2500 x 1300	6860	6395
40	75305	COMPONENTS OF ASSEMBLY FIXTURE	2300 x 2100 x 900	1800	1510
41	75306	COMPONENTS OF ASSLY FIXTURE FOR HPT	3300 x 1800 x 1300	3350	2852
42	75307	COMPONENTS FOR ASSLY FIXTURE FOR HPT	5450 x 4050 x 400	3400	2566
43	75308/1	AUXILARIES OF LP TURBINE	3000 x 1300 x 1000	2100	1710
44	75308/2	AUXILARIES OF LP TURBINE	3000 x 1300 x 1000	2100	1710
45	75309/1	AUXLIARIES OF LP TURBINE	2000 x 1000 x 1825	1142	1142
46	75309/2	AUXLIARIES OF LP TURBINE	2000 x 1000 x 1825	1142	1142
47	75310/1	AUXLIARIES OF LP TURBINE	2000 x 1000 x 1825	1142	1142
48	75310/2	AUXLIARIES OF LP TURBINE	2000 x 1000 x 1825	1142	1142
49	75311	ASSEMBLY TOOLS	1700 x 800 x 400	1020	580
50	75312	AUXILIARIES OF IP TURBINE	1200 x 500 x 550	260	205

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
51	75313	AUXILIARIES OF IP TURBINE	1100 x 500 x 650	210	205
52	75314	AUXILIARIES OF IP TURBINE	1100 x 500 x 650	210	205
53	75315	BOLT HEATING EQUIPMENT AND BREECH NUT HEATING DEVICE	1700 x 900 x 700	150	90
54	75316	GROMMET SLINGS	1700 x 1700 x 300	625	548
55	75318	OIL FLUSHING AND PRESSURE TEST DEVICE	750 x 550 x 400	250	150
56	75319	STEAM BLOWING & HYDRAULIC TEST DEVICE	2900 x 2100 x 1200	4650	3910
57	75320	TOOLS FOR GOV.SYST.&VALVES	1750 x 1200 x 1000	1500	900
58	75321	VALVE SUPPORT FOR HPT OVERHALL	1500 x 750 x 750	905	705
59	75401	IP-LP BEARING PEDESTAL ASSLY	3700 x 1860 x 2100	14500	13500
60	75501	LP/GEN. PEDESTAL ASSEMBLY	3200 x 2280 x 2070	9168	8276
61	75502	BEARING PEDESTAL (PARTS)	1600 x 800 x 600	1150	1030
62	75503	LP/LP PEDESTAL ASSEMBLY	3200X2280X2070	9366	8474
63	75504	OIL FLUSHING AND PRESSURE TEST DEVICE	750X550X400	250	150
64	75505	LP-LP BEARING PEDESTAL PARTS	800X800X600	542	462
65	75601/1	FRONT BEARING PEDESTAL	3140 x 3140 x 2050	12386	11058
66	75601/2	HYDRAULIC TURNING GEAR	2100 x 1000 x 600	750	630
67	75601/3	MAIN OIL PUMP ASSEMBLY.	1400 x 1200 x 1000	550	380
68	75704/1	LP CASING ASSEMBLY(FASTENERS)	1800 x 1700 x 740	2653	2190
69	75704/2	LP CASING ASSEMBLY(FASTENERS)	1800 x 1700 x 740	2653	2190
70	75704/3	LP CASING ASSEMBLY(PARTS)	3760X2060X860	4900	4511
71	75704/4	LP CASING ASSEMBLY(PARTS)	3760X2060X860	4900	4511
72	75705/1	LP EXTRACTION A1	5000X1100X700	1262	772
73	75705/2	LP EXTRACTION A1	5000X1100X700	1262	772
74	75706/1	LP EXTRACTION A1	5000X1100X700	1262	772
75	75706/2	LP EXTRACTION A1	5000X1100X700	1262	772
76	75707/1	LP EXTRACTION A1	3420X1620X870	1286	790
77	75707/2	LP EXTRACTION A1	1400X1300X700	330	144
78	75707/3	LP EXTRACTION A1	1400X1300X700	330	144
79	75707/4	LP EXTRACTION A1	1400X1300X700	330	144
80	75707/5	EXTRACTION PIPE LINE (LPC)	1650X800X450	470	320
81	75707/6	EXTRACTION PIPE LINE (LPC)	1650X800X450	470	320
82	75708/1	LP EXTRACTION A2	2700X1200X750	575	375
83	75708/2	LP EXTRACTION A2	2700X1200X750	575	375
84	75709/1	LP EXTRACTION A2	1100X850X850	307	226
85	75709/2	LP EXTRACTION A2	1100X850X850	307	226
86	75710/1	EXTRACTION PIPE LINE (LPC)	3300X1750X1100	1006	440
87	75710/2	LP EXTRACTION A2	3300X1750X1100	1006	440
88	75711/1	LP EXTRACTION A3	1400X600X600	302	200
89	75711/2	LP EXTRACTION A3	1400X600X600	302	200
90	75711/3	LP EXTRACTION A3	1400X700X700	346	223
91	75711/4	LP EXTRACTION A3	1400X700X700	346	223
92	75711/5	LP EXTRACTION A3	2000X600X600	373	235
93	75711/6	LP EXTRACTION A3	2000X600X600	373	235
94	75716/1	LP EXTRACTION PIPE SHEATHING	2600X2000X1400	1386	985
95	75716/2	LP EXTRACTION PIPE SHEATHING	2600X2000X1400	1386	985
96	75717/1	INNER GUIDE PLATE OF DIFFUSER (TS)	2600X2400X1000	2118	1334
97	75717/2	INNER GUIDE PLATE OF DIFFUSER (TS)	2600X2400X1000	2118	1334
98	75718/1	DIFFUSER (TS)	4880x1730x2340	3235	3225
99	75718/2	DIFFUSER (TS)	4880x1730x2340	3235	3225
100	75719/1	DIFFUSER (GS)	4880x1730x2340	3235	3225

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
101	75719/2	DIFFUSER (GS)	4880x1730x2340	3235	3225
102	75720/1	LP INNER OUTER CASING (U/H)	6720x3150x2325	21750	20800
103	75720/2	LP INNER OUTER CASING (U/H)	6720x3150x2325	21750	20800
104	75721/1	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING(L/H)	6750X3500X2350	30907	29207
105	75721/2	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING(L/H)	6750X3500X2350	30907	29207
106	75722/1	LP INNER INNER CASING ASSY FASTNERS	1800X1700X740	1760	1300
107	75722/2	LP INNER INNER CASING ASSY FASTNERS	1800X1700X740	1760	1300
108	75723/1	LP CASING ASSEMBLY (PARTS)	450X450X250	140	65
109	75723/2	LP CASING ASSEMBLY (PARTS)	450X450X250	140	65
110	75724/1	LP INNER - INNER CASING (U/H) PARTIAL	4000x1570x2000	11722	10800
111	75724/2	LP INNER - INNER CASING (U/H) PARTIAL	4000x1570x2000	11722	10800
112	75725/1	INNER GUIDE PLATE OF DIFFUSER (GS)	2600x2400x1000	2118	1334
113	75725/2	INNER GUIDE PLATE OF DIFFUSER (GS)	2600x2400x1000	2118	1334
114	75728/1	STEAM INLET PIPE (LPT)	2700X1300X900	840	512
115	75728/2	STEAM INLET PIPE (LPT)	2700X1300X900	840	512
116	75801/1	LP ROTOR	7210X3300X3350	62049	58277
117	75801/2	LP ROTOR	7210X3300X3350	62049	58277
118	75901	IP ROTOR	4800x2120x1995	23132	21765
119	75902	IP OUTER CASING (U/H)	4050x3800x2650	25850	25450
120	75903	IP OUTER CASING (L/H)	3400x5250x2600	25870	25450
121	75904	IP INNER CASING (U/H)	2900x3200x1850	15200	14150
122	75905	IP INNER CASING (L/H)	2900x3200x1850	15200	14150
123	75906	IP INLET ASSEMBLY	4500x3725x1300	13550	13500
124	75907	IP SHAFT SEALING	1400x1200x900	950	765
125	75908	IP TURBINE (PARTS)	2000x1900x1000	3125	2750
126	75909	I.P. TURBINE PARTS	1000x1000x750	475	365
127	76001/1	HP TURBINE	5675x3400x2900	88650	86350
128	76001/2	EMERGENCY GOVERN0R	495x395x695	57	48
129	76002	HP INLET ASSLY. & HP EXHAUST ASSLY. (PARTS)	1200x1200x500	80	35
130	76003	HP EXHAUST ASSEMBLY	1650x1400x900	2000	1810
131	76004	HPT RELATED PARTS	1300x1300x700	200	120
132	76104	ESV & CV CASING WITH VALVES	3600x3600x2500	23146	20276
133	76105/1	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x1200x1200	4250	3849
134	76105/2	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x1200x1200	4250	3849
135	76107	HP CONTROL VALVE SERVOMOTOR	2800x1200x2100	3280	2680
136	76108	ESV & CV CASING WITH VALVES	3600x3600x2500	23146	20276
137	76112	HP CONTROL VALVE SERVOMOTOR	2800x1200x2100	3288	2688
138	76201	SUSPENSION OF VALVE (IV)	4250x2640x750	8078	6618
139	76202	IV & CV CASING WITH VALVES	5040x4690x2770	33276	28276
140	76203/1	IV SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700x1450x1400	3965	3385
141	76203/2	IV SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700x1450x1400	3965	3385
142	76204	IP CONTROL VALVE SERVOMOTOR	3240x1240x1950	3019	2403
143	76205/1	FRAME FOR SUSPENSION (IV)	3400x3150x750	2026	2026
144	76205/2	FRAME FOR SUSPENSION (IV)	3400x3150x750	2026	2026
145	76205/3	LOOSE ITEMS FOR FRAME FOR SUSPENSION(IV)	300x200x200	20	17
146	76206	IV & CV CASING WITH VALVES	5040x4690x2770	33276	28276
147	76210	IP CONTROL VALVE SERVOMOTOR	3240x1240x1950	3003	2387
148	76301/1	SUSPENSION OF LPBP VALVE	3600x1700x800	1836	986
149	76301/2	SUSPENSION OF LPBP VALVE	3600x1700x800	1836	986
150	76402	INJECTOR FOR SUC. PIPE NB 350	3300x800x800	588	338

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
151	76403	INJECTOR FOR SUC. PIPE NB 300	3300x1750x1200	999	499
152	76404	MAIN OIL TANK & NOZZLE ARRGT.ASSY.	6180x3260x2650	10697	10697
153	76405	MAIN OIL TANK & NOZZLE ARRGT.ASSY.	4200x1200x900	402	327
154	76406	OIL STRAINERS	1500x1000x1200	228	168
155	76407	OIL STRAINERS	1500x1000x1200	228	168
156	76409	OIL STRAINERS	2050x1200x1410	470	170
157	76412	LEAKAGE OIL TANK	1000x1000x3000	515	515
158	76413	WASTE OIL TANK	1000x1000x3000	515	515
159	76414	VAR.ORIFICES THR.VALV.&FLUSH PARTS	1700x700x760	255	165
160	76415	VARIABLE ORIFICE 125	400x300x200	50	30
161	76601	OBLIQUE REDUCER AASLY.(CAP)	1980X1580X1380	1000	686
162	76602	OBLIQUE REDUCER AASLY.(CAP)	1980X1580X1380	1000	686
163	76603	MANHOLE ASSLY (CAP)	2240X1760X1830	2400	1725
164	76604	MANHOLE ASSLY (CAP)	2240X1760X1830	2400	1725
165	76605	MITRE BEND ASSLY(CAP)	2270X2270X1730	2400	1650
166	76606	MITRE BEND ASSLY(CAP)	2270X2270X1730	2400	1650
167	76607	PIPE ASSLY LPT1(CAP)	8010X2600X2370	15200	13139
168	76608	PIPE ASSLY LPT1(CAP)	8010X2600X2370	15200	13139
169	76609	PIPE ASSLY LPT2(CAP)	5460X2240X2160	9500	8120
170	76610	PIPE ASSLY LPT2(CAP)	5460X2240X2160	9500	8120
171	76611	MANHOLE INLET ASSLY(CAP)	1330X2110X1630	1850	1366
172	76612	MANHOLE INLET ASSLY(CAP)	1330X2110X1630	1850	1366
173	76613	SPRING SUPPORT-1(CAP)	1350X720X790	850	706
174	76614	SPRING SUPPORT-1(CAP)	1350X720X790	850	706
175	76615	SPRING SUPPORT-2 & 3 (CAP)	1350X720X790	700	544
176	76616	SPRING SUPPORT-2 & 3 (CAP)	1350X720X790	700	544
177	76617	SPRING SUPPORT-4 & 5 (CAP)	1350X720X790	700	544
178	76618	SPRING SUPPORT-4 & 5 (CAP)	1350X720X790	700	544
179	76701	CHANGE OVER VALVE	800x500x200	97	77
180	76702/1	CRH NRV WITH SERVOMOTOR	3200x2300x2600	10528	8990
181	76702/2	STEAM BLOWING DEV.FOR NRV CRH LINE	2500x1600x1200	5600	2600
182	76801	RATING,COLLABORATION&COMPANY'S MONOGRAM PLATE	850x550x200	55	36
183	76901	OIL STRIPPER	600x600x850	133	83
184	76902	OIL STRIPPER	600x600x850	133	83
185	76903	HOUSING FOR M.S STRAINER	1900x1380x700	3380	3380
186	76904	HOUSING FOR M.S STRAINER	1900x1380x700	3380	3380
187	76908	HOUSING FOR HRH STEAM STRAINER	2550x1850x1125	5400	5400
188	76909	HOUSING FOR HRH STEAM STRAINER	2550x1850x1125	5400	5400
189	76912/1	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000x900x500	455	350
190	76912/2	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING	1600x1200x600	1210	940
191	76912/3	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000x900x500	455	350
192	76912/4	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING	1600x1200x600	1210	940
193	76913	GASKETS FOR MS & HRH STEAM STRAINER HOUSING	1000x1000x600	41	21
194	76914	COMPENSATOR	600x600x900	50	27
195	76915	ASSY. & DISASSY. DEVICES FOR MS & HRH STEAM STRAINERS	2140x1400x500	800	694
196	76917	STEAM STRAINER (MS)	1240x990x550	400	324
197	76918	STEAM STRAINER (HRH)	1900x1750x950	1350	1244
198	76919	STEAM STRAINER (MS)	1240x990x550	400	324
199	76920	STEAM STRAINER (HRH)	1900x1750x950	1350	1244
200	77001	GOV.SYSTEM CONTROL RACK ASSLY. & TRANSPORT DEVICE	2800x1360x2750	1847	1300

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
201	77002	SUPPLY RACK HP VALVE-2 (RIGHT)	2300x1400x2550	1797	767
202	77003	SUPPLY RACK HP VALVE-1 (LEFT)	2300x1400x2550	1797	767
203	77004	SUPPLY RACK FOR IP VALVES 1 & 2	2300x1400x2550	2080	1050
204	77006	GOVERNING SYSTEM PROTECTION RACK & TRANSPORT DEVICE	2450x1300x2250	1622	1182
205	77201	TURBINE INSTRUMENTS RACKS (FRAMES)	2750x1500x800	2600	2250
206	77202	TEMP. AND PRESSURE CONNECTIONS	1700x750x750	750	600
207	77203	IMPLUSE PIPES (CARBON STEEL)	6900x650x500	1225	1025
208	77204	GAUGES AND SENSORS	2800x1250x1250	1035	785
209	77205	TRANSMITTERS & J.B.OF BEARINGS	500x300x200	118	68
210	77206	IMPULSE PIPES (ALLOY STEEL AND S.S.)	6900x500x500	1136	986
				1111958	**1008816**

GENERATOR PACKAGE					
SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
1	601	FOUNDATION PLATES	5950X1230X800	7800	7450
2	602	FOUNDATION BOLTS	2540X655X600	1480	760
3	603	FOUNDATION ITEMS	5800X1120X520	1500	1000
4	604	EMBEDDED PARTS	1000X800X400	1000	800
5	605	GENERATOR STATOR	9860X4440X3870	304000	301000
6	606	GENERATOR ROTOR WITH SKIDPLATE	14125X1790X1750	84300	75090
7	607	END SHIELD LOWER HALF (TE)	3900X1500X2150	8350	8250
8	608	END SHIELD UPPER HALF (TE)	3900X1500X2150	7350	7250
9	609	END SHIELD LOWER HALF (EE)	3900X1650X2150	8400	8300
10	610	END SHIELD UPPER HALF (EE)	3900X1650X2150	7400	7300
11	611	GENERATOR BEARING (EE & TE)	1390X1130X1015	1930	1700
12	612	BAFFLE RING,BAFFLE RING CARIER & AIR GAP SEAL ASSLY	1930X1920X1160	1100	882
13	613	TERMINAL BUSHING	2200x1830x610	1427	1062
14	614	TERMINAL BUSHING BOX	3500x2800x1800	7300	5302
15	615	SHAFT SEALS (EE & TE) AND OIL CATCHER (INNER & OUTER)	2110x1125x900	1530	1108
16	616	BAFFLE RING ASSY	1750X1750X1140	1100	600
17	617	GENERATOR ACCESSORIES	2140X2140X1240	1700	1100
18	618	FLEXIBLE TERMINAL CONNECTIONS	1350X850X300	472	372
19	619	GENERATOR ACCESSORIES	2240X2140X1220	1600	1200
20	620	GENERATOR ACCESSORIES	1640X1140X1240	2781	2471
21	621	GENERATOR ACCESSORIES	1700X1200X250	140	85
22	622	PRIMARY WATER TANK	10500x2400x1200	2600	2400
23	623	P.W.TANK PIPE LINES	6800x2100x1000	860	460
24	624	P.W.TANK PIPE LINES	3000x600x500	454	354
25	625	PLATFORM FOR P W TANK	10500x1200x500	974	574
26	626	COOLER HOUSING FRAME	4290X4450X1450	21300	19992
27	627	SEAL RINGS	750x750x200	90	65
28	628	CONNECTION PIECE ASSEMBLY	1600x1050x400	862	712
29	629	EMBEDMENTS FOR PORTAL CRANE	1400X1000X400	1651	1391
30	631	DRY AIR BLOWER	1100X1000X700	80	52
31	632	ERECTION PEDESTALS	5300X1500X940	5900	5500
32	633	ROTOR INSERTION DEVICES	2460X1170X1240	3000	2500
33	634	WIRE ROPES FOR ROTOR	1800X1800X400	330	250
34	635	GENERATOR ERECTION DEVICES	3300X1555X1140	1649	1174
35	636	SPECIAL TOOLS AND TACKLES	800X700X300	130	80
36	637	BRUSHLESS EXCITER SET	5750x2350x3400	32928	29928
37	638	BRUSHLESS EXCITER FRONT COVER	4400x3400x3100	4478	1663
38	639	BRUSHLESS EXCITER REAR COVER	4400x3400x3100	4978	2150
39	640	EXCITER BED PLATE ACCESSORIES & RACK ASSEMBLY	3900x1250x1150	1741	860
40	641	EXCITER BED PLATE ACCESSORIES (NON TEST BED)	5800X1140X1240	2925	1815

TECHNICAL CONDITIONS OF CONTRACT (TCC)

SL NO	PKGNO	DESCRIPTION	PACKING SIZE	GROSS WEIGHT (KG)	NET WEIGHT (KG)
41	642	EXCITER ACCESSORIES	2200X1100X1000	1111	611
42	643	EXCITER BED PLATE ACCESSORIES (NON TEST BED ITEMS)	1000X800X800	775	695
43	644	RR WHEEL AIR GUIDE COVER	2800x1500x2000	1572	872
44	645	SEAL OIL STORAGE TANK	5000x1800x1700	2500	1940
45	646	PW PUMP AND FILTER UNIT	4000X4000X3000	7065	4550
46	648	SEAL OIL UNIT	6200x2500x3400	10000	7825
47	649	LIQUID DETECTOR RACK	2000X1000X2100	660	460
48	650	GAS UNIT	1520x840x840	1205	630
49	651	CO2 VAPOURISER	3480x1540x440	250	170
50	652	H2 DISTRIBUTOR	4860x1240x440	333	150
51	653	CO2 DISTRIBUTOR	1400x1240x440	353	163
52	654	N2 DISTRIBUTOR	550X550X1750	143	60
53	655	DRAIN OIL COLLECTOR	1200x600x600	139	89
54	656	RESINS	2750x1400x1400	100	56
55	657	TG SYSTEM INTEGRAL PIPING (VALVES)	1000x940x900	3800	3300
56	658	TG SYSTEM INTEGRAL PIPING (INSTRUMENTS)	800x400x200	180	80
57	659	CONSUMABLES		55	40
				569831	526693

Volume 1A **PART –II**

ANNEXURE –3

CONSTRUCTION POWER SUPPLY CLEARENCE/ PERIODIC INSPECTION CHECK LIST

SL.NO	CHECKS TO BE CARRIED OUT	OBSERVATIONS
01	Whether switch fuse isolators and other accessories are of suitable rating to match the connected load	YES/ NO
02	Whether suitable earthing is provided	YES/ NO
03	Whether double earthing is provided for DB,Motor, Motorstarter, welding machine etc.	YES/ NO
04	Whether surrounding area of the installation is clear and easily accessible	YES/ NO
05	Whether the installation is covered properly with a shed or canopy	YES/ NO
06	IR value of cable	SATIFACTORY/ UNSATISFACTORY
07	Operation of ELCB	SATIFACTORY/ UNSATISFACTORY
08	Operation of Isolators	SATIFACTORY/ UNSATISFACTORY
09	Whether any live part is exposed	YES/ NO
10	Whether all cable entry holes/openings are plugged	YES/ NO
11	Whether Neutral link is provided	YES/ NO
12	Whether industrial plug and sockets are used wherever applicable	YES/ NO
13	Whether the cable is of proper size and without any cuts in insulations	YES/ NO
14	Whether the proper cable termination is done using suitable lugs.	YES/ NO
15	Whether the cable termination is done using suitable lugs.	YES/ NO
16	Is Earth resistance of the earth pit is within permissible limit	YES/ NO
17	Whether danger tag is provided	YES/ NO
18	Whether HRC fuses are provided	YES/ NO
19	Whether ELCB’s of suitable ratings are provided in outgoing feeders.	YES/ NO

CONSTRUCTION POWER SUPPLY SYSTEM
DO'S AND DON'TS

DO's

i. Use Personal Protective equipments like Helmet, Safety Belt, hand gloves, Rubber boots etc. while working on electrical installation.

ii. Check yourself that the installation on which you are going to work is electrically isolated.

iii. Use proper tools for carrying out the work. Ensure that the tools and measuring equipments are of good quality.

iv. Check the healthiness of T & P and test equipments regularly.

v. Use protective devices like fuse, MCB, ELCB of proper rating.

vi. Use 24 v supply for carrying out work in enclosed area.

vii. Use 3-pin plug and socket for power hand tool.

viii. Ensure double earthing of all the installations.

ix. Cover the installation properly to avoid ingress of water.

x. Identify the source of supply clearly.

xi. Use appropriate starters for starting and stopping motors.

xii. Insulate joints properly with good quality insulation tapes.

xiii. Allow only qualified electrician to carry out maintenance work.

xiv. Educate the people about the electrical hazards.

xv. Use only insulated cables for supply extension.

xvi. Use only wooden bullies for fixing the light fixtures.

xvii. Electrically operated mixture machine to be earthed locally by driving earthing spikes.

xviii. Cables shall be either buried or supported on bullies/other suitable structures above ground.

xix. Only industrial type plug top and socket shall be used in the system.

DON'T'S

xx. No cable should be laid on the surface.

xxi. Don't use wires for extension of supply.

xxii. Do not keep live wires/ joints open.

xxiii. Do not use copper wires as fuse wires.

xxiv. Don't fix any light fixture on scaffolding pipe / reinforcement rod.

Volume 1A **PART –II**

ANNEXURE –4

PAINTING SCHEME

PAINTING SCHEME
FOR
TURBOGENERATOR AND AUXILIARY SYSTEMS
PROJECT : 2X600 MW TPP at DERANG, ANGUL, ORISSA, JITPL

Rev No.	Sl No	
	01	**The following are the details of painting scheme :** **Paint (Coat) Paint Type No. of coat DFT*** Primer Paint : Epoxy based Zinc rich primer paint 2 Coats 70 Intermediate Paint : Epoxy TiO_2 Pigmented Polyamide Cured Paint 1 Coat 70 Finish (Final) Paint : Aliphatic Acrylic 2 Pack Polyurethane Finish paint 1 Coat 60 --- Total DFT 200 --- * DFT – Dry Film Thickness (final) in microns.
	02	**Details of Color Scheme :** (**Legend** : **W**-at BHEL works; **S**-at site; **V**-at vendor's works; **NA-** Not Applicable)

No	Assembly	Shade as per IS-5 or Eq.	Primer	Int. Paint	Final Paint	Touch-up	Identification Band Colour (For Piping)	Remarks
A	Turbogenerator (Stator, end-shields etc.)	Light Grey ISC No. 631	W	S	S	NA		
B	Exciter	NA	W	NA	NA	NA		
C	Exciter Cover	Light Grey ISC No. 631	W	S	S	NA		
D	S.O. Unit	Light Grey ISC No. 631	W	W	W	S		
E	S.O. Storage Tank	Light Grey ISC No. 631	W	W	W	S		
F	Liquid Detector Rack	Light Grey ISC No. 631	W	W	W	S		
G	S.O. Piping	Light Grey ISC No. 631	V/ W	S	S	NA	Light Brown ISC 410	Legend - SO
H	Gas Unit	Light Grey ISC No. 631	W	W	W	S		
I	H2 Distributor	Light Grey ISC No. 631	W	W	W	S		
J	CO2 Distributor	Light Grey ISC No. 631	W	W	W	S		
K	N2 Distributor	Light Grey ISC No. 631	W	W	W	S		
L	CO2 Vapouriser	Light Grey ISC No. 631	W	W	W	S		
M	Refrigeration Gas Dryer	Light Grey ISC No. 631	V	V	V	S		
N	H2 Piping	Light Grey ISC No. 631	V/ W	S	S	NA	Canary Yellow ISC 309	Legend - H
O	CO2 Piping	Light Grey ISC No. 631	V/ W	S	S	NA	Canary Yellow ISC 309	Legend – CO2

		P	ACW Piping for H2 coolers	Light Grey ISC No. 631	V/ W	S	S	NA	Sea Green ISC 217	Legend - ACW
		Q	Bearing Vapour Exhauster	Light Grey ISC No. 631	V	V	V	S		
		R	PW pump & filter unit	Light Grey ISC No. 631	W	W	W	S		
		S	PW coolers	Light Grey ISC No. 631	W	W	W	S		
		T	Alkaliser Unit	Light Grey ISC No. 631	W	W	W	S		
		U	PW Piping & impulse piping	Light Grey ISC No. 631	V/ W	S	S	NA	Sea Green ISC 217	Legend - DMW
		V	PW tank	Light Grey ISC No. 631	W	W	W	S		
		W	Hanger & Pipe supports	Black RAL 9011	V/ W	S	S	NA		
	03	For painting work at Site and for touch-up paints (if required), paint & painting materials are to be arranged at site by BHEL-Site office (PS).								

BASED ON BHEL EXPERIENCE

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

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

हस्ताक्षर एवं दिनांक SIGN & DATE					नाम NAME	दिनांक एवं हस्ताक्षर SIGN. & DATE
				अनुवादक TRANSLATED BY		
27/1/04	TSX	S. NATH	dealle 27/1/04	निर्माणकर्ता WORKED BY	R.RAWAT	12-01-04
	QAX	A.S.CHANDNA	Aschandna 27/1/04	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

सामग्री सूची संख्या INVENTORY NO.							HE
P-55550				स्वीकृति : APPROVED : V.K.SAXENA / AGM (HXE)			6.20
	Rev No. 01			निर्माण : PREPARED	जारी : ISSUED	दिनांक : DATE	
	24-01-04			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

PRODUCT STANDARD
HEAT EXCHANGER ENGINEERING

उत्पाद मानक

HE 77001

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

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				

निर्माणकर्ता Worked by	जांचकर्ता Checked by
R.RAWAT	K.N.MEHTA
14.01.04	14.01.04

उत्पाद मानक

PRODUCT STANDARD

HEAT EXCHANGER ENGINEERING

HE 77001

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—	

तैयारकर्ता Worked by	जांचकर्ता Checked by
R.RAWAT	K.N.MEHTA
19/11/04	19/11/04

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				

निर्माणकर्ता Worked by	जांचकर्ता Checked by
R.RAWAT	K.N.MEHTA
12/11/04	19/11/04

उत्पाद मानक

PRODUCT STANDARD

HEAT EXCHANGER ENGINEERING

HE 77001

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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
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—	

निर्माणकर्ता Worked by	जांचकर्ता Checked by
R.RAWAT	K.N.MEHTA
12.01.04	12.01.04

उत्पाद मानक

PRODUCT STANDARD

HEAT EXCHANGER ENGINEERING

HE 77001

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BASED ON:
BHEL EXPERIENCE

INSTRUCTIONS FOR PAINTING AND CONSERVATION OF PARTS AND SUB ASSEMBLIES OF STEAM TURBINE

1.0 SCOPE.

This standard deals with painting and conservation of steam turbine components, before despatch from the plant. This shall also be applicable for deconservation and reconservation at site.

2.0 GENERAL.

2.1 As soon as the components are received at site, they should be examined for rupture of conservative layer and development of rust , if any. Reconservation after rust removal wherever necessary, should be done with suitable conservative and if necessary repacked.

2.2 Normally after an interval of 6 months the surface of conservated jobs shall be re-examined for damage and corrosion spots at site.

2.3 For lifting of jobs with machined surfaces, rubber sheet should be used alongwith wire rope, as rope alone damages conservative film and results in subsequent corrosion.

2.4 Machined surfaces on which other parts are to be fitted e.g. guides, threads etc. should not be coated with paint.

2.5 Two coats should be applied for all TRPs (Temporary rust preventives) except when conservation is done with TRP 1706 & TRP 1710 where total three coats are required.

2.6 TRP/Paint should be stirred well before use.

2.7 All pipe openings are to be covered with PVC/Plastic plugs as per AA 724280 I.

				नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
PSC member	N.R. De	19/3/04	अनुवादक TRANSLATED BY		
TSX	S.Nath	5.4.04	निर्माणकर्ता WORKED BY	Y.P. Singh	19/03/04
QAX	M.M. Gupta	5.4.04	जाचकर्ता CHECKED BY	R.P. Gupta	
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	P.C. Bhavnani	
			स्वीकृति APPROVED : (B.K. BHALLA) AGM(STE)		5/4/04
REV.NO. 02			निर्माण PREPARED : STE	जारी ISSUED : STE(FES)	दिनांक DATE : 12.05.81
Dt. 6.4.04					

सामग्री सूची संख्या INVENTORY NO. P-5435

हस्ताक्षर एवं दिनांक SIGN & DATE 5/4/04

सामग्री सूची संख्या को अधिक्रमित करता है SUPERSEDES INVENTORY NO.

दिनांक एवं हस्ताक्षर SIGN & DATE

2.8.1 In place of TRP HE 1712, Cartec 369 M of M/s OKS can be used.

2.8.2 For subcontracted items instead of TRP HE 1706 + TRP HE 1710, 368 L of M/s OKS can be used.

2.9 Procedure for conservation with TRP 1706 and TRP 1710 has been given at serial 6.0 of Annexure 1. This provides a very good dry protective layer.

2.10 For Rotor journals and thrust collars, the procedure for conservation has been given at Annexure 2.

2.11 For preparation of Epoxide Primer and Finishing Paint refer Annexure 3.

2.12 List of materials required for painting and conservation has been given at Annexure 4.

2.13 Refer corporate standard AA0674123 on 'Process for Painting of Metal components and steel surfaces'. Application of paints should be done accordingly.

2.14 Drying time of at least 3 hrs. is to be given after each coat of primer or paint.

2.15 Viscosity of primer or paint will be as follows :

COAT	PROCESS	VISCOSITY
PRIMER	Spray	30
	Brush	35
PAINT	Spray	30
	Brush	55

2.16 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 AA 0674101. The surfaces before painting should correspond to standard degree of purity SA 2 ½.

2.17 Checking of surface preparation / measurement of dry paint thickness, adhesion, gloss & finish of painted surface is to be done as per AA 0674105

2.18 Deconservation before erection to be done as stated at 4.0 of Annexure 1

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
01.	10101, 10102, 10201, 10202, 10301, 10306 10307	HP, IP & LP Rotor, Blading of HP, IP & LP Rotor	All surfaces except journals, thrust collars, flanges faces & coupling bolt holes Rotor journals, Thrust collars, Flanges faces Coupling bolt holes	TRP HE 1712 TRP HE 1706 & 1710 Mobilux grease-2	
02	10501, 10601	HPT & IPT Outer Casing	Outer unmachined Outer machined Inner	Aluminium Paint TRP HE 1706 & TRP HE 1710 TRP HE 1712	
03	10502, 10602	HPT & IPT Inner Casing or Diaphragm Carrier	Outer & Inner	TRP HE 1712	
04	10505, 10506,	HP Shaft Sealings	Inner	TRP HE 1712	
05	10605, 10606	IP Shaft Sealing Housing	Inner Outer	TRP HE 1712 Aluminium paint	
06	10514	HP Inlet Insert	All	TRP HE 1712	
07	10515	HP Exhaust Assy	Outer unmachined Outer machined Inner	Aluminium paint TRP HE 1706 & TRP HE 1710 TRP HE 1712	
08	10518, 10519	Guide blades HPC	All	TRP HE 1712	
09	10612, 10613	IP Inlet	Outer unmachined Outer machined Inner	Aluminium paint TRP HE 1706 & TRP HE 1710 TRP HE 1712	
10	10616, 10617	Guide blade IPC	All	TRP HE 1712	
11	10710, 10711	LP shaft seal casing (TS&GS)	Inner Outer	TRP HE 1712 Aluminium paint	

हस्ताक्षर
सामग्री सूची संख्या INVENTORY NO. P-5435

REV. NO. 02

निर्माणकर्ता Worked by	Y.P.Singh		13.3.04
जांचकर्ता Checked by	R.P.Gupta		

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
12	10713, 10750 to 10758	Cross Around Pipe	Outer Unmachined Machined Inner	Aluminium paint TRP HE 1706 & TRP HE 1710 TRP HE 1712	
13	10723	Base plate	Unmachined Bottom Machined	Red Oxide Zinc Chromate Primer TRP HE 1712 TRP HE 1706 & TRP HE 1710	
14	10736, 10738 & 10739	Longitudinal Girder (Left & Right) LPC Front Wall (TS&GS)	Outer unmachined Outer machined Inner	Painting Scheme Annexure 3 TRP HE 1706 & TRP HE 1710 TRP HE 1712	Phiroz Blue
15	10740	LP Outer casing Upper Part	Outer unmachined Outer machined Inner	Painting scheme-Annexure 3 TRP HE 1706 & 1710 TRP HE 1712	Phiroz Blue
16	10741	LP Inner Outer Casing	Inner Outer unmachined Outer machined	TRP HE 1712 TRP HE 1712 TRP HE 1706 & 1710	
17	10742	LP Inner Inner Casing	Inner Outer unmachined Outer machined	TRP HE 1712 TRP HE 1712 TRP HE 1706 & 1710	
18	10745, 10746	LP steam inlet & Extraction piping	Inner Outer	TRP HE 1712 TRP HE 1712	

REV. NO. 02

निर्माणकता Y.P.Singh Worked by — 13.3.04

जांचकर्ता R.P.Gupta Checked by

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
19	10747, 10748	Guide blades LPC	All	TRP HE 1712	
20	10749	LP Extraction pipe sheathing	All	TRP HE 1712	
21	10759, 10760	Inner guide plate of Diffuser (TS&GS)	Machined Unmachined	TRP HE 1706 & 1710 TRP HE 1712	
22	10761	Support to CAP End Assy	Outer Unmachined Other surfaces	Painting scheme TRP HE 1712	Phiroz Blue
23	10762, 10763	Diffuser TS & GS	Machined Unmachined	TRP HE 1706 & 1710 TRP HE 1712	
24	10766, 10767	LP Shaft Sealing – TS & GS	All	TRP HE 1712	
25	11101, 11102, 11103, 11121, 11122, 11123,	Guide Blade Carrier LP 1R, 2R, 3R (TS) & Guide Blade Carrier LP 1L, 2L, 3L (GS)	All	TRP HE 1712	
26	11200	Suspension arrangement of Valves (ESV & CV)	Unmachined Machined surface Springs	Painting scheme – Annexure 3 TRP HE 1706 & 1710 Mobilux grease-2	Black
27	11202, 11223, 11224 & 11222	ESV, HPCV and E.S.V. & C.V. Casing	Outside Inner unmachined Machined	Aluminium paint TRP HE 1712 TRP HE 1706 & 1710	
28	11225	Frame for suspension (IV)	Machined Unmachined	TRP HE 1706 & 1710 Painting scheme -Annexure 3	Black
29	11320, 11321 & 11322	IV, IV & CV Casing and IPCV	Outside Inner unmachined Machined	Aluminium paint TRP HE 1712 TRP HE 1706 & 1710	

REV. NO.
02

निर्माणकता Y.P.Singh Worked by — 13.3.04
जांचकर्ता R.P.Gupta Checked by

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
30	11323	Suspension of Valve (IV)	Unmachined Outer machined Springs	Painting scheme – Annexure 3 TRP HE 1706 & 1710 Mobilux grease-2	Black
31	11400	Gov.System control rack & supply unit	Outer unmachined	Painting scheme – Annexure 3	As per schematic diagram
32	11401, 11402, 11403, 11404	ESV / HPCV / IV & IPCV Servomotor, Control valve testing device & its gear	Outer unmachined Outer machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Canery Yellow
33	11417	Gov system Control Rack Assy	Outer unmachined	Painting scheme – Annexure 3	As per Governing schematic
34	11418	Test Valve	Outer unmachined	Painting scheme – Annexure 3	Canery Yellow
35	11420	Frame for control rack	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
36	11421	Gear for start up & loading device, Hy.speed governor	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
37	11422	Electro Hyd.convertor (Gov.)	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
38	11423	Follow up pistons for Hd.Amp.	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
39	11424	Low vacuum trip assy	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
40	11425	Assy of Extraction valve relay	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
41	11426	Overspeed trip testing unit	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
42	11427	Support Assy, Follow up piston for EHC	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
43	11428	Hydraulic amplifier	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
44	11429	Main trip valve	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
45	11430	Hy.Pr Accumulator	Outer unmachined	Painting scheme – Annexure 3	Brown
46	11433	Trip valve (Fire protection)	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
47	11435	ATT change over valve	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
48	11436	Oil filter (Fire protection)	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
49	11437	Emergency shutt off valve	Outer unmachined	Painting scheme – Annexure 3	Canery Yellow
50	11440	Valve block Assy	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
51	11441, 11442	Supply unit for valves & its frame	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
52	11445	Changeover double filter	Outer unmachined	Painting scheme – Annexure 3	Canery Yellow
53	11446	Hand trip valve	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
54	11447, 11448	Hyd..accumulator	Outer unmachined	Painting scheme – Annexure 3	Brown
55	11451	Frame for protection rack	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
56	11452	Pressure converter for LPB valve	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
57	11454	Supply unit frame (IP)	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
58	11501	Hydraulic turning gear	All	TRP HE 1712	
59	11505	Hand barring gear	All	TRP HE 1712	
60	11601	HP front bearing pedestal	Outer unmachined Outer machined Inner	Painting Scheme - Annexure 3 TRP HE 1706 & 1710 TRP HE 1712	Phiroz Blue
61	11603	Oil piping of front pedestal	All	TRP HE 1712	
62	11604	journal bearing D250x180	All	TRP HE 1712	

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
63	11605	MOP casing, MOP assy, Impeller assy	All	TRP HE 1712	
64	11627	Emergency governor	All	TRP HE 1712	
65	11647	Mounting of speed sensors	All	TRP HE 1712	
66	11648	Oil flush & Pr. testing device	All	TRP HE 1712	
67	11651	Over speed trip release device	All	TRP HE 1712	
68	11652	Oil guard ring F.B.pedestal)	All	TRP HE 1712	
69	11653	Cover of bearing pedestal	Outer Inner	Painting Scheme -Annexure 3 TRP HE 1712	Phiroz Blue
70	11655	Piping for Hy. motor	All	TRP HE 1712	
71	11701	Bearing pedestal (HP-IP)	Outer Inner	Painting Scheme -Annexure 3 TRP HE 1712	Phiroz Blue
72	11703	Radial thrust & Jour.Brg.D380x290	All	TRP HE 1712	
73	11717	Oil flush & Pr. testing device	All	TRP HE 1712	
74	11721	HP-IP.Ped. oil guard ring(F)	All	TRP HE 1712	
75	11722	Cover of bearing pedestal	Outer Inner	Painting Scheme -Annexure 3 TRP HE 1712	Phiroz Blue
76	11724	HP-IP Ped. oil guard ring (R)	All	TRP HE 1712	
77	11801,11802, 11803,11804	Bearing pedestal & Cover (IP/LP, LP/Gen)	Outer Inner	Painting Scheme -Annexure 3 TRP HE 1712	Phiroz Blue
78	11812	Oil flush & Pr. testing device	All	TRP HE 1712	
79	11814	Journal bearing D500x450	All	TRP HE 1712	
80	11816,11820, 11821	I.P/L.P. Ped oil guard ring (F&R)	All	TRP HE 1712	

REV. NO. 02	निर्माणकर्ता Worked by Y.P.Singh		13.3.04
	जांचकर्ता Checked by R.P.Gupta		

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
81	11817,11826, 11827	LP-Gen Ped. oil guard ring (F&R)	All	TRP HE 1712	
82	11818	Journal bearing D450 x 450	All	TRP HE 1712	
83	11831, 11833	Arrangement of IP/LP & LP/Gen pedestal	All	TRP HE 1712	
84	11901	Main oil tank nozzle arrang., Main oil tank assly	Outer unmachined Outer machined Inner	Painting scheme – Annexure 3 TRP HE 1706 & 1710 TRP HE 1712	Light Grey
85	11904	Injector with float, Injector without float	All Inner Outer unmachined Outer machined	TRP HE 1712 TRP HE 1712 Painting Scheme – Annexure 3 TRP HE 1706 & 1710	Light Grey
86	11906	Oil vapour exhausters	Outer	Painting Scheme – Annexure 3	Light Grey
87	11912	Waste oil tank, Leakage/dirty oil tank	Outer Inner	Painting Scheme – Annexure 3 TRP HE 1712	Light Grey
88	11923	Oil strainer	All	TRP HE 1712	
89	11925	Control fluid tank	All	No Painting	
90	11928	Oil purification unit	Outer unmachined	Painting scheme – Annexure 3	Light Grey
91	11929	CF vapour exhauster	Outer	Painting scheme – Annexure 3	Light Grey
92	11930	CF purifier	Outer unmachined	Painting scheme – Annexure 3	Canery Yellow
93	11934, 11936	Duplex oil filter (Lub oil/ Jacking oil)	Outer	Painting Scheme - Annexure 3	Light Grey
94	11935	Fixing plates for tank	All	Red oxide Primer	
95	12010	Dummy shaft	Machined Unmachined	TRP HE 1706 & 1710 TRP HE 1712	

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
96	12013	Shaft lifting device (LPT)	Machined Unmachined	TRP HE 1706 & 1710 Painting scheme –Annexure 3	Black
97	12019	LP shaft support	Machined Unmachined	TRP HE 1706 & 1710 Painting scheme –Annexure 3	Light Grey
98	12023, 12024	Hy.Test device MS / HRH pipe	All	TRP HE 1712	
99	12025, 12026	Steam blowing device MS/HRH pipe	Unmachined Machined	Red oxide Primer TRP HE 1712	
100	12027	Assy tools for main turbine	All	TRP HE 1712	
101	12037	Assy fixture for HPT	Machined Unmachined	TRP HE 1706 & TRP HE 1710 Painting scheme –Annexure 3	Light Grey
102	12039, 12040, 12041	M.device for shaft seal compensator, Device for axial adjustment LP Rotor, HP transport device	Machined Unmachined	TRP HE 1706 & 1710 Painting scheme –Annexure 3	Light Grey
103	12042	LP joint covering	All	Red oxide primer	
104	12043, 12044	Assy device for valves	All surfaces Fasteners	Red oxide Primer Grease	
105	12046, 12047	Transport device for Gov.rack/LPB rack	All	Red oxide primer	
106	12050	Steam blowing device for LPBP valves	Unmachined Machined	Red oxide Primer TRP HE 1712	
107	12052	Turning over device	Unmachined Machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Light Grey
108	12053	Casing support	Unmachined Machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Light Grey

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
109	12061	Mounting frame of bearing shell	Machined Unmachined	TRP HE 1706 & 1710 Painting scheme –Annexure 3	Black
110	12069	Transport device for protection rack	All	Red oxide primer	
119	12071	Valve support for HP Overhaul	All	TRP HE 1712	
120	12300	LP By pass control rack	Outer unmachined	Painting scheme – Annexure 3	As per schematic diagram
121	12301	LPBV with servomotor	Outer machined Outer Unmachined	TRP HE 1706 & 1710 Painting scheme –Annexure 3	Canery Yellow
122	12302, 12308	Pilot valve for LPB stop / control valves	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
123	12303	Chest LPB stop & control valve	Outer unmachined Outer machined Inner	Aluminium paint TRP HE 1706 & 1710 TRP HE 1712	
124	12304, 12305	LP bypass stop / control valve	All	TRP HE 1712	
125	12306, 12307	LPB stop / control valve servomotor	Outer unmachined Outer machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Canery Yellow
126	12309	Frame for suspension of LPBV	Machined Unmachined	TRP HE 1706 & 1710 Painting scheme –Annexure 3	Black
127	12310, 12311	LPB control rack assy / frame	Outer unmachined	Painting scheme – Annexure 3	As per By pass rack schematic diagram
128	12312, 12313	Electro Hy.Convertor LPB, Hy.Convertor LPB	Outer unmachined	Painting scheme – Annexure 3	Brillianmt Green
129	12314	Bypass limit controller	Outer unmachined	Painting scheme – Annexure 3	Brillianmt Green

REV. NO.
02

निर्माणकर्ता Y.P.Singh
Worked by
13.3.04

जांचकर्ता R.P.Gupta
Checked by

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
130	12315	Low vacuum condensor protection	Outer unmachined	Painting scheme – Annexure 3	Brillianmt Green
131	12316	Spray water pressure switch	Outer unmachined	Painting scheme – Annexure 3	Brillianmt Green
132	12317	Pilot valve	Outer unmachined	Painting scheme – Annexure 3	Brillianmt Green
133	12318	Check valve	Outer unmachined	Painting scheme – Annexure 3	Brillianmt Green
134	12320	Water injection valve	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
135	12321	Suspension of LPB valves	Unmachined Machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Black
136	12322	Feedback Assy	Outer unmachined	Painting scheme – Annexure 3	Canery Yellow
137	12323	Pr.convertor for LPBV	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
138	12402	Embedments for anchor points	All	Red oxide Primer	
139	12404	Base plate Assy	Unmachined Machined	Red oxide Primer TRP HE 1706 & 1710	
140	13111	Variable orifiece Nb 125 (B70)	All	TRP HE 1712	
141	13121	Hanger & support Lub oil	Unmachined Machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Black
142	13123	Oil throttle valve Nb25, Flushing part oil throttle Nb25	All	TRP HE 1712	
143	13142	Hanger & support Control fluid	Unmachined Machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Black
144	13143, 13144	Steam strainer of MS / HRH	All	TRP HE 1712	

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निर्माणकता Y.P.Singh
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17.3.04

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SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
145	13147	Oil stripper	Outer unmachined Inner	Painting scheme – Annexure 3 TRP HE 1712	Light Grey
146	13150, 13151, 13159, 13160	MS / HRH strainer housing	Outer Inner	Aluminium TRP HE 1712	
147	13159	MS strainer assy.device	All	TRP HE 1712	
148	13152, 13154	Hangers & support seal steam / cond.spray	Unmachined	Painting scheme – Annexure 3	Black
149	13156, 13158	H&S control oil (LPBV) / control pipes (NRV)	Unmachined Machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Black
150	13162, 13164	Hangers for CW (Oil cooler/ C.F.Cooler)	Unmachined	Painting scheme – Annexure 3	Black
151	13166	Water spray nozzles	All	TRP HE 1712	
152	13166	Sludge catcher	Inner Outer	TRP HE 1712 Painting scheme – Annexure 3	Light Grey
153	13169	Variable orifiece Nb150/Nb200	All	TRP HE 1712	
154	13173, 13174	Oil throttle valve Nb65/ Flushing part Oil throttle valve Nb65	All	TRP HE 1712	
155	13177	SPR blocks & damper INT SYS	Outer unmachined	Painting scheme – Annexure 3	Black
156	13235	Servomotor for NRV on CRH line	Outer unmachined Machined	Painting scheme – Annexure 3 TRP HE 1706 & 1710	Canery Yellow
157	13236	Change over valve	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green

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हस्ताक्षर 9/4/04
सामग्री सूची संख्या INVENTORY NO. P-5435

SL No.	PGMA	COMPONENT	SURFACE	CONSERVA-TIONS	FINISH PAINT COLOUR SHADE
158	13238	Pilot valve / pilot valve for NRV CRH	Outer unmachined	Painting scheme – Annexure 3	Brilliant Green
159	13239, 13240	Gland / Leakage steam valve, Electro Hy. actuator	Valve Outer Valve Inner Actuator Outer	Aluminium TRP HE 1712 Painting Scheme – Annexure 3	Light Grey
160	13345,13346 13348	Junction box for Supply rack	Outer surface	Painting scheme – Annexure 3	Brilliant Green
161	13352, 13353, 13354, 13355, 13356, 13357, 13359	Rack for FR fluid/ Pr./ condenser/ Ext.&Gland/ MS Pr./ Control fluid/ Lub oil instruments	Unmachined	Painting Scheme – Annexure 3	Light Grey
162	13378	Junction Box for LPBP rack	Outer surface	Painting scheme – Annexure 3	Brilliant Green
163	13379	Junction Box for Gov. rack / Protection rack	Outer surface	Painting scheme – Annexure 3	Brilliant Green

Components not covered above to be conserved as follows:

1. External unmachined surface exposed to atmosphere during installation -Painting scheme- Annexure 3
2. External machined surfaces - TRP HE 1706 & TRP HE 1710
3. Surfaces in contact with steam/oil during installation - TRP HE1712
4. Threads and holes - Mobilux grease

NOTE :

On inner surfaces of bearing pedestals, MOP casing, cross over pipes, extraction pipes, LP upper part, Front & rear walls, Longitudinal girders and on inner and outer surfaces of LP inner and LP inner outer casing, inner surface of IP inlet pipe, oil tank, which will come in contract with steam or oil during operation, no primer is to be used only HE 1712 is to be used.

Annexure 1

4.0 DECONSERVATION BEFORE ERECTION.

4.1 During erection and commissioning of turbine the deconservation of different parts of the turbine should be done as and when necessary.

4.2 Paints and TRP need not be removed, provided their presence do not interfere with erection or working of turbine and they are in good condition, without any sign of damage in their coatings.

4.3 Due to requirement of erection technology when and where it is necessary, the paint or TRP coating may be removed with the help of solvents.

4.4 Deconservation of thrust collars and journals of rotors are done by wrapping them with thick cloth, well soaked in solvent and after 20-30 minutes the cloth is removed and the surface is rubbed with clean cloth soaked in solvent till the conservative is completely removed.

No sharp edge tools shall be used to remove the conservative coating.

5.0 CONSERVATION OF SPARES

5.1 Extra care should be taken for conservation of spare parts as these are to be stored for long duration before they are used.

5.2 One extra coat of preservative is to be applied on the components to enhance protection.

5.3 Periodic inspection of these components is to be carried out and reconservation is to be done if required at site.

6.0 PROCEDURE OF CONSERVATION WITH TRP HE 1706 AND HE 1710.

6.1 After the surface of the job has been properly cleaned apply coat of TRP HE 1706 and allow it to air dry for about 12 hours.

6.2 Clean the dust from the surface and given first coat of black TRP HE 1710. Allow to air dry for about 12 hours.

6.3 Apply second coat of TRP HE 1710 .

Annexure 2

CONSERVATION OF JOURNALS AND THRUST COLLARS OF ROTORS OF STEAM TURBINE

1 Before starting preservation take piece of cloth dipped in toluol and remove the dirt from the surface of the thrust collar and journals and then clean the surface with white spirit. Presence of fats, corrosion spots on the surface are not allowed.

2 Cleaned surface should be dried in the air for 20-30 minutes and only after that it should be conserved.

3 It is prohibited to touch the cleaned surface by hand.

4 Apply one coat of TRP 1706 and two coats of TRP 1710 as described at Annexure 1.

5 After the coatings get completely dried up, the thrust collar and journal of the rotors are wrapped with Bitumin paper which shall be suitably fixed with adhesive tape at the ends. Then the journal will be wrapped with rubber sheet and thereafter with Aluminium foil of 0.05 to 0.1 mm thick. Finally tightened with a adhesive tape.

Annexure 3

PAINTING SCHEME

Primer Paint	No.of Coats	DFT µm (For 2 coats)	Intermediate Paint	No. of Coats	DFT µm	Finish Paint	No.of Coats	DFT µm (For 2 coats)	**Total DFT µm**
Epoxy Base zinc rich primer paint (two pack) AA56114	2	70	Epoxy Tio2 pigmented polyamide cured paint AA 56112	1	70	Aliphatic Acrylic Two pack Polyurethane Finish Paint AA56142	2	60	**180**

DFT - Dry film thickness

PREPARATION OF EXPOSIDE PRIMER (AA56114) AND EPOXIDE FINISHING PAINT (AA56142)

Both these paints as supplied consist of two separate ingredients namely base and accelerator. Shortly before mixing and use these shall be thoroughly stirred. Mixing ratio of base : Accelerator is to be kept as per the recommendations of the supplier. The Accelerator should be added to the base and not the base to the accelerator. The paints shall be mixed with continuous stirring until a uniform consistency is obtained.

NOTE:- After mixing the paint shall be allowed to mature for 30 minutes and the mixed paint shall be used within 8 hours, unless otherwise specified by the paint supplier.

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Annexure 4

LIST OF MATERIALS

S.NO.	DESCRIPTION		REMARKS	
1	TRP HE 1706		AA5510055308	AA55155
2	TRP HE 1710		AA5510054000	AA55154
3	TRP HE 1712		AA5510051000	AA55151
4	ALUMINIUM PAINT		HW5610076005	HW 56176
5	RED OXIDE ZINC CHROMATE PRIMER		AA5610002010	AA56102
6	MOBILUX GREASE 2 OF IOC OR INDUSTRIAL GREASE		AA5740001005	AA57401
7.1	EPOXIDE PRIMARY PAINT BASE		AA5610014019	AA56114
7.2	EPOXIDE PRIMARY PAINT ACCELERATOR		AA5610014604	AA56114
8	HIGH BUILD INTERMEDIATE EPOXY PAINT		AA5610012004	AA56112
9	EPOXIDE FINISHING PAINT OF FOLLOWING SHADES :			
	YELLOW, GREEN, BLUE,		HW5610042923	AA56142
	WHITE, ORANGE, RED		HW5610042958	AA56142
	VOILET, BROWN, BLACK		HW6510042940	AA56142
			AA5610031567	AA56142
			HW5610042966	AA56142
			HW5610042990	AA56142
			HW5610042907	AA56142
			HW5610042982	AA56142
10	EPOXIDE FINISHING PAINT :			
	LIGHT GREY		AA5610042208	AA56142
	BRILLIANT GREEN		HW 5610042976	AA56142
	LIGHT BROWN		HW 5610042950	AA56142
	FIROZ BLUE		HW 5610042992	AA56142
11	XYLOL		AA5670003004	AA56703
12	TOLUOL		AA5670002008	AA56702
13	MINERAL TURPENTINE (WHITE SPIRIT)		AA5670001001	AA56701
14	VCI PAPER		HW5511516015	IS: 6263
15	ALUMINIUM FOIL	0.05-01 MM THICK	AA1232301019	
			AA1232301027	AA12301

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LIST OF CROSS REFERRED STANDARDS

1. AA 55155
2. AA 55154
3. AA 55151
4. AA 56126
5. AA 56128
6. AA 56102
7. AA 57401
8. AA 56105
9. AA 56131
10. AA 56703
11. AA 56702
12. AA 56701
13. AA 55619
14. AA 12301
15. AA 7242801.
16. AA 0674101
17. AA 0674123
18. IS 5730
19. IS 6263
20. IS 5

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Volume 1A **PART –II**

ANNEXURE –5

REVERSE AUCTION PROCEDURE
GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION

Against this NIT for the subject work, tender shall be processed through "REVERSE AUCTION PROCEDURE" i.e. ON LINE BIDDING on INTERNET.

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. BHEL will inform the vendor in writing in case reverse auction, the details of service provider to enable them to contact and get trained.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. BHEL will provide the calculation sheet (e.g.: EXCEL sheet) which will help to arrive at "Total Cost to BHEL".
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider within 24 hours of action without fail.
10. During Reverse Auction, the process of reverse auction is unsuccessful then BHEL at its discretion may decide to call the L1 bidder of reverse auction for further negotiation.

11. Sealed bid reverse auction: The opening bid (in the initial auction) of the bidders shall be same as that quoted in their final sealed price submitted to BHEL. The bidder shall confirm in writing to BHEL that their opening bid in both cases shall be same as that quoted in their final sealed price bids submitted to BHEL against this NIT along with Technical bid.
12. BHEL reserves the right to cancel Reverse Auction (RA) without assigning any reasons and resort to considering the sealed bids submitted by vendor for processing and finalizing the tender.
13. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
14. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.
15. Bids given by the bidders during the reverse auction process will be taken as an offer to execute the work. Bids once made by the bidder, cannot be cancelled/withdrawn and bidders shall be bound to execute the work as mentioned above at the final bid price. BHEL shall take appropriate action as the lowest bidder do not execute the contract as per the rates quoted by him.