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

TENDER NO. BHEL/ NR/SCT/ BARA & LALITPUR/TG/853

FOR

ERECTION ,TESTING, COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF STEAM TURBINE, GENERATOR AND ITS AUXILIARIES & PIPING ETC. FOR UNIT NO.1, 2&3 AT 3X660 MW PSTPP OF PPGCL AT BARA , ALLAHABAD , U.P. & UNIT NO. 1, 2&3 AT 3X660 MW LALITPUR TPS OF LPGCL AT LALITPUR ,U.P.

PART I – TECHNICAL BID

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)

ISO 9001, ISO 14001, OHSAS 18001 & SA 8000 certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120- 2416286 / 2416296
Fax 091-0120-2416528
Email: vkg@bhelpsnr.co.in / pdas@bhelpsnr.co.in

TENDER NO. BHEL/ NR/SCT/ BARA & LALITPUR/TG/853

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

Rev 00
6th July
2010

NOTICE INVITING TENDER

(Document No. PS: MSX: NIT)

Bharat Heavy Electricals Limited

Registered Office : BHEL House, Siri Fort, New Delhi – 110 049, India
Website : www.bhel.com

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

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To

Dear Sir/Madam,

Sub: NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	TENDER NUMBER	BHEL/ NR/SCT/ BARA & LALITPUR/TG/853	
ii	Broad Scope of job	**ERECTION ,TESTING, COMMISSIONING, TRIAL OPERATION A HANDING OVER OF STEAM TURBINE, GENERATOR AND ITS AUXILIARIES & PIPING ETC. FOR UNIT NO.1, 2&3 AT 3X660 MW PSTPP OF PPGCL AT BARA , ALLAHABAD , U.P. & UNIT NO. 1, 2&3 AT 3X660 MW LALITPUR TPS OF LPGCL AT LALITPUR, U.P.**	
iii	DETAILS OF TENDER DOCUMENT		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	Issue of Tender Documents	***1. Sale from BHEL PSNR,NOIDA office at :*** ***Start:23.01.2012, Time:From 0900 to 1200 Hrs*** ***Close: 13.02.2012, Time :1200 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	*Applicable*
v	DUE DATE & TIME OF OFFER SUBMISSION	***Date 13.02.2012, Time: 1500 Hrs.*** ***Place : Noida (UP)***	*Applicable*
vi	OPENING OF TENDER	***1/2 hour after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	EMD AMOUNT	*Rs 2,00,000/-*	*Applicable*
viii	COST OF TENDER	*Rs 2000/-.*	*Applicable/~~Not Applicable~~*
ix	LAST DATE FOR SEEKING	*Date **04.02.2012**.* *Along with soft version also, addressing to*	*Applicable*

	CLARIFICATION	*undersigned & to others as per contact address given below*	
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	***Date :*** *_ _ /_ _/ _ _ _ _* ***, Time :*** ***Place :***	~~*Applicable*~~***/Not Applicable***
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	*Shri Kanwarjit Singh, IRS (Rtd.)* *D-6/12, Ground Floor,* *Vasant Vihar,* *New Delhi - 110 057* E-mail - (kanwarfeb@gmail.com)	***Applicable/~~Not Applicable~~***
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, and 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 Noida 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 Noida, 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 Noida. For other details and for 'One Time EMD' please refer General Conditions of Contract.

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

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

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

Sl no	Description	Remarks
	Part-I A	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	

ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	Applicable
vi.	Duly filled-in annexure, 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/ annexure submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

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

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

9.0 Assessment of Capacity of Bidders:

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

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

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

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

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

i). Ratings by Power Sector Region:

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

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

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

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

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

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

IV. **Explanatory note**:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

26.0 Order of Precedence

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

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

27.0 The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site www.bhel.com

For BHARAT HEAVY ELECTRICALS LTD

Sr.DGM/SCT

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03 Annexure-3: GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)
04 Annexure-4: Authorization of representative who will participate in the on line Reverse Auction Process
05 Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	"ERECTION ,TESTING, COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF STEAM TURBINE, GENERATOR AND ITS AUXILIARIES & PIPING ETC. FOR UNIT NO.1,2&3 AT 3X660 MW PSTPP OF PPGCL AT BARA, ALLAHABAD, U.P. & UNIT NO. 1,2&3 AT 3X660 MW LALITPUR TPS OF LPGCL AT LALITPUR ,U.P."
TENDER NO.	BHEL/ NR/SCT/ BARA & LALITPUR/TG/853

SL NO	PRE QUALIFICATION CRITERIA	Name and Description of qualifying criteria
A	Submission of Integrity Pact duly signed (if applicable)	APPLICABLE
B	Assessment of Capacity of Bidder to execute the work as per sl no. 9 of NIT (if applicable)	APPLICABLE
C (i)	Technical Bidder who wish to participate should have executed at least one STG work of above 400 MW unit in the last 7 years (as on the "latest date of Bid Submission")	APPLICABLE
D 1	Financial TURNOVER Tenderers should have an average annual turnover of minimum of Rs 12.30 Cr.(Rupees Twelve Crore and Thirty lac only) based on the audited accounts of last three financial years (2008-09, 2009-10 & 2010-11). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.	APPLICABLE
E	NETWORTH Net worth of the Bidder based on the latest Audited Accounts as furnished for '1.0' above should be positive.	APPLICABLE
F	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in '1.0' above based on latest Audited Accounts.	APPLICABLE
G	Approval of Customer (if applicable)	APPLICABLE
H	Consortium criteria (if applicable)	NOT APPLICABLE
	Explanatory Notes for QR 'C' (a) If the qualifying work is completed in the seven (7) year period specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements. (b) The word "executed" means, tenderer should have achieved the target of synchronization of the unit even if the total contract is not completed/closed."	

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3	Details of Contact person for this Tender	Name : Mr./Ms Designation: Telephone No: Mobile No: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
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** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/Not Applicable	YES/NO
8	Copy of PAN Card	Applicable/Not Applicable	YES/NO
9	Whether all pages of the Tender documents including annexure, appendices etc are read understood and signed	Applicable/Not Applicable	YES/NO
10	Integrity Pact	Applicable/Not Applicable	YES/NO
11	Declaration by Authorized 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
17	Capacity Evaluation of Bidder for current Tender	Applicable/Not Applicable	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	Applicable/Not Applicable	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable/Not Applicable	YES/NO
20	Analysis of Unit rates	Applicable/Not Applicable	YES/NO

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

DATE:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE- 3

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this enquiry for the subject item / system with detailed scope of supply as per our tender specification, BHEL-PSNR, NOIDA may resort to "REVERSE AUCTION PROCEDURE" i.e. **ONLINE 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. In case BHEL decides to conduct reverse auction, BHEL's service provider shall contact the vendor directly and impart them the training.
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. **Total Price quoted shall be inclusive of all expenses, taxes/ duties, worker insurance in line with the NIT conditions for the subject work in INR, which is to be worked out as per the BOQ (Rate Schedule) given in tender enquiry and subsequent changes made, if any. EXCEL Sheet shall be provided, if applicable.**
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 after completion of event on the same day preferably.
10. 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.
11. 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.

ANNEXURE- 4

Authorization of representative who will participate in the on line Reverse Auction Process;

1	NAME & DESIGNATION OF OFFICIAL	
2	POSTAL ADDRESS (COMPLETE)	
3	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

INTEGRITY PACT

Between

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

and

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

Preamble

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

_____

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

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

Section 1 – Commitments of the Principal

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

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

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

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

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

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

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

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

order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

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

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

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

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

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

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

Section 4 – Compensation for Damages

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

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

Section 5 – Previous Transgression

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

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

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

6.1 The Bidder(s)/ Contractor(s) undertake(s) to demand from his sub-contractors a commitment consistent with this Integrity Pact. This commitment shall be taken only from those sub-contractors whose contract value is more than 20% of Bidder's/ Contractor's contract value with the Principal.

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

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

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

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

Section 8 –Independent External Monitor(s)

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

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

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

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

8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or

take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

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

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

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

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

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

Section 9 – Pact Duration

9.1 This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

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

Section 10 – Other Provisions

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

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

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

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

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

----------	----------
For & On behalf of the Principal	For & On behalf of the Bidder/ Contractor
(Office Seal)	(Office Seal)

Place----------

Date----------

Witness: _____	Witness: _____
(Name & Address) _____	(Name & Address)_____
_____	_____

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TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ BARA & LALITPUR/TG/853

FOR

ERECTION ,TESTING, COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF STEAM TURBINE, GENERATOR AND ITS AUXILIARIES & PIPING ETC. FOR UNIT NO.1, 2&3 AT 3X660 MW PSTPP OF PPGCL AT BARA , ALLAHABAD , U.P. & UNIT NO. 1, 2&3 AT 3X660 MW LALITPUR TPS OF LPGCL AT LALITPUR ,U.P.

PART- I OF TCC

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301 (INDIA)

PART-I OF TCC

S.No.	DESCRIPTION	Chapter No.
	Part-I: Contract specific details	
1.	Project Information	Chapter-I
2.	Scope of Works	Chapter-II
3.	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III
4.	T&Ps and MMEs to be deployed by Contractor	Chapter-IV
5.	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V
6.	Time Schedule	Chapter-VI
7.	Terms of Payment	Chapter-VII
8.	Taxes and other Duties	Chapter-VIII
9.	Others	Chapter-IX
10.	Annexures	Chapter-X
11.	Rate Schedule	Chapter-XI

Chapter - 1: Project Information

AA : PRAYAGRAJ SUPER THERMAL POWER PROJECT, BARA

Name of the Owner	:	**PRYAGRAJ POWER GENERATION COMPANY LTD.**
Address	:	Prayagraj Super Thermal Power Project (3X660MW) Bara, District- ALLAHBAD (UTTAR PARDESH)
New Installation	:	3 x 660 MW
Nearest Railway station	:	Loghara station on Mumbai - Howrah main line (3 km west of site)
Nearest Road	:	NH-76(500 m SW of SITE)
Nearest City	:	ALLAHBAD (34 KM)
Nearest Airport	:	BAMROLI AIRPORT, ALLAHBAD (28 km)
Highest Temperature	:	42.3 C^0 (MAY)
Lowest Temperature	:	8.7 C^0 (JANUARY)
Relative Humidity	:	70-80% during monsoon 15-20% during summer
Seismic Zone	:	III

BB: 3X660MW SUPER CRITICAL TPP, LALITPUR

Name of the Owner	:	**LALITPUR POWER GEN. CO. LTD. OF BAJAJ HINDUSTAN LTD.**
Address	:	3X660MW SUPER CRITICAL TPP at Mirchwara and Buraugaon near Utari river,Lalitpur,U.P.
New Installation	:	3 x 660 MW
Nearest Railway station	:	Lalitpur railway station (37 kms from site) on Jhansi – Bhopal line
Nearest Road	:	Approach to site from NH which about 23 km from Bansi on NH-26 connects Jhansi and Sagar
Nearest City	:	LALITPUR
Nearest Airport	:	GWALIOR AIRPORT (186 km)
Highest Temperature	:	45.1 C^0
Lowest Temperature	:	1.9 C^0
Relative Humidity	:	87% maximum
		22% minimum
Seismic Zone	:	III

Chapter - 2: SCOPE OF WORKS

2.0 SCOPE OF WORK

2.1 BHEL has been awarded the work of Design, Manufacture, supply, installation, erection & commissioning of BTG & Station C&I for 3X660 MW **Prayagraj Super Thermal Power Project** at BARA, District: Allahabad, Uttar Pradesh and work of Design, Engineering, Supply, Erection, Testing & Commissioning & Handing over BTG package and Mill bay structures & bunker of 3X660 MW Super critical Thermal Power plant at Lalitpur, U.P.by **Lalitpur Power Generation Company Ltd. (LPGCL)** of M/s Bajaj Hindustan Ltd

The equipment consists of Boiler, Electro-static precipitator, Fans, milling systems, steam turbines, generators, boilers feed pumps, condensate extraction pumps and piping along with the associated auxiliary supports and controls.

2.2 The scope of work under this tender consists of following packages:

1. **Package-A -- Erection ,Testing, Commissioning, Trial run & Handing over of Steam Turbine, Turbo-Generators & its Auxiliaries & Piping:**
   Part I: Unit No.1 &3 at 3x660 MW Bara
   Part II: Unit No.2 at 3x660 MW Lalitpur STPS.

2. **Package-B -- Erection ,Testing, Commissioning, Trial run & Handing over of Steam Turbine, Turbo-Generators & its Auxiliaries & Piping:**
   Part I: Unit No.1 &3 at 3x660 MW Lalitpur STPS
   Part II: Unit No.2 at 3x660 MW BARA

   The above two packages shall be awarded to two separate contractors as per procedure given below as per clause no 9.2 of Part-I of TCC and Each package have two contracts one for part –I & other for part-II separately. The scope hereunder is given for per unit for both the packages for Erection ,Testing, Commissioning, Trial run & Handing over of Steam Turbine, Turbo-Generators & its Auxiliaries & Piping

2.3 The scope of work for Package-A&B(part I &II) under this tender for Erection Testing, Commissioning & Handing over of per unit of 660 MW Steam Turbine, Turbo-Generator & its Auxiliaries & Piping broadly consists of:

1. Receipt of Materials from BHEL Store/ yards/ other designated places and

transportation to erection site/ TG Floor. Their preservation, safe keeping, watch and ward.

2. Checking, dressing, chipping and leveling of foundations. Pre-assembly, erection, alignment of various equipment, machining and grouting.

   NOTE:

   In Bara project the cement for grouting will be provided by the Customer.

   In Lalitpur project cement for grouting will be in the scope of contractor.

3. Welding, heat treatment, radiography (including supply of radioactive sources) and other non-destructive tests wherever required
4. Erection and commissioning of Main Turbine (HP, IP, LP) with all auxiliaries.
5. Erection and Commissioning of Generator and Auxiliaries.
6. Erection and Commissioning of all BFPs (Turbo-driven +Motor Driven) and auxiliaries
7. Erection and commissioning of all CEPs along with suction pipe from hotwell to CEPs suction inlet flanges and other fittings.
8. Erection and commissioning of all MISC pumps including DMCW Pumps, Sump pumps etc.
9. Erection and commissioning of Gland Steam Condenser, Drain Cooler, LP Heaters, HP Heaters
10. Erection and Commissioning of Condenser with extraction steam piping and air extraction piping inside condenser steam space up to condenser walls, including Erection, Commissioning & load testing of Condenser water box handling arrangement.
11. Erection, Commissioning of Condenser on load tube cleaning systems and self-cleaning strainers
12. Generator Stator Unloading, lifting & placement to TG floor with the help of Strand-Jack system applicable for Bara TG i.e. Package A part I & package B part II.
13. Generator Stator Unloading, lifting & placement to TG floor with the help of Portal crane applicable for Lalitpur TG i.e. Package A part II & package B I
14. Erection and Commissioning of Deaerator and Feed Storage Tank with platform and accessories.
15. Erection and Commissioning of TG integral Piping, TG Cycle piping, ACW & DMCW piping, other interconnecting piping along with valves, fittings, H&S & insulation

16. Grouting, painting, insulation of all equipment as per requirement along with supply of required materials, machineries and other resources as required to carry out the job.

17. Arranging statutory co-ordination for IBR related activities.

18. Erection and Commissioning of Auxiliaries of Turbine, Generator, BFPs and other systems.

19. Erection, Commissioning of Turbine lube oil, governing oil, Generator seal oil system, gas system, Jacking oil system, control fluid system, Primary Water system, dirty/ waste fluid system, Gland steam system - for main turbine (for Hardwar portion of supply) and drive turbines of BFPs (for Hyderabad portion of Supply), Water drainage system, Turbine Governing System with Valves and their servomotors, LP Bypass System with Valves, servomotors and other systems tanks and equipments as per scope.

20. Vacuum pumps with connected piping and other integral piping.

21. Erection and Commissioning of MS, HRH Strainers, Coolers, CRH-NRVs, Extraction NRVs with associated pipelines etc.

22. Preservation of TG & Aux. Components after receipt from BHEL Store.

23. Chemical cleaning (assistance) and associated testing plus related activities of different system and normalization

24. Arrangement of fixing of steam blowing and hydro-test blanks and restoration.

25. Arrangement for hydro-test/ steam blowing in strainers including removal/restoration in MS & HRH lines etc.

26. Flushing, steam blowing, related testing, pre-commissioning, commissioning activities of lub oil system, governing oil, gas systems, water lines and other systems of Turbine, Generator, Condenser, BFP and other auxiliaries. This includes preparation for flushing, hydro-test, chemical cleaning, steam blowing, other cleaning activities, actual execution of the activities, normalization etc.

27. Setting and commissioning of governing system.

28. Preparation of MIRs, following of safety and quality norms and documentation, preparation of material status and up-gradation of activities, networks at regular intervals.

29. Trial run of Equipments related to TG systems, of 660 MW Unit (s) as a whole.

30. Assistance during PG Testing of main equipment along with all auxiliaries. Completion of punch points and assistance for handing over of unit (s) to customer.

2.4 SITE VISIT

Contractor should visit site and acquire full knowledge & information about site conditions. The bidder must visit site, to acquaint themselves with the conditions prevailing at site and in & around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid.

2.5 SITE ORGANISATION

2.5.1 The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL:

1. Overall planning, monitoring & control.
2. Quality control and quality assurance.
3. Materials management.
4. Safety, fire & security.
5. Industrial relations and fulfillment of labour laws and other statutory obligations.

2.5.2 The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.

2.5.3 On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by BHEL, will have to be posted at site and deviations in this regard will not generally be permitted.

2.5.4 The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

2.5.5 The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the contractor shall ensure providing one qualified supervisor against deployment of 15 workmen.

2.6 ERECTION SCHEDULE

2.6.1 Contractor shall submit within 30 days of LOI date, detailed program (L2 schedule) of construction / erection / commissioning, for approval to Site

In-Charge/Project Manager-Noida. L2 schedule shall be the working level document demonstrating contractor's ability and methods of completing the work within the key milestones identified in the tender specification These program would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring, The three monthly rolling program with the first month's program being tentative based on the site conditions would be prepared based on these program. The Contractor shall also be involved along with the Customer/BHEL to tie up detailed resource mobilization plan over the period of time of the contract matching with the performance targets.

2.6.2 The program would be jointly finalised by the site in-charge of the contractor with BHEL/Customer's project coordinator as well as the site planning representative. The erection program will also identify the sequential erectable tonnages

2.7 The scope of work will also include providing free of cost services of experienced and qualified Supervisors by contractor for direct supervision of various works of power plant preferably works other than the scope covered under this tender. The qualification and experience of the supervisors shall be acceptable to the Construction Manager BHEL BARA/LALITPUR site.

These qualified supervisors quantity indicated below shall be provided for as per site conditions:

For package A

Fifty Eight(58) man-months (For package-A: Part-I)
Twenty Two(22) man-months(For package-A Part-II)

For package B

Sixty (60) man-months (For package-B: Part-I)
Nineteen (19) man-months(For package-B Part-II)

The supervisiors shall possess a minimum qualification of a mechanical engineering diploma and working experience in power plants. They shall be deployed in any work area in plant/site at the discretion of BHEL construction manager.

In case contractor fails to provide above-mentioned manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man months as per above provision, fully or partly a lump sum of Rs. 20,000/- (Rupees twenty thousand only) per man month for the un-utilised man months will be recovered from the bills of the contractor.

2.8 Contractor shall ensure following:

2.8.1 Contractor has to maintain contact with local hospital having ambulance facility, scanning & other ultra-modern medical facilities required during emergency.

2.8.2 Contractor has to ensure pre-employment medical check for all staff & workers.

2.8.3 Contractor has to ensure that adequate First Aid facilities with trained nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following

Male nurse (in shifts)
Oxygen set up
Breathing apparatus
Eye wash facility
Stretcher
Trauma blanket
Medicines.

In addition to above, BHEL (through its other contractor) has arranged ambulance at work site for emergency purpose, which can be utilized by the contractor in case of emergency. The charges for the same will be decided mutually at site. In case, under unavoidable circumstances, if the ambulance is not available / being used elsewhere, the contractor will have to arrange for the same as under clause 2.8.1.

2.9 The contractor shall comply with following towards Social Accountability;

a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.
b) The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.
c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.
d) The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimation/ Corporal punishment for failure in meeting with relevant requirements.
e) The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.
f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.
g) The Contractor shall arrange potable drinking water to its employees & workers.

2.10 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least 500 trees or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers.

2.11 Brief description of major equipment(per unit) to be Installed, Tested and Commissioned under this specification is given below

(For package A & B Part I & II):

However, changes in design may occur as is usual in any such large scale work for which no compensation will be payable and contractor shall complete the entire work as detailed in tender specifications within finally accepted rates / prices.

(A) STEAM TURBINE

- High Pressure(HP), intermediate pressure(IP) and low pressure(LP) steam turbines complete with sole plates, foundation holding down bolts, bearing, bearing pedestals, rotors, couplings, steam gland seals, electric/hydraulic turning gear and hand barring gear.
- Emergency stop(ESV) and control valves(CV), reheat stop, interceptor and control valves with their servomotors, steam strainers (including its housing & blanking arrangement) for main and reheat steam lines etc., LP bypass stop and control valves along with their servomotors
- Cold reheat and extraction NRVs along with their servomotors, necessary supports and secondary structure if required.
- Complete Installation of necessary blanking to protect the valves and turbine internals during hydraulic testing and steam blowing. If required CRH NRV may have to be dismantled and replace with a spool during steam blowing. It will be re-installed after completion of steam blowing.
- **Electro –hydraulic governing system** for the turbine including governing control rack, LP bypass control, rack, valve test devices and racks, turbine gland sealing system complete with converters, associated piping, valves and fittings, specialties, fire protection valves and devices, hangers and supports to make the system complete in all respects.
- Complete cross around piping along with their supports from IP turbine to LP turbine.
- Complete extraction piping along with their supports and protective covers from LP turbine to condenser dome walls.
- Lube Oil System consists of main oil tank, oil coolers, centrifuge, 2x100 %MOP, 2x100% AOP, 02 nos. JOP, 01 no. DC driven EOP, Leak & Dirty oil tank with pumps, Duplex Filter, vapour fans and auxiliaries, clean oil tank, oil, connected oil piping, valves, H&S etc.,
- Control oil system: 2x100% Control oil pumps, control oil tank, filters, control oil purification system etc.

(B) 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

FOR BARA TG:

BHEL will provide stator to nearest location of designed foundation. All other works of shifting the stator to foundation, leveling, centering and alignment etc. will be carried out by contractor as scope of work. **THE EOT (CAPACITY 180/20 TONES) AVAILABLE IN TG HALL SHALL NOT BE SUITABLE FOR LIFTING OF THIS STATOR & SAME SHALL BE LIFTED BY STRAND & JACKS / LIFT & SHIFT ARRANGEMENT METHOD. SCOPE UNDER THIS TENDER INCLUDES ARRANGING THE STRAND & JACKS /LIFT & SHIFT ARRANGEMENTS, MAKING RESTING FOUNDATIONS /FOOTINGS TO SUIT THE INSTALLATION OF HIS STRAND & JACKS ARRANGEMENTS (AS REQUIRED) & THEIR ASSEMBLY /INSTALLATION WITH EXPERT SUPERVISION TILL LIFTING & PLACEMENT OF PACKAGE TO REQUIRED FOUNDATION / ELEVATION.**

The Stator weighing about 324 MT (Approx.) will be transported by road and received at site in a special type of low bed high payload hydraulic carrier from BHEL Hardwar. The stator will be duly supported and lashed to ensure safe and secured transportation. Contractor for subject work is to unload Stator from the carrier at a predetermined location near ‘A’ row.

BHEL will provide Stator to nearest location along the side of ‘A’ row and parallel to the foundation axis across the column of ‘A’ row corresponding to the TG Deck location subsequent of Both the Units for onward handling. The Stator is to be rested on Temporary stools placed over foundation using appropriate means and trailer is to be released. The Stator is to be rested on Temporary stools with adequate ground clearance (Minimum 500 MM) so that blue matching of mating surfaces can be carried out before shifting to its foundation on TG Floor at the indicated elevation.

NOTE:

ALL CIVIL WORKS RCC/ PCC/ BRICK WORKS ETC. ALONG WITH MATERIALS AS MAY BE REQUIRED FOR INSTALLATION OF THE LIFTING EQUIPMENT/ MODULAR STRUCTURAL TOWERS/ SUPPORTING OF TEMPORARY STRUCTURES ETC. INCLUDING EXCAVATION OF FOUNDATION PITS, CASTING OF FOUNDATION SHALL BE CARRIED OUT BY CUSTOMER.

HOWEVER SUPPLY OF ANCHOR BOLTS & PLATES ETC, ALIGNMENT, LEVELING AND GROUTING BY ANY GROUTING MATERIALS SPECIFIED/ AGREED BY CUSTOMER / BHEL DURING EXECUTION SHALL BE CARRIED OUT BY THE CONTRACTOR. DETAILED DRAWINGS INDICATING SPECIFICATION, FOUNDATION DETAIL, LOCATION, SIZES OF ANCHOR/ QP FOR THIS SHALL BE PROVIDED BY THE CONTRACTOR, ALONG WITH

TECHNICAL BID.

Following soft copies PEM Layout Drawings ARE ENCLOSED for the bidders to supplement the information given in this tender document. The Bidder is required to study the drawings and propose a complete scheme/ location of anchor bolts for Lifting & Placement of the Generator Stator with the Technical Bid for evaluation/ acceptance of BHEL. These drawings are for the reference purpose only. These drawings or any part thereof are not to be used in any way or referred for any other purpose than the work of this tender.

FOR BARA TG:

- DRG. NO 350-100-M006 (R4P),
- DRG. NO 350-100-M002 (R3A)
- DRG. NO 350-100-M004 (R3A)
- DRG. NO 0-139-00-01375

For Heavy Duty Slings including that of for handling of Stator, appropriate Test Certificate from Statutory Agencies declaring the sling to be fit for handling the desired load is to be produced by the Bidder prior to use of the same at Site.

The Lifting/ Shifting System to be installed is required to be Load tested at 25% overload than the Load it is intended to carry at Site (i.e. 1.25 Times of 324 MT), added with the load of slings and other lifting tackles used by Contractor and a certificate to this effect has to be submitted by vendor to BHEL engineer before commencement of work.

For lifting and placement of Stator, it may require to hold the some of structures / casting of certain foundations. Contractor shall visit site and study & discuss with BHEL Engineer at site and submit his plan (which shall not affect the project schedule) for deployment of these arrangements at site for lifting of these equipments along with Technical Bid. Contractor shall deploy these Strand and Jacks arrangements & other resources well in advance to suit the site requirement so as to lift & place these equipments on required foundations in minimum possible time. Some of the renowned agencies such as (1) M/s. Fagioli PSE India Pvt. Ltd.(203,Krishna Bhavan, Govandi Station Road, Deonar, Mumbai-400088,Tel.No. 022-25564388, Fax No. 022-25562565), (2) M/s. Freight Wings (P) Ltd.(309, Rex Chambers, Walchand Hirachand Marg. Ballard Estate, Mumbai-400001,Tel. No.022-22631714/22619988), who are in this field in the country, can be contacted.

FOR LALITPUR TG:

BHEL will provide stator to nearest location of designed foundation. All other works of shifting the stator to foundation, leveling, centering and alignment etc. will be carried out by contractor as scope of work.

Stator unloading, lifting and installation will be done by portal crane (360 MT) which will

be provided by BHEL free of cost.

Transportation from the stores, assembly & installation including electrical system of portal crane and dismantling after lifting & placement of the stator on foundation will be in the scope of the contractor.

Foundation for the portal crane will be in the scope of customer

(C) CONDENSER

Condenser mainly comprising of the following parts:

- Bottom Plate
- Hot Well
- Turbine & generator End side plate
- Dome Walls
- Front & Rear Water Boxes with Tube Plates
- Tube Support Plates
- Springs
- Steam Throw -off device
- Air Extraction Pipe & Baffle
- Stiffening/Support Pipes/Rods, Bars etc.,
- Misc Fittings & Loose items
- Instruments
- Condenser Tubes- (**SS- 304, Approx. 27410Nos)**

D) AUXILIARIES

- Flash tanks and all other misc. tanks with drains & vents.
- Deaerator & feed storage tank (in sections), complete with ladders platform and other accessories.
- Drain coolers along with fittings, piping, steam traps and gland steam condensers and air exhausters with motor and fittings, associated piping, hangers and supports etc. to make the system complete in all respects.
- LP and HP heaters, fittings, group protection device, stand pipes along with fittings including gauge glasses for level indication, safety valves etc. to make the equipment complete in all respects.
- RE Joints along with in built CW pipes, flanges and tie rods and spool pieces, H&S etc. to make system complete in all respect.
- Suction strainers for boiler feed and condensate extraction pumps along with supports and other fixtures.
- Turbine oil coolers, gland steam condenser, drain coolers, seal oil coolers, steam jet main ejectors, along with stand pipes and fittings including gauge glasses for level indication, safety valves etc. to make the equipment complete in all respects.
- Oil strippers, strainers, oil injectors and duplex oil filters.

- Main oil, drain oil and dirty oil tanks along with fittings including gauge glasses for level indication, to make the equipment complete in all respects.
- Coolers , Tank , Filters etc. of Control Fluid System
- Hydraulic coupling, working oil and lubricating oil coolers of Boiler feed pumps.
- Seal oil storage tank, seal oil unit, pre-chambers, gauge glasses along with stand pipes, gauge glasses for level indication etc. etc. to make the system complete in all respects.
- Hydrogen cooling system, nitrogen and carbon dioxide systems including H_2 dryers, gas control units and gas stands, racks and distributors to make the system complete in all respects.
- Exciter air cooler.
- Turbine oil purifiction system consisting of clean oil storage tank, dirty oil storage tank, central oil purifier, dirty & clean oil transfer pumps, drain oil return pumps, oil unloading vessel & interconnecting piping.

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-3no
- Motors for CEP-3nos

- Air evacuation pumps, including priming pumps for maintaining condenser vacuum, along with motors and its accessories, to make the equipments complete in all respects.
- A.C. and DC motor driven lubricating oil pumps including DC motors starters along with resistance box.

  Seal oil pumps with drives and fittings to make the system complete in all respects
- Pumps of Control Fluid System

(E) 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.,

• 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

(F) PEM supplied Packages to erected & commissioned under this scope of work.

- Plate heat Exchangers (PHEs)
- Condenser on load tube cleaning system
- Aux. PRDS
- Simplex strainers
- Misc. Pumps
- Sump pumps
- Miscellaneous electric hoists/Cranes and Chain Pulley Blocks(Mech. & Electrical)
- Lube Oil Pumps.
- LP valves, air traps, B. F. valves, etc.
- LP Chemical Dosing & oxygen dosing system

G) COMMON SYSTEM

- **Central lube oil storage & purifying system** consisting of clean oil storage tank, dirty oil storage tank, central oil purifier, dirty & clean oil transfer pumps,

drain oil return pumps, oil unloading vessel & interconnecting piping.

The tentative weight schedule of Steam Turbine, Generator and auxiliaries to be erected under this specifications are as per Annexure-IA, IB & IC.

2.12 PIPING SYSTEM

Major PIPING SYSTEMS to be erected, tested and commissioned under this specification are briefly described below. Indicative weights of major items of piping systems are **as per Annexure-II.**

Bidders are required to quote rate in per metric tonne for entire work as per tender specification for **piping systems as per ITEM NO. 2 & 4 OF RATE SCHEDULE For respective packages.**

2.12.1 TG- CYCLE PIPING

1. Main condensate suction.
2. Main condensate discharge including excess return and minimum re-circulation.
3. Condensate supply for CEP sealing, L.P. dosing dilution, spray to LP BP valve / exhaust hood / turbine etc., spray to HP flash box, valve gland sealing.
4. Condensate supply from condensate surge tank to CEP sealing and makeup to condenser and valve gland sealing.
5. Steam extraction to HPH 5,6 & 7.
6. Steam extraction to deaerator from turbine & CRH line.
7. Steam extraction to LPH – 2, 3 & 4.
8. Cascading piping between heaters to condenser and to deaerator.
9. Boiler feed discharge between heaters.
10. Drains from GSC, LPH through drain cooler.
11. Deaerator overflow and drain
12. HP & LP flash box vent and drain.
13. Steam from aux. Steam header to turbine sealing system and its drain to flash b
14. Condenser air piping to vacuum pumps.
15. Aux. Steam for initial heating of FST and deaerator pegging.
16. Vent pipes from HPH – 5,6 & 7 to flash box and start up vents.
17. Vent pipes from LPH – 2, 3 & 4 to condenser.
18. Vent pipe from CEP to condenser.
19. Vent pipe from GSC to atmosphere.
20. Drain & vents from above piping.
21. Condenser hot well drain.
22. Turbine wet steam-washing system.

2.12.2 CW Piping

CW piping between approx. 2.0 M from ‘A’ row col. outside and condenser including RE joints, butterfly valves and associated equipment.

2.12.3 MISCELLANOUS drain & vent line according to layout

The tentative weight schedule of Piping system to be erected under this specifications are as per Annexure-II

NOTES:-

1. All the above systems of piping include the erection of pipes, bends, elbows, valves, fittings, impulse piping up to and including first root valve(s), sampling lines, drains, hangers and supports and other accessories so as to make the system complete in all respects.
2. Above systems of piping can be regrouped / renamed or any addition or deletion in the system can be made in order to make system complete as per requirement. No extra claim shall be entertained on this account.
3. The equipment and piping systems indicated above are only major items and does not cover all the equipment / piping system to be erected / commissioned. Contractors are however, required to erect / commission within the price quoted by them, all connected equipment / system shown in manufacturer's drawings / other documents which may be necessary for erection completion and overall commissioning of TG set.

2.13 ADDITIONAL PLATFORM / STRUCTURES

Additional platforms and approaches wherever required by the engineer to facilitate operation are to be fabricated and installed Bidders are required to quote rate in the **RATE SCHEDULE of the respective packages** for fabrication & erection of such platforms & approaches. This does not include those of de-aerator and FST. These are covered under the erection of static auxiliaries.

2.14 INSULATION

All piping and equipment, as per requirement / drawings are to be thermally insulated with bonded / unbounded mineral wool /LRB mineral wool and to be covered with aluminum cladding.. Only spray insulation wherever applicable is not covered in this scope of work.

2.15 The Information furnished in **the IA, IB & IC (For item no. 1&5 of rate schedule of Package A & B part I& II)** 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. 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 Lump sump rate. No additional payment shall be made towards any variation in weights and quantities

2.16 The weight/quantities indicated under Annexures –II for Piping system (For item no. 2 &4 of rate schedule of Package A & B part I& II) are tentative and may vary.

The contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above system and complete the work in all respects as detailed in tender specifications, for which payments shall be released as per actual executed quantities.

2.17 **Approx. weight of major components has been indicated in various Annexures .** The contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above systems and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted rates. The contractor undertakes to erect/ commission actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually erected at site and payments will also be regulated for the same (**Except for Item no. 1 & 5 of Rate schedule where no additional payment/ recovery shall be made towards any variation in weights and quantities)**. Compensation, if applicable, for variation in the final executed contract value shall be worked out in line with Clause 2.14 of GCC

2.18 The customer / or their Consultant may depute their representative or checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.

Chapter - III: Facilities in the scope of Contractor/BHEL

3.0 FACILITIES IN THE SCOPE OF CONTRACTOR/BHEL

S.No.	Description	Scope / to be taken care by			
		BHEL	CONT.	BARA	LALITPUR
1.1.0	ESTABLISHMENT				
1.1.1	FOR CONSTRUCTION PURPOSE				
A.	Open space for office	YES		Free of charge. As and where made available by customer M/s **PPGCL /BHEL**	Limited space (free of charge) As and where made available by customer **M/s LPGCL**
B.	Open space for storage	YES		Free of charge. As and where made available by customer M/s **PPGCL /BHEL**	Limited space(free of charge) As and where made available by customer **M/s LPGCL**
1.1.2	FOR LABOUR COLONY				
A	Open space	YES		Free of charge. As and where made available by customer M/s **PPGCL /BHEL**	Contractor have to make their own arrangement
1.2.0	ELECTRICITY				
1.2.1.	Electricity for construction purposes (chargeable/free)			**FREE OF CHARGE**	**CHARGEABLE BASIS**
1.2.1.1	Single point source	YES			
1.2.1.2	Further distribution for the work to be done which include supply of materials &		YES		As per LPGCL/UPPCL standard rates Contractor shall install calibrated energy meter for metering electricity consumption

	execution				
1.2.2	**Electricity for the office, stores, canteen etc of the bidder which include:**			**FREE OF CHARGE**	**CHARGEABLE BASIS**
1.2.2.1	Distribution from single point including supply of materials & service		**YES**		As per LPGCL/UPPCL standard rates Contractor shall install calibrated energy meter for metering electricity consumption
1.2.2.2	Supply, Installation & connection of material of energy meter including operation & maintenance		**YES**		
1.2.2.3	Duties & deposits including statutory clearances for above		**YES**		
1.2.2.4	Demobilization of the facilities after completion of works		**YES**		
1.2.2.5	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above lines		**YES**	**Chargeable** As per PPGCL/UPPCL standard rates Contractor shall install calibrated energy meter for metering electricity **consumption**	**Chargeable** As per prevailing rates Contractor shall install calibrated energy meter for metering electricity **consumption**.
1.3.0	**WATER SUPPLY**				
1.3.1	**FOR CONSTRUCTION :**				
1.3.1.1	Making the water available at single point			Free. As and where made available by BHEL/M/s **PPGCL**	Contractor have to make bore wells it self. wherever approved by M/s LPGCL at their own cost.
1.3.1.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**		

1.3.2	**LABOUR COLONY:**				
1.3.2.1	Making the water available at single point		**YES**	Contractor have to **arrange on his own**	Contractor have to arrange on his own.
1.3.2.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**		
1.4.0	**LIGHTING**				
1.4.1	For construction work (supply of all materials) 1. At office storage area 2.At preassembly area 3.At construction site/area		**YES**		
1.4.2	For construction work (execution of lighting work/arrangements) 1. At office storage area 2. At preassembly area 3. At construction site/area		**YES**		
	Providing the necessary consumables like bulbs, Switches, etc during the course of construction		**YES**		
1.5.0	**Communications facilities for site operations of the bidder**				
	Telephone, fax , internet ,intranet, email etc.		**YES**		
1.6.0	**COMPRESSED AIR SUPPLY**				
1.6.1	Supply of compressor and all other equipments required for		**YES**		

	compressor & compressed air system including pipes, valves, storage system etc.				
1.6.2	Installation of the above system and operation & maintenance of the same		**YES**		
1.6.3	Supply of all the consumables for the above system during the contract period.		**YES**		
	ERECTION FACILITIES				
2.1.1	Providing erection drawings for all the Equipments covered under this scope	**YES**			
2.1.2	Drawings for construction method	**YES**	**YES**	In consultation with **BHEL**	In consultation with **BHEL**
2.1.3	As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site		**YES**	**do**	**do**
2.1.4	Shipping lists etc for reference & planning the activities	**YES**	**YES**	**do**	**do**
2.1.5	Preparation of site erection schedules and other input requirements		**YES**	**do**	**do**
2.1.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	**YES**	**YES**	**do**	**do**
2.1.7	Weekly erection schedule based on Sl. No.2.1.5		**YES**	**do**	**do**

2.1.8	Daily erection/work plan based on Sl. No.2.1.7		**YES**	**do**	**do**
2.1.9	Periodic visit of senior official of 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 month		**YES**	**do**	**do**
2.1.10	Preparation of preassembly bay		**YES**	**do**	**do**

3.1 BHEL will not be responsible for any loss or damage to the contractor's equipment as a result of variation in voltage or frequency or interruptions in power supply.

3.2 The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

3.3 Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets. **The energy meter to be installed by the contractor & shall be tested and certified by State Electricity Board or any other agency approved by the Customer at his own cost.**

3.4 The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.

a) All electrical installations should be as per Indian Electricity rules.

b) All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.

c) Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.

d) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.

e) Contractor have to make their own earthing arrangement for their equipment / DB earthing.

f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.

g) Contractor should use “MCCB” and “ ELCB” either on incoming or outgoing connections to the DBs.

h) Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.

i) For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.

3.5 ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.

3.6 In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

3.7 On completion of work or as and when required by BHEL, 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 Engineer will get it done and expenses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.

3.8 Compressor required capacity for construction purposes shall be arranged by Contractor.

3.9 Contractor should install a PC ALONG WITH MODEM to connect with our server (LAN) AT SITE.

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

4.1 LIST OF T&P TO BE DEPLOYED BY CONTRACTOR

INDICATIVE LIST OF T&P/MMD TO BE DEPLOYED BY CONTRACTOR					
				For Pkg A &B :Part I (For two unit)	**For Pkg A &B :Part II (For one unit)**
S.NO	**EQUIPMENT**		**CAPACITY**	**QTY**	**QTY**
1.	Welding Generators, Transformers, Rectifiers & TIG Welding Machine and ovens for welding electrodes backing and holding			APR*	APR*
2.	Mobile crane		40 T	1 no.	1 no.
3.	Low Bed Trailer		60 MT	APR	APR
4.	Trailer with Pulling Unit		10 / 20 MT	3 No.	2 No.
5.	Hydra		14/18 MT	3 No.	2 No.
6.	Hydraulic Jack (Low Height)		25/50/100T	APR	APR
7.	Screw Jacks		5/10/25/50T	APR	APR
8.	Strand Jack System for stator lifting			1 Set	1 Set
9.	Hydraulic Pipe Bending Machine (Manual and Motorised)			1 no. each.	1 no. each.
10.	Bolt stretching device				
11.	Stress Relieving Sets, including oil cooled transformers, heating coils, panels Recorders Etc.			APR	APR
12.	Radiography arrangement including source			1 set	1 set
13.	Vacuum Cleaner (Industrial)			1 number.	1 number.
14.	Surface Grinder and other Workshop Equipment s			1 set.	1 set.
15.	Electric Winches			APR	APR
16.	Torque Tension Meter/ Wrench Up to 1000ft Lbs Range			1 number.	1 number.
17.	Electronic / Electrical Tube			4 number.	4 number.

	Expander (With Tools)				
18.	Air Compressor		140/210 CFM	1 number.	1 number.
19.	Tube/ pipe chamfering machine			1 number	1 number
20.	Profile making M/C			APR	APR
21.	Nibbling M/C			APR	APR
22.	Shearing M/C			APR	APR
23.	Portable grinding M/C			APR	APR
24.	Portable drilling M/C			APR	APR
25.	Chain Pulley blocks	Up to 15 MT		APR	APR
26.	Fire retardant Tarpaulins			APR	APR
27.	Fire Extinguisher			APR	APR
28.	Three phase distribution board with complete setup for drawl & distribution of construction power			APR	APR
29.	Power cables for drawl & distribution of construction power, heating machines			APR	APR
30.	Recordable UT test Equipment			APR	APR
31.	Long feeler Gauge set			APR	APR
32.	Scaffolding pipes			Minimum 1000 nos. per unit(2000 nos.)	Minimum 1000 nos.
33.	Hand operated Megger	Up to 200 M ohms 500V/ 1000V	±5% at center scale ±10% at end of scale	2 Nos.	2 Nos.
34.	Digital Multimeter 3½ digit			2 Nos.	2 Nos.
35.	Digital Multimeter			2 Nos.	2 Nos.

	4½ digit				
36.	Dial Gauges of different sizes and types			APR	APR
37.	Micro-Meter (both inside and outside)			APR	APR
38.	NDT test kits			APR	APR
39.	Taps and die sets			APR	APR
40.	Dumpy level	0 to 350 mm	LC-0.01	1 No.	1 No.
41.	Surface plate	Up to 1.0 Sq. Mtr	Grade 1,2,3	1 No	1 No
42.	Straight Edge	Up to 2 Mtr long	Grade 1,2,3	1 No.	1 No.
43.	Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable			3 Sets	2 Sets
44.	Master pressure gauge	0 – 4 Kg/cm2	0.02	2 No.	1 No.
45.	Master pressure gauge	0 – 25 Kg/cm2		2 No.	1 No.
46.	Master pressure gauge	0 – 60 Kg/cm2		2 No.	1 No.

***APR- Contractor have to deploy T&P as per the requirement of BHEL site as decided by BHEL Engineer**

NOTES:

1. **The above list specifies only major T&P/MMD (may not be complete to be deployed by the contractor for the respective packages. All additional/ other tools and plants which are required for satisfactory & timely completion of work of the respective packages shall also be deployed by the contractor within finally accepted rate/ price.**

2. If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to get work done at the risk & cost of contractor without prejudice to right of BHEL as in GCC

3. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.

4. Other terms and conditions regarding above items shall be as per T&P clause in SCC

5.0 T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS PER PACKAGE

LIST OF T&P and MMD being provided by BHEL for use of contractor free of hire charges on sharing basis.				
S.NO.	**EQUIPMENT**	**CAPACITY**	**QTY**	**REMARKS**
T&Ps				
1.	Crawler crane	100/135 / 250 MT	01 No	Refer Note no. 3
2.	Portal crane with accessories	360 MT	01 No.	For Lalitpur TG only i.e. for package A part ii & package B part I
3.	EOT Crane (in T.G. hall)	180T / 20T	02 No	Based on availability FOR HANDLING AND ERECTION WITHIN TG HALL
4.	Motorised hydraulic test pump		One No.	
5.	Chemical Cleaning Arrangement	By BHEL agency		
SPECIAL T&Ps				
5	Slings for lifting turbine rotors with lifting beam		One Set	
6	Slings for lifting generator stator with lifting beam		One Set	

NOTES:

1. **Cl.4.2.2.16 c. of SCC shall be read as** day-today upkeep and running maintenance like filling topping up of lubricants, changing filters, etc including repair of self-starter, batteries and dynamo of these cranes shall be the responsibility of the contractor. If on checking it is found that the same is not followed, BHEL will exercise its right to get the job/works done at the risk and cost of contactor. BHEL may also provide cranes through

crane hiring agencies in which case the day-to-day upkeep and running maintenance shall be excluded from scope of contractor.

2. **Cl.4.2.2.16 e. of SCC shall be read as-** The **operator for** BHEL's cranes **100 MT & above capacity** being provided by BHEL free of cost. **Further, Helpers and fuel for operation of all BHEL cranes, shall be provided by contractor within the final accepted rates.**

3. **The Cranes at Sl No. 1 will be provided as per requirement on sharing basis** FOR LIFTING OF DEAERATOR SHELL AND FEED STORAGE TANK SHELL SEGMENTS AND FOR SHIFTING OF HP TURBINE & LP TURBINE ROTOR AND OTHER HEAVY COMPONENTS THE TYPES OF CRANES SHALL BE ALOTTED AFTER SEEING THE ACTUAL LOAD REQUIREMENT**.** The cranes shall be issued for the purpose of loading/unloading and lifting to locations as stated above at erection site **at the discretion of the BHEL Engineer.**

4. **The contractor shall make necessary arrangement like lying of steel plates, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of crane.**

5. Any other special T&P if supplied by the manufacturer and available with the customer will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition. However low height jack may not be made available and will have to be arranged for by the contractor

6. **Other T&P mention above contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores.**

7. Other terms and conditions regarding above items shall be as per T&P clause in SCC

Chapter - VI: TIME SCHEDULE

6.0 TIME SCHEDULE FOR PACKAGE A & B

6.1 TIME SCHEDULE FOR PACKAGE A: PART-I: BARA-Unit 1 & 3

6.1.1 The contractor is required to commence the work within 15 days from the date of issue of LOI unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&Ps by the contractor.

6.1.2 Entire work as detailed in the tender specifications shall be completed **within 29 months** from the Zero date as per programme/ milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.1.3 The various milestones dates to be achieved for Package A part I: Bara under this tender is as:

MILE STONES	**MONTHS**
Condenser Erection Start	ZERO
TG Erection Start	ONE
MDBFP Commissioning	NINE
Box – up for oil flushing	ELEVEN
Oil Flushing Completion.	THIRTEEN
Barring Gear	FOURTEEN
Synchronisation (Coal firing)	SIXTEEN
FULL LOAD	SEVENTEEN
Trial operation & Handing over	EIGHTEEN

The above schedule is only for Unit No. 1 .For Unit No. 3 the phase gap shall tentatively be 10 months w.r.t all activities of unit no. 1.

Note:

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. This project is a fast track project. Customer is making all out efforts to advance the project schedule. In case the civil inputs are advanced by customer, TG erection start and further erection work may have to be advanced to suit project

requirement. No extra payment whatsoever shall be paid on this account.

6.2 TIME SCHEDULE FOR PACKAGE A: PART-II: LALITPUR: UNIT 2

6.2.1 The contractor is required to commence the work within 15 days from the date of issue of LOI unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&Ps by the contractor.

6.2.2 Entire work as detailed in the tender specifications for package A : part II shall be completed **within 22 months** from the Zero date as per programme/ milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.2.3 The various milestones dates to be achieved for Package A part II: Unit 2, Lalitpur under this tender is as:

MILE STONES	**MONTHS**
Condenser Erection Start	ZERO **(Tentaively start in MAY'13)**
TG Erection Start	TWO
MDBFP Commissioning	TWELVE
Box – up for oil flushing	SIXTEEN
Oil Flushing Completion.	EIGHTEEN
Barring Gear	NINETEEN
Synchronisation (Coal firing)	TWENTY
FULL LOAD	TWENTY ONE
Trial operation & Handing over	TWENTY ONE

Note:

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. This project is a fast track project. Customer is making all out efforts to advance the project schedule. In case the civil inputs are advanced by customer, TG erection start and further erection work may have to be advanced to suit project

requirement. No extra payment whatsoever shall be paid on this account.

6.3 TIME SCHEDULE FOR PACKAGE B: PART-I: LALITPUR: UNIT 1&3

6.3.1 The contractor is required to commence the work within 15 days from the date of issue of LOI unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&Ps by the contractor.

6.3.2 Entire work as detailed in the tender specifications for package B: part I: lalitpur: Unit1 &3 shall be completed **within 30 months** from the Zero date as per programme/ milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.3.3 The various milestones dates to be achieved for Package A: part I: lalitpur: Unit 1, under this tender is as:

MILE STONES	**MONTHS**
Condenser Erection Start	ZERO **(Tentaively start in JAN'13)**
TG Erection Start	TWO
MDBFP Commissioning	TWELVE
Box – up for oil flushing	SIXTEEN
Oil Flushing Completion.	EIGHTEEN
Barring Gear	NINETEEN
Synchronisation (Coal firing)	TWENTY
FULL LOAD	TWENTY ONE
Trial operation & Handing over	TWENTY ONE

The above schedule is only for Unit No. 1 .For Unit No. 3 the phase gap shall tentatively be 8 months respectively w.r.t all activities of unit no. 1.

Note:

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. This project is a fast track project. Customer is making all out efforts to advance the project schedule. In case the civil inputs are advanced by customer, TG erection start and further erection work may have to be advanced to suit project requirement. No extra payment whatsoever shall be paid on this account.

6.4 TIME SCHEDULE FOR PACKAGE B: PART-II: BARA: UNIT 2

6.4.1 The contractor is required to commence the work within 15 days from the date of issue of LOI unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&Ps by the contractor.

6.4.2 Entire work as detailed in the tender specifications for package A: part II shall be completed **within 19 months** from the Zero date as per programme/ milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.4.3 The various milestones dates to be achieved for Package B: part II: Bara: Unit 2 under this tender is as:

MILE STONES	MONTHS
Condenser Erection Start	ZERO
TG Erection Start	ONE
MDBFP Commissioning	NINE
Box – up for oil flushing	ELEVEN
Oil Flushing Completion.	THIRTEEN
Barring Gear	FOURTEEN
Synchronisation (Coal firing)	SIXTEEN
FULL LOAD	SEVENTEEN
Trial operation & Handing over	EIGHTEEN

Note:

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. This project is a fast track project. Customer is making all out efforts to advance the project schedule. In case the civil inputs are advanced by customer, TG erection start and further erection work may have to be advanced to suit project requirement. No extra payment whatsoever shall be paid on this account.

6.5 The contractor has to ensure that work is completed in all respects leaving no pending points. However the punch list/ pending points, which are possible to be attended at site, shall be fully liquidated within two months from successful trial operation of the unit.

6.6 The work under the scope of this contract is deemed to be complete in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.

Chapter - VII: TERMS OF PAYMENT

7.0 TERMS OF PAYMENT

7.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

7.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

7.3 Subject to any deduction, which BHEL may be authorized to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder.

7.3.1 Interest bearing recoverable advance: Applicable as per Clause No. 2.13 of GCC.

7.3.2. PROGESSIVE PAYMENT ON PRORATA BASIS

A. 84% of Lump sum price (Item No.1&5 of Rate Schedule of Package A) (Applicable on items covered under ANNEXURE – IC)

		Pkg A: Part-I	**Pkg A: Part-II**
		Unit 1&3: Bara	Unit 2: Lalitpur
1.	UNLOADING, LIFTING & PLACEMENT OF GEN. STATOR ON FOUNDATION AT ELEVATION OF 17.0 M BY STRAND JACK SYSTEM/PORTAL CRANE	2X5%	4%
2.	CONDENSER	2X12%	26%
3.	TURBINE	2X9%	22%
4.	GENERATOR	2X6%	12%
5.	AUXILIARIES (DEAERATOR, FST,PUMPS ETC.)	2X8%	16%
6.	INTEGRAL PIPING	2X2%	4%
	TOTAL	84%	84%

B. 84% of Lump sum price (Item No.1&5 of Rate Schedule of Package B) (Applicable on items covered under ANNEXURE – IC)

		Pkg B: Part-I	**Pkg B: Part-II**
		Unit 1&3: Lalitpur	Unit 2: Bara
1.	UNLOADING, LIFTING & PLACEMENT OF GEN. STATOR ON FOUNDATION AT ELEVATION OF 17.0 M BY STRAND JACK SYSTEM/PORTAL CRANE	2X2%	10%
2.	CONDENSER	2X13%	24%
3.	TURBINE	2X11%	18%
4.	GENERATOR	2X6%	12%
5.	AUXILIARIES (DEAERATOR, FST,PUMPS ETC.)	2X8%	16%
6.	INTEGRAL PIPING	2X2%	4%
	TOTAL	84%	84%

NOTES:

1. Further break-up of above terms of payment, if required can be carried out at site entirely at the discretion of BHEL.

2. The above break up is only for payment purposes and does not cover all equipment in the scope of the subject work. The total scope of work shall be as detailed in the tender specification.

3. Pro-rata payments shall be made every month in proportion to the work carried out by the contractor during the month, which shall be measured on the basis of percentages fixed above. The engineer shall carry out the assessment of the work for payment within the above percentages and it shall be final and binding on contractor. However, further percentage break up for payment against above clauses, will be mutually discussed and finalized at site.

C. 84% of UNIT RATE (Item No.2 & 6 of rate Schedule for Package A & B resp.)

(Applicable on items covered under ANNEXURE – II ITEM A)

1.	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION TO BE PAID ALONG WITH PLACEMENT IN POSITION)	15 %
2.	PLACEMENT IN POSITION	20 %
3.	ALIGNMENT	15 %
4.	WELDING/BOLTING/FIXING	20 %
5.	COMPLETION OF NON DESTRUCTIVE EXAMINATION & STRESS RELIEVING/ HEAT TREATMENT (IF NOT APPLICABLE, THEN THIS PORTION TO BE CLUBBED W NEXT ACTIVITY)	5%
6.	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	5%
7.	HYDRAULIC TEST/PNEUMATIC TEST WHERE EVER APPLICABLE	4%

D .84% of UNIT RATE (item No. 3 / 7 of rate schedule for Package A / B)

(Applicable on items covered under ANNEXURE – II ITEM B)

1.	On transportation of required quantity of materials on locations and its proper protection.	10 %
2.	On fabrication / fixing of retainers, lagging & stitching of mattresses and welding of retainers,	40 %
3.	On fixing of casing supports, fabrication, beading, sealing, bitumen painting, installation and screen fixing of cladding & completion of all jobs	30 %
4.	On system completion and area cleaning.	4 %

E. 84% of UNIT RATE (item No. 4 / 8 of rate schedule for Package A/B resp.)

1.	PLACEMENT IN POSITION	50 %
2.	ALIGNMENT	14 %
3.	WELDING/BOLTING/FIXING	20 %

F. STAGE/MILESTONE PAYMENTS (16% of contract Value of resp. pkgs)

S. No.	Description	For Pkg. A /B: Part -I	For Pkg A/B: Part -II
1.	Condenser HT	3x0.5%	1%
2.	CEP Trial run	6x0.25%	3x1%
3.	TDBFP Trial run	4X0.5%	2x1%
4.	MD BFP Trial run	2x0.5%	1%
5.	Barring Gear Completion	2x0.5%	1%
6.	Rolling and Synchronisation	2x0.5%	1%
7.	Trial Operation of Unit	2x1%	2%
8.	Painting (including arrow marking, nomenclature, etc	2x1%	2%
9.	Area cleaning, temporary structures cutting/removal and return of scrap	2X0.5%	1%
10.	Punch List points/pending points liquidation	2x0.5%	1%
11.	Material Reconciliation	2X0.5%	0.5%
12.	Completion of Contractual Obligations	2x0.5%	0.5%

Note:

1. **If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone/ commissioning activity.**
2. **Recovery & refund of retention amount shall be as per clause No. 2.22., 2.23.2 & 2.24.2 of GCC**

Chapter - VIII: TAXES, DUTIES, LEVIES

8.0 TAXES, DUTIES, LEVIES

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

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

8.1 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be exclusive of Service Tax and Cess on Output Services.

Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the

Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract.For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted :

Contractor shall submit serially numbered Service Tax and Cess Invoices, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely:

1. The name, address and registration number of the contractor

2. The name and address of the party receiving taxable service (BHEL)

3. Description, classification and value of taxable service provided and

4. The Service Tax payable thereon.

All the four conditions shall be fulfilled in the invoice for payment of Service Tax by BHEL.

Where more than one nature of Service under Service Tax Rules is involved, the invoice mentioned above shall contain the break up of all values for each nature of Service.

8.2 VAT (Sales Tax /WCT)

The rates quoted by the Contractor shall be inclusive of VAT/Sales Tax and BHEL shall not reimburse any amount on this account due to any reason whatsoever.

The Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill.

Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted.

In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing all their material, plant and equipment etc at site for the execution of the work, including arrangement of Road Permits if and as applicable under the relevant VAT Act.

8.2.1 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for dischargingthe liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with

regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the contractor.

8.2.2 New Taxes/Levies

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

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

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

9.0 OTHERS

9.1 For reverse auction/ Price Bid opening, only those bidders will be considered who will qualify for the subject job on the basis of pre-qualification evaluation/ Techno-commercial bids. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

9.2 THE PROCEDURE FOR SELECTION & FINALIZATION OF CONTRACTORS FOR PACKAGE-A & PACKAGE-B OF THIS TENDER FOR UNIT NO. 1, 2 & 3 AT 3X660 MW BARA STPS & UNIT NO. 1, 2 & 3 AT 3X660 LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR, U.P.

9.2.1 There will be three units of 660 MW each AT 3X660 MW LALITPUR STPS OF LALITPUR POWER GENERATION CO. LTD., DISTT. LALITPUR, U.P. & AT 3X660 MW PRYAGRAJ POWER GENERATION CO. LTD.,BARA

9.2.2 Scope of work under Package-A & B of this tender is given under clause 2.3. The two packages shall be awarded to two separate contractors i. e. no single bidder shall be awarded more than one package.

9.2.3 Bidders may submit their offer either for both the packages and any one of the packages i.e. Package-A / Package-B given in this tender. However, Bidders shall specifically confirm in their bid that they have quoted for Package-A / Package-B or both of the tender.

9.2.4 Bidders shall submit price bid for each package separately by enclosing each price bid in a separate envelop, clearly indicating on cover of the envelop the respective package number(A /B) besides furnishing other requisite details.

9.2.5 Comparative status of bidders shall prepared by BHEL after conducting RA/opening price bids for each package separately. In case RA is resorted to, the RA process shall be conducted separately for both the packages.

9.2.6 In case, one of the bidders is found be the lowest bidder in both the packages, such successful bidder shall be considered only for one package at the discretion of BHEL i.e the selection of the package to be awarded to the bidder shall be at the discretion of BHEL and BHEL's decision shall be final and binding on the bidders.

9.2.7 After deciding the successful bidder for any particular package (either through Price bid opening or through RA process), offer of this successful bidder for the other package shall not be considered for further processing (including price bid opening / RA process) in deciding the successful bidder of the other package.

9.2.8 There will be two Contracts for each Package. In Package A one contract for part-I & other for part –II .Similarly for Package B one contract for part-I & other for part –II. All the contracts will individually be treated as a separate contract and Contract Agreement for each part shall be signed separately.

Chapter - X: ANNEXURES

ANNEXURE-IA

TENTATIVE WEIGHT SCHEDULE OF MAIN PACKAGES FOR 1X660 MW UNIT (APPLICABLE FOR PACKAGE A PART I & PACKAGE B PART II)

S.No.	EQUIPMENT / PACKAGE	APPROX. WT. (in MT)
A	STEAM TURBINE & AUX.	1650
B.	TURBO GENERATOR & AUX.	
C.	CONDENSOR,LP,HP Heaters, Deaerator, FST	1200
D.	BOUGHT OUT ITEMS (BHEL Hardwar Scope)	500
E.	TANKS,VESSELS,R.E.JOINTS,B.F.valves	580
F.	PUMPS, TURBO DRIVE & MOTORS	267
G	TG INTEGRAL PIPING	94
H.	BOUGHT OUT ITEMS (BHEL PEM Scope) for pkg A	200

NOTE:

THE WEIGHT INDICATE ABOVE IS APPROXIMATE AND THERE MAY BE A VARIATION IN WEIGHT OF EQUIPMENT / PACKAGE. NO CLAIM WHATSOEVER WILL BE ENTERTAINED BY BHEL ON ACCOUNT OF VARIATION IN WEIGHT / QUANTITIES IN RESPECT OF TG EQUIPMENTS; TG INTEGRAL PIPING ALONGWITH OTHER EQUIPMENTS & PEM SUPPLIED ITEMS.

ANNEXURE-IB

TENTATIVE WEIGHT SCHEDULE OF MAIN PACKAGES FOR 1X660 MW UNIT (APPLICABLE FOR PACKAGE A PART II & PACKAGE B PART I)

S.No.	EQUIPMENT / PACKAGE	APPROX. WT. (in MT)
A	STEAM TURBINE & AUX.	1650
B.	TURBO GENERATOR & AUX.	
C.	CONDENSOR,LP,HP Heaters, Deaerator, FST	1200
D.	BOUGHT OUT ITEMS (BHEL Hardwar Scope)	500
E.	TANKS,VESSELS,R.E.JOINTS,B.F.valves	580
F.	PUMPS, TURBO DRIVE & MOTORS	267
G	TG INTEGRAL PIPING	94
H.	BOUGHT OUT ITEMS (BHEL PEM Scope)	250

NOTE:

THE WEIGHT INDICATE ABOVE IS APPROXIMATE AND THERE MAY BE A VARIATION IN WEIGHT OF EQUIPMENT / PACKAGE. NO CLAIM WHATSOEVER WILL BE ENTERTAINED BY BHEL ON ACCOUNT OF VARIATION IN WEIGHT / QUANTITIES IN RESPECT OF TG EQUIPMENTS; TG INTEGRAL PIPING ALONGWITH OTHER EQUIPMENTS & PEM SUPPLIED ITEMS.

ANNEXURE-IC

APPROXIMATE WEIGHT SCHEDULE OF MAJOR PACKAGES FOR EACH 660 MW SET

A. 1) TURBINE & GENERATOR

SL NO.	Main System	Description	QTY	GROSS WT.	TRANSPORT DIMENSIONS/UNIT		
				MT	L [m]	W (m)	H [m]
1	HP-Turbine	Front Bearing Pedestal	1	5,70	3,00		1,60
2	HP-Turbine	Turbine	1	140,00	8,50	3,70	3,50
3	HP-Turbine	Comb. Main Steam Stop & Control (SSV/STV) Valves-HPV 250/200-V32	1	32,00	3,70	3,50	2,70
4	HP-Turbine	Comb. Main Steam Stop & Control (SSV/STV) Valves-HPV 250/200-V32	1	32,00	3,70	3,50	2,70
5	HP-Turbine	Main steam Stop Valve actuators	2	7,40	2,60	2,40	1,30
6	HP-Turbine	Main Steam Control Valve actuators	2	1,60	1,40	0,75	1,00
7	HP-Turbine	Overload valve OLV 125-V32	1	7,50	3,00	2,00	1,40
8	HP-Turbine	Actuator for Overload valve	1	0,80	1,10	0,70	1,20
9	HP-Turbine	Hardware and accessories	1	3,00	2,40	1,20	1,40
10	HP-Turbine	Rear bearing pedestal (HP-IP)	1	12,00	3,30	1,60	1,95
11	IP-Turbine	IP-Turbine compl.	1	179,00	9,04	4,60	4,55
12	IP-Turbine	Rear bearing pedestal (IP-LP)	1	18,30	5,45	1,80	1,95
13	IP-Turbine	Comb. Reheat steam Stop & Control (SSV/STV) Valves-IPV 560/500-V22	1	50,00	6,10	4,50	3,60
14	IP-Turbine	Comb. Reheat steam Stop & Control (SSV/STV) Valves-IPV 560/500-V22	1	50,00	6,10	4,50	3,60
15	IP-Turbine	Reheat steam Stop Valve actuators	2	4,50	2,60	2,10	1,40
16	IP-Turbine	Reheat Steam Control Valve actuators	2	1,60	1,40	0,75	1,00
17	IP-Turbine	Hardware and accessories	1	4,00	2,40	1,20	1,40
18	LP-Turbine	Turbine Rotor	1	115,00	10,20	4,50	4,64
19	LP-Turbine	Lower part with included stationary blade ring, Guide blade carrier and scre	1	105,00	7,40	6,80	4,30
20	LP-Turbine	Upper part	1	65,00	7,10	5,20	4,67
21	LP-Turbine	Stationary blade ring	2	7,00	5,00	2,90	1,60
22	LP-Turbine	Stationary Blade ring top section TS / GS	2	7,00	5,00	2,90	1,60
23	LP-Turbine	Stationary Blade Carrier top section TS / GS	2	8,75	4,70	1,90	1,50
24	LP-Turbine	Hardware and Accessories	1	2,30	2,2	2,1	1,4

25	LP-Turbine	Rear Bearing Pedestal (LP-Generator)	1	15,00	5,55			1,67	1,96
26	Extraction NRV (with & without Actuators)	RSK 600	2	2,50	1,4			2,7	1,8
27	Extraction NRV (with & without Actuators)	RSK 500	4	2,30	1,3			2,7	1,2
28	Extraction NRV (with & without Actuators)	RSK 400	2	1,80	2,4			1,4	1,5
29	Extraction NRV (with & without Actuators)	RSK 300	2	1,30	1,9			1,1	1,2
30	Extraction NRV (with & without Actuators)	RSK 150	4	0,80	1,9			1	1
31	Accessories, Cross Over Piping	Flange, piping	2	4,10	3,2			2,4	2,6
32	Accessories, Cross Over Piping	piping, bent	2	4,80	3,6			2,8	2,6
33	Accessories, Cross Over Piping	piping	2	4,30	3,2			2,3	2,6
34	Accessories, Cross Over Piping	Piping, Expansion joint	2	2,90	2,4			2,4	1,8
35	Accessories, Cross Over Piping	Flange, piping	2	3,70			3	2,4	2,6
36	Accessories, Cross Over Piping	Alignment shaft	1	1,80	5,2			0,8	0,8
37	Accessories, Cross Over Piping	Crossarm	1	4,60	5,2			1,6	1,6
38	Accessories, Cross Over Piping	Support pedestals	1	2,90	3,2			2,4	2,4
39	Accessories, Cross Over Piping	barrel-type casing fixture	2	11,00			4	2,8	1,6
40	Accessories, Cross Over Piping	Blow-out inserts	1	3,20	2,4			1,3	1,4
41	Accessories, Cross Over Piping	Tools	1	3,40	2,45			1,25	1,4
42	Accessories, Cross Over Piping	IP valve support	1	6,60	4,2			2,4	2,4
43	Accessories, Cross Over Piping	Miscellaneous	5	2,00	2,4			1,3	1,4
44	Accessories, others	Turning Gear	1	0,50			1	0,7	0,7
45	HP-Turbine	Turbine (excluding bearings)	1	140,00	8,50			3,70	3,50
46	IP-Turbine	Diagonal inlet guide blade ring (diagonal guide blade carrier)	4	0,20	1,40			0,70	0,25
47	LP-Turbine	Rotor blades for LA-0	3	3,01	1,40			1,20	1,55

48	LP-Turbine	Rotor blades for LA-1	3	1,40	1,50	0,88	1,00
49	LP-Turbine	LP guide blade rings for LE-0/LE-1 (stationary blade ring assembly)	2	7,00	4,70	2,35	1,10
50	Generator stator	Generator stator	1	324,00	12,4	4,45	4,4
51	Generator stator	High voltage terminal box	1	6,76	3,56	2,59	1,79
52	Generator stator	Bushings (6 pcs.)	1	1,36	1,93	1,77	0,61
53	Generator stator	Frame cooler head	1	24,20	4,55	4,63	2,08
54	Generator stator	Cooler (2 elements)	1	7,00	4,77	2,27	1,35
55	Generator stator	Brush carrier (4 pcs.)	1	2,60	2,56	1,96	1,63
56	Generator stator	Baffle ring	1	1,02	1,87	1,71	1,26
57	Generator stator	Seal ring holder	1	1,07	2,44	1,22	0,73
58	Generator stator	End-shield bearing TE	1	19,10	3,97	2,78	2,36
59	Generator stator	End-shield bearing EE	1	19,90	3,97	3,02	2,36
60	Generator stator	Bearing shell	1	1,61	2,04	0,94	0,84
61	Generator stator	Baffle ring carrier	1	1,21	2,03	1,83	0,91
62	Generator stator	Primary Water Tank (only)	1	5,40	10,51	2,38	1,52
63	Generator stator	Slip ring shaft (collector)	1	4,39	3,78	1,85	1,42
64	Generator rotor	Generator rotor	1	79,60	14,52	1,96	2,23
65	Generator rotor	Foundation beam generator	1	11,50	14,00	5,50	0,50
66	Generator rotor	Base frame accessories a. o.	1	1,63	3,66	3,20	0,85
67	Generator rotor	Ropes	1	3,60	3,27	1,61	1,45
68	Generator rotor	Grout for generator foundation	1	4,50	2,15	1,35	1,43
69	Generator rotor	Bearing assembly parts	1	1,21	2,03	1,83	0,91
70	Generator Others	Generator foundation material	1	0,94	2,76	2,13	1,30
71	Generator Others	Pipes for pressuring and cleaning	1	0,27	1,28	1,18	0,73
72	Generator Others	Assembly parts	1	1,80	2,44	1,22	0,73
73	Generator Others	Assembly parts	1	5,62	2,99	2,05	1,76

74	Generator Others	Diverse parts	1	0,76	2,44	1,22	0,73
75	Generator Others	Assembly parts	1	1,74	2,44	1,23	1,34
76	Generator Others	Assembly parts	1	0,69	2,44	1,23	0,73
77	Generator Others	Pipes	1	1,10	2,44	1,23	1,34
78	Generator Others	Assembly parts	1	0,00	0,31	0,22	0,22
79	Generator Others	Wind bolt	1	0,03	1,05	0,17	0,23
80	Generator Others	Plate	1	0,04	0,48	0,38	0,44
81	Generator Others	Generator foundation material	2	0,00	0,37	0,27	0,33
82	Generator Others	Generator foundation material	2	0,01	0,37	0,27	0,33
83	Generator Others	Assembly material	7	0,00	0,37	0,27	0,33
84	Generator Others	Assembly material	8	0,01	0,37	0,27	0,33
85	Generator Others	Assembly material	1	0,02	0,41	0,41	0,47
86	Generator Others	Diverse material	2	0,00	0,37	0,27	0,33
87	Generator Others	Diverse material	1	0,00	0,37	0,27	0,33
88	Generator Others	Diverse material	1	0,00	0,37	0,27	0,33
89	Generator Others	Diverse material	1	0,01	0,45	0,33	0,34
90	Static Excitation	SEE Static Excitation Equipment	1	5,00	5,4	1,2	2,7
91	Static Excitation	Excitation Transformer	1	14,00	2,7	1,4	2,7
92	Static Excitation	Excitation Transformer Housing	1	1,50		3 1,7	3,2
93	Static Excitation	SEE Static Excitation Equipment	1	5,00	5,4	1,2	2,7
94	Static Excitation	Excitation Transformer	1	14,00	2,7	1,4	2,7
95	Static Excitation	Excitation Transformer Housing	1	1,50		3 1,7	3,2

A. 2) LIST OF BOIs(BROUGHT OUT ITEMS) :

SL	ITEM ID	QTY	UNIT	DESCRIPTION
1	BG001	120	NO	EMPTY H2 CYLINDER
2	BG002	40	NO	EMPTY CO2 CYLINDER
3	BG003	12	NO	EMPTY N2 CYLINDER
4	BG004	1	NO	PORTABLE GAS ANALYSER
5	BG005	1	ST	MOISTURE MEASURING SYSTEM
6	BG007	2	NO	VAPOUR EXHAUSTER
7	BG008	1	ST	MOTORISED TEMPERATURE CONTROL VALVE WITH ACTUATOR NB250 VAR-02
9	BG011	2	NO	REFRIGERATION GAS DRYER
10	BG018	1	NO	STARTING RESISTOR FOR DC S.O MOTOR
11	BG020	1	NO	SOUND ABSORBING COVER
12	BG021	1	ST	GROUNDING BRUSH MONITOR
13	BG079	2	NO	PRIMARY WATER COOLER (PLATE TYPE)
14	BG090	1	ST	GENERATOR INTEGRAL PIPING
15	BG091	1	ST	HYDROGEN COOLERS PIPING
16	BG092	1	NO	PW TEMPERATURE CONTROL VALVE
17	BH001	29668	NO	WELDED AUSTENITIC S.S. TUBES GR.304 (FOR CONDENSOR)

18	BH010	2	NO	CONDENSOR AIR EVACUATION PACKAGE (VACUUM PUMP)
19	BH012	2	NO	AIR EXHAUSTER WITH MOTOR (GSC AIR EXHAUSTER)
20	BH022	1	ST	MULTI BALL BEARING SUPPORT FOR CONDENSOR
21	BT006	1	ST	BUTTERFLY VALVES
22	BT009	2	NO	NRV WITH ALUMINIUM FLAP
23	BT011	1	NO	OIL PURIFICATION UNIT (OIL CENTRIFUGE)
24	BT013	4	NO	LEAD DIAPHRAGM
25	BT014	1	ST	SPRAY NOZZLES
26	BT015	1	NO	DIRT CATCHERS
27	BT016	1	ST	DAMPER
28	BT017	1	ST	VARIABLE LOAD SPRING CAGES
32	BT024	1	ST	DRY AIR PRESERVATION SYSTEM
33	BT025	1	NO	OIL PURIFICATION SYSTEM (CENTRAL)
35	BT027	1	ST	TURBINE INTEGRAL PIPING
36	BT028	1	ST	H & S FOR TURBINE INTEGRAL PIPING
37	BT029	1	ST	CALIBRATED FLOW NOZZLE ASSLY.
38	BT030	1	ST	DRAIN VALVES
39	BT032	2	NO	GLOBE VALVE
40	BT043	1	M3	CONTROL FLUID (FRF)
41	BT046	1	ST	LP BYPASS STOP & CONTROL VALVE WITH EHA AND WATER INJECTION VALVE
42	BT054	1	ST	STEAM TRAP
43	BT065	1	ST	GEAR PUMPS
45	BT074	1	NO	VACUUM BREAKER VALVE WITH PNEUMATIC ACTUATOR
46	BT075	1	ST	SEAL STEAM SUPPLY & LEAKAGE STEAM CONTROL VALVE WITH PNEUMATIC ACTUATOR
47	BT080	1	ST	EHA FOR TURBINE VALVES ALONGWITH HPSU
48	BT081	1	NO	HPT STEAM EVACUATION VALVE
52	BT096	1	NO	OIL MODULE
53	BT097	1	ST	OIL THROTTLE VALVES
54	BT098	1	NO	CRH-NRV WITH PNEUMATIC ACTUATOR
55	BT099	1	ST	EXTRACTION NRVS WITH & WITHOUT PNEUMATIC ACT.
56	BT100	1	ST	CROSS OVER PIPE
		1	ST	HP TURBINE WITHOUT BEARINGS
		1	ST	TURBINE AUXILIARIES
		1	ST	GENERATOR AUXILIARIES

No	Content Name	Bgr No	Packing Dimension Qty (unit)	L (cm)	W (cm)	H (cm)	Weight Net (kg)
1	Upper Part TS Compensator for Casing	321260 321550	1 6	1140	389	410	24699
2	Upper Part GS	321260	1	1140	389	410	23491
3	Casing End Wall Front Casing of Shaft Seal Compensator for Shaft Seal	321200 323600 321080	1 1 1	1110	515	250	36966

4	Casing End Wall Rear Casing of Shaft Seal Compensator for Shaft Seal	321230 323650 321090	1 1 1	1110	515	250	36966
5	Frame Section Assy Parts	321650 321700	1 1lot	920	384	205	17873

B) CONDENSER (BHEL/HARDWAR SUPPLY):

SNO	PKG. NO/SL	NET WT	GROSS WT	DESCRIPTION	PKG SIZE
1	603/0	654	854	FOUNDATION COVERING ITEMS	XX
2	645/0	1940	2500	SEAL OIL STORAGE TANK	5000X1800X1700
3	646/0	4550	7065	PW PUMP & FILTER UNIT	4000X4000X3000
4	648/0	7825	10000	SEAL OIL UNIT	6200X2500X3400
5	649/0	460	660	LIQUID DETECTOR RACK	2000X1000X2100
6	650/0	630	1205	GAS UNIT	1980X1640X2420
7	651/0	170	250	CO2 VAPOURISER	1520X840X840
8	652/0	150	333	H2 DISTRIBUTOR	2300X700X2000
9	653/0	163	353	CO2 DISTRIBUTOR	2850X700X2000
10	654/0	60	143	N2 DISTRIBUTOR	1300X700X2075
11	655/0	127	267	ALKALYSER UNIT	1150X780X1900
12	656/0	56	100	RESINS	1200X600X600
13	657/0	3300	3800	TG SYSTEM INTEGRAL PIPING(VALVES)	2750X1400X1400
14	658/0	80	180	TG SYSTEM INTEGRAL PIPING(INSTRUMENTS)	1000X940X900

SNO	PKG. NO/SL	NET WT	GROSS WT	DESCRIPTION	PKG SIZE
1	78004/0	8465	8465	BOTTOM PLATE (FRONT PART)	8800X3600X910
2	78005/0	8800	8800	BOTTOM PLATE (REAR PART)	8800X3600X1040
3	78006/0	7230	7230	BOTTOM PLATE (MIDDLE PART-1)	8800X3600X1080
4	78007/0	7844	7844	BOTTOM PLATE (MIDDLE PART-2)	8800X3600X1120
5	78008/0	7286	7286	BOTTOM PLATE(MIDDLE PART-3)	8800X3600X1150
6	78010/0	1962	2150	LOOSE ITEMS (BOTTOM PLATE)	XX
7	78014/0	840	920	LOOSE ITEMS(COND. SUPPORTEMBEDMENTS)	XX
8	78018/0	1219	1320	LOOSE ITEMS(CONDENSER SUPPORT)	XX
9	78019/0	3054	3300	LOOSE ITEMS(CONDENSER SUPPORT)	XX
10	78020/0	7475	7725	FRONT WATER CHAMBER(GEN.END)	5330X4460X300
11	78022/0	16150	16400	FRONT WATER BOX(GEN.END)	4650X4460X3030
12	78023/0	7475	7725	FRONT WATER CHAMBER(TUR.END)	5330X4460X300
13	78025/0	16150	16400	FRONT WATER BOX(TUR.END)	4650X4460X3030
14	78026/0	7475	7725	REAR WATER CHAMBER(GEN.END)	5330X4460X300
15	78028/0	16150	16400	REAR WATER BOX (GEN.END)	4650X4460X3030
16	78029/0	7475	7725	REAR WATER CHAMBER(TUR.END)	5330X4460X300
17	78031/0	16150	16400	REAR WATER BOX (TUR.END)	4650X4460X3030
18	78032/0	14700	14700	PLATES(SIDE WALL -TUR.SIDE)	5380X2530X200
19	78038/0	1220	1370	LOOSE ITEMS(SIDE WALL-TUR.SIDE)	XX
20	78040/0	14700	14700	PLATES(SIDE WALL-GEN.SIDE)	5380X2530X200
21	78045/0	1220	1370	LOOSE ITEMS(SIDE WALL-GEN SIDE)	XX
22	78046/0	5165	5465	LOOSE ITEMS(SHELL INTERNALS)	2190X970X775
23	78047/0	5220	5450	RODS(SHELL INTERNALS)	3530X1150X270

24	78048/0	5220	5450		RODS(SHELL INTERNALS)	3530X1150X270
25	78049/0	5220	5450		RODS(SHELL INTERNALS)	3530X1150X270
26	78050/0	5220	5450		RODS(SHELL INTERNALS)	3530X1150X270
27	78051/0	5220	5450		RODS(SHELL INTERNALS)	3530X1150X270
28	78052/0	5220	5450		RODS(SHELL INTERNALS)	3530X1150X270
29	78053/0	5220	5450		RODS(SHELL INTERNALS)	3530X1150X270
30	78054/0	5220	5450		RODS(SHELL INTERNALS)	3530X1150X270
31	78055/0	5220	5450		RODS(SHELL INTERNALS)	3530X1150X270
32	78056/0	4455	4705		LOOSE ITEMS(SHELL INTERNALS)	4000X800X800
33	78057/0	4455	4705		LOOSE ITEMS(SHELL INTERNALS)	4000X800X800
34	78058/0	2152	2452		AIR EXTRACTION PIPE	7100X900X560
35	78059/0	8264	8514		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
36	78060/0	8264	8614		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
37	78061/0	8264	8614		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
38	78062/0	8264	8614		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
39	78063/0	8264	8614		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
40	78064/0	8264	8614		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
41	78065/0	8264	8614		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
42	78066/0	8264	8614		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
43	78067/0	8264	8614		SUPPORT TUBE PLATES(SHELL INTERNALS)	4500X4225X224
44	78068/0	4132	4382		SUPPORT TUBE PLATE (SHELL INTERNALS)	4500X4225X224
45	78069/0	8264	8514		SUPPORT TUBE PLATE (SHELL INTERNALS)	4500X4225X224

46	78070/0	5665	5915	LOOSE ITEMS(SHELL INTERNALS)	6200X900X570
47	78071/0	6573	6823	LOOSE ITEM (SHELL INTERRNALS)	2190X970X775
48	78073/0	5220	5450	RODS(SHELL INTERNALS)	3600X1150X270
49	78074/0	5220	5450	RODS(SHELL INTERNALS)	3600X1150X270
50	78075/0	4455	4705	LOOSE ITEMS(SHELL INTERNALS)	4000X800X800
51	78076/0	6500	6500	LOWER DOME WALL (TUR.END)-LOWER PART	10200X3600X500
52	78077/0	1000	1000	LOWER DOME WALL(TUR.SIDE)-UPPER PART	11200X600X500
53	78078/0	500	600	LOOSE ITEMS (LOWER DOME WALL-TUR.SIDE)	2200X900X500
54	78079/0	7500	7500	LOWER DOME WALL(TUR.SIDE)-MIDDLE PART	10200X2900X500
55	78080/0	1500	1500	LOWER DOME WALL(TUR.SIDE)-SIDEPLATES	5400X2500X1200
56	78104/0	6500	6500	LOWER DOME WALL (GEN.SIDE)LOWER PART	10200X3600X500
57	78105/0	1000	1000	LOWER DOME WALL (GEN.SIDE)UPPER PART	11200X600X500
58	78106/0	500	600	LOOSE ITEMS (LOWER DOME WALL-GEN.SIDE)	2200X900X500
59	78107/0	7500	7500	LOWER DOME WALL(GEN.SIDE)MIDDLE PART	10200X2900X500
60	78108/0	1500	1500	LOWER DOME WALL(GEN.SIDE)SIDEE PLATES	5400X2500X1200
61	78110/0	6700	6700	LOWER DOME WALL (FWB SIDE)-LOWER PART	9200X3700X500
62	78111/0	5600	5600	LOWER DOME WALL (FWB SIDE)-UPPER PART	8250X3800X500
63	78112/0	600	720	LOOSE ITEMS (LOWER DOME WALL-FWB SIDE)	1800X1800X1500
64	78116/0	6000	6000	LOWER DOME WALL (RWB SIDE)LOWER PART	9200X1600X500
65	78117/0	700	700	LOWER DOME WALL (RWB SIDE)-UPPER PART	8000X2800X500

66	78118/0	600	700	LOOSE ITEMS LOWER DOME WALL (RWB SIDE)	2000X1500X1400
67	78119/0	4500	4500	LOWER DOME WALL(RWB SIDE)MIDDLE PART	8800X3200X600
68	78121/0	3545	3895	PIPES(DOME INTERNAL STIFFENING)	XX
69	78122/0	4590	4940	PIPES(DOME INTERNAL STIFFENING)	XX
70	78123/0	5900	6300	PIPES(DOME INTERNAL STIFFENING)	XX
71	78124/0	1963	1963	PIPES(DOME INTERNAL STIFFENING)	XX
72	78125/0	2730	2930	PIPES(DOME INTERNAL STIFFENING)	XX
73	78126/0	1963	1963	PIPES(DOME INTERNAL STIFFENING)	XX
74	78127/0	2000	2000	PIPES(DOME INTERNAL STIFFENING)	XX
75	78129/0	2565	2965	LOOSE ITEMS(LP HEATER SUPPORTS)	XX
76	78130/0	3370	3665	LOOSE ITEMS(LP HEATER SUPPORTS)	XX
77	78132/0	327	327	UPPER DOME WALL (TUR.SIDE)	10400X250X16
78	78133/0	327	327	UPPER DOME WALL(GEN.SIDE)	10400X250X16
79	78136/0	210	210	UPPER DOME WALL (FWB SIDE)	6700X250X16
80	78137/0	651	731	LOOSE ITEMS(UPPER DOME WALL-FWB SIDE)	3600X550X200
81	78139/0	210	210	UPPER DOME WALL (RWB SIDE)	6700X250X16
82	78140/0	651	731	LOOSE ITEMS(UPPER DOME WALL-RWB SIDE)	3600X550X200
83	78142/0	6652	6852	LOOSE ITEMS(W/BOX HINGE ARRANGEMENT)	2450X1650X800
84	78143/0	116	135	LOOSE ITEMS(W/BOX HINGE ARRANGEMENT)	500X500X500
85	78144/0	1558	1650	SWIVEL PIPE ASSLY.(W/BOX HINGEARRANGEMENT)	2500X600X750
86	78149/0	504	564	UPPER & LOWER BRG. BLOCK(W/BOXHINGE ARRANGEMENT)	800X660X580
87	78150/0	914	914	FRAME (W/BOX HINGE ARRANGEMENT)	1670X1040X480

Weights are indicated in Kgs

C- HEAT EXCHANGERS (BHEL HYDERABAD)

Sl.No	Equipment	Overall Dimensions (in mm)	Quantity	Dry Weight (in kgs)
1.	***Drain Cooler***			(Wt / no.)
a.	Complete Assly.	L 8700 x W 1100 x H 1500	1 no.	6800
2.	***LP Heater #2***			
a.	Complete Assly.	L 13800 x W 2000 x H 2200	1 no.	29000
3.	***LP Heater #3***			
a.	Complete Assly.	L 13800 x W 2000 x H 2200	1 no.	27500
4.	***LP Heater #4***			
a.	Complete Assly.	L 14500 x W 2000 x H 2200	1 no.	26000
4.	***Deaerator***			
a.	Header	L 12850 x W 3400 x H 3750	1 no.	36000
b.	Storage Tank Sec-1	L 11500 x W 4150 x H 4650	1 no.	46500
c.	Storage Tank Sec-2	L 10550 x W 4150 x H 4650	1 no.	41500
d.	Storage Tank Sec-3	L 12500 x W 4150 x H 4750	1 no.	51000
e.	Storage Tank Sec-4	L 10550 x W 4150 x H 4650	1 no.	41500
f.	Storage Tank Sec-5	L 11500 x W 4150 x H 4650	1 no.	46500
5.	***HP Heater #6A/B***			
a.	Complete Assly.	L 10500 x W 2100 x H 2500	1 no.	52000
6.	***HP Heater #7A/B***			
a.	Complete Assly.	L 13700 x W 2100 x H 2500	1 no.	78000
7.	***HP Heater #8A/B***			
a.	Complete Assly.	L 11100 x W 2100 x H 2500	1 no.	75000
8.	***BFPDT Twin oil Cooler***			
a.	Per Cooler	Ø 508 x H 5000	2 nos.	5700

D-(PUMPS, TURBO DRIVES AND MOTORS)

Motor Driven/**Turbine Driven** BFP Package details (BHEL HYDERABAD

SL. No.	DESCRIPTION	QTY./UNIT		APPROX. WT. (KGS)	PACKING SIZE (mm) (L x W x H)
		TD BFP-2NOS	MD BFP-1NO		
1	Motor Driven Boiler Feed Pump(MD BFP) with	NA	1	22500	3500 x 3100 x 3000
2	Turbine Driven Boiler Feed Pump (TD BFP) with	2	NA	22500	3500 x 3100 x 3000
3	Motor Driven Boiler Feed Booster Pump (MD BP)	NA	1	6500	3000 x 2800 x 2000
4	Turbine Driven Boiler Feed Booster Pump (TD	2	NA	6500	3000 x 2800 x 2000
5	Hydraulic Coupling	NA	1	14800	4000 x 3000 x 4000
6	HC Working Oil Coolers & accessories	NA	1 SET	2100	5000 x 1000 x 1000
7	HC Lube Oil Coolers & i	NA	1 SET	1000	2500 x 600 x 600
8	Recirculation Valve	2	1	1000	1100 x 1100 x 2900
9	Conical Suction Strainer at BFP suction	2	1	1400	4000 x 1200 x 1200
10	Basket type Suction Strainer at BP suction	2	1	2500	1500 x 1500 x 2000
11	MD BFP MOTOR 17500KW	NA	1	43000	5500 x 5000 x 4000

Details of Condensate Extraction Pump (BHEL HYDERABAD)

SL. No.	DESCRIPTION	QTY./UNIT	APPROX. WT. (KGS)	PACKING SIZE (mm) (L x W x H)
1	Condensate Extraction Pump	3	19000	11000 x 3000 x 3000
2	Sole plate	3	1000	2200 x 2200 x 400
3	Canister	3	3400	7600 x 2200 x 2200
4	Basket type Suction Strainer at CEP suction	3	1500	1750 x 1750 x 2000
5	CEP MOTOR 1450 KW	3	10000	3000 (H) X DIA 2100
6	Misc. Integral piping etc.	3 lot	2000	

E) TG-INTEGRAL PIPING (Part of Bought out items of BHEL HWR)

S.No.	TG INTEGRAL PIPING	APPROX. WT. (in MT)
1.	LUBE. OIL PIPING (CS & Alloy)	15
2.	CONTROL FLUID PIPING (Stainless Steel)	17.2
3.	SEAL STEAM PIPING	16
4.	CONDENSATE SPRAY PIPING (CS & Alloy Steel	3.6
5.	TURBINE WATER DRAINAGE PIPING (CS & Alloy Steel)	13
6.	ACW PIPING (OIL & C.F.ROOM)	5
7.	GENERATOR INTEGRAL PIPING—SEAL OIL, P.W. PIPING AND GAS PIPING ETC.	23.7
		93.5

F. Flash Tanks & Vessels, RE-JOINTS, HT Motors, BUTTERFLY VALVES ETC (BHEL BHOPAL)

Sl.NO	DESCRIPTION	PACKAGE SIZE	UNIT WT.(KG)	Remarks
A.	**Flash Tanks**			
1.	HP Drain Flash Tank – 1 No.	3500X3500X5600	7900	
2.	LP Drain Flash Tank - 1 No.	3600X3100X5300	6600	
3.	Steam Drain Flash Tank – 1 No.	2500X2800X3700	3700	
4.	Atmospheric-1 No.	1700Dx1800L	3700	
5.	Boxes for Loose items-6 No.	2000Lx1000Wx1000H	1000	
	Total weight			**27.9 MT**
B.	**Misc. Tanks**			
1.	Clean Oil Tank -2 No.	6400X3100X4500	9500	
2.	Dirty Oil Tank – 2 No.	6400X3100X4500	9500	
3.	Oil unloading Tank – 2 No.	2300X1250X800	600	
4.	DMCW Overhead tank-1 No.	3000x3000x7200	6000	
5.	Alkali Dosing Tank			
	Total weight			**25.6 MT**

C.	**R.E. JOINTS**			**Unit weight(KG)**
1.	Inlet –Pipe Assy. (RH)	1	2600Dx1050L	3000
2.	Inlet –Pipe Assy. (LH)	1	2600Dx1050L	3000
3.	Inlet –Pipe Detail	2	1500Wx3000L	6000
4.	Inlet –Pipe Assy.	2	3200Dx450H	6000
5.	Inlet – Blank Flange Assy.	2	3650Dx125H	8000
6.	Inlet – Bellows	4	2600Dx500H	700
7.	Outlet–Pipe Assy. (RH)	1	2600Dx350H	1800
8.	Outlet–Pipe Assy. (LH)	1	2600Dx350H	1800
9.	Outlet – Pipe Details	2	1500Wx3000L	700
10.	Outlet – Pipe Assy	2	3200Dx450H	700
11.	Outlet–Blank Flange Assy	2	3650Dx125TH	900
12.	Outlet – Bellows	4	2600Dx500H	700
13.	Boxes for loose items	9	2000x1000x1000	1000
	Total weight			**68.8 MT**

D.	**B.F. VALVES**			**Unit weight**
1.	2520 Dia	4	2530Lx3000Wx1110H	10000
2.	800 Dia	6	1030Lx1250Wx415H	1400
3.	700 Dia	2	930Lx1160Wx405H	1200
4.	600 Dia	3	815Lx1000Wx300H	800
5.	500 Dia	8	700Lx865Wx300H	**600**
6.	400/450 Dia	21	600Lx750Wx275H	400
7.	Boxes for loose items	52	700Lx700Wx300H	300
	Total weight			**442 MT**

G. BHEL PEM SUPPLIED BOUGHT OUT PACKAGES
(APPLICABLE FOR PACKAGE A PART I & PACKAGE B PART II)

1.	Misc. Pumps	**Total approximate weight shall be around 200 MT**
	DMCW-TG (3 nos)	
	DMCW-SG (2 nos)	
2.	Sump pumps	
3.	PHEs	
4.	COLTCS	
5.	Simplex strainers	
6.	Debris filter	
7.	Aux. PRDS	
8.	LO Pumps	
9.	Electric Hoists	
10	LP CHEMICAL DOSING & OXYGEN DOSING SYSTEM	
11.	MISC CRANES	
12.	LP valves	
13.	Air Traps	
14.	ME bellows	
15.	Steam traps	
16.	B.F. Valves(steam)	
17.	Angle valves	
18.	Spring loaded By pass valves	

H. BHEL PEM SUPPLIED BOUGHT OUT PACKAGES
(APPLICABLE FOR PACKAGE A PART II & PACKAGE B PART I)

1	DMCW Pumps-TG	**Total approximate weight shall be around 250 MT**
2.	DMCW Pumps-SG	
3.	ACW Pumps booster pumps	
4.	Boiler fill Pumps	
5.	APH wash pump	
6.	Hotwell MU pumps	
7.	Submersible pumps(in TG Hall)	
8.	Submersible pumps(in Transformer yard)	
9.	Sump pumps	
10	PHEs(TG+SG)	
11.	COLTCS	
12.	Self cleaning strainers	
13.	Simplex strainers	
14.	Debris filter	
15.	Aux. PRDS	
16.	Lube oil Pumps	
17.	Electric Hoists & chain pulley block	
18.	LP CHEMICAL DOSING & OXYGEN DOSING SYSTEM	
19.	MISC CRANES	
20	LP valves	
21	Air Traps	
22	ME bellows	
23	Steam traps	
24	B.F. Valves(steam)	
25	Angle valves	
26	Spring loaded By pass valves	

NOTE :

1. The information furnished in this section is only a summary list regarding the major equipment/ item to be erected and commissioned by the contractor. BHEL reserves the right of adding or excluding any components / items / system according to the site requirements / customer requirements to complete various system under the scope of work in all respects.

2. Any other systems / components which are integral to equipment supplied by the manufacturing unit is also to be erected and commissioned by the contractor within the quoted / accepted rate / lump sum value.

3. The above lists is tentative and has been given to enable the contractor to study the nature of work to be done in this contract. There may be variation in size, weight etc. and no claim, whatsoever, will be entertained on account of this by BHEL.

4. Some of the packages may be sent in parts to suit the site condition / transportation, the same is to be assembled site without any extra cost, likewise the package may be assembled together and send as a single assy. Contractor may have to dismantle and erect or, erect as single assembly as per the instruction of BHEL Engineers without any extra cost.

Annexure –II

WEIGHT SCHEDULE FOR PIPING SYSTEM PER UNIT
(Applicable for Both Packages A & B : Part I & II)

A.	TG CYCLE PIPING			
S.No.	PG	MA	Description	Wt in KGS
1	80	329	EXTRACTION STEAM TO BFP DRIVE TURBINE	9100
2	80	331	EXTRACTION STEAM TO LP HEATER-2	6700
3	80	332	EXTRACTION STEAM TO LP HEATER-3	4800
4	80	334	EXTRACTION STEAM TO LP HEATER-4	3000
5	80	335	EXTRACTION STEAM TO DEAERATING HEATER	21600
6	80	336	EXTRACTION STEAM TO HP HEATER NO.1	8000
7	80	337	EXTRACTION STEAM TO HP HEATER-2	5300
8	80	338	EXTRACTION STEAM TO HP HEATER-3	5300
9	80	339	AUX STEAM TO BFD TURBINE	1900
10	80	349	AUX STEAM TO GLAND SEALS - TG SCOPE	1800
11	80	352	AUX STEAM TO UNLISTED USERS - TG SCOPE	2000
12	80	363	EXHAUST STEAM FROM PRIME MOVERS-TG SCOPE	29700
13	80	371	DRAIN FLASH TANK VENT TO CONDENSER	13300
14	80	375	UNLISTED SV EXHAUSTS - TG SCOPE	2200
15	80	379	HPH SV EXHAUST TO FLASH TANK	5200
18	80	382	LP HEATER VENTS	1800
19	80	385	VENT FROM UNLISTED PPG/EQPT TO COND	12200
20	80	388	CONDENSER AIR EVACUATION PIPING	4100
21	80	400	CONDENSATE SUCTION	8700
22	80	401	CD FROM PUMP TO LPH1/DC INLET TEE AND RE	37800
23	80	402	CD FROM LPH1/DC INLET TEE TO TG TP	25700
24	80	403	CD FROM TG TP TO DEAERATING HEATER	13100
25	80	407	CONDENSATE FOR SEALING OF VACUUM	2900
26	80	408	CONDENSATE DUMP FROM HEADER	1100
27	80	412	CONDENSATE TRANSFER	1900
28	80	418	ERECTION MATERIALS FOR INSTRUMENTS	1600
29	80	419	DEAERATOR SAFETY VALVE EXHAUST TO ATM	4600
30	80	420	BOILER FEED PUMP SUCTION	25700
31	80	421	BOILER FEED PUMP RECIRCULATION	62000
32	80	423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	128000
33	80	424	BFD BETWEEN HTRS & GROUP PROTECTION VLV	48000
34	80	433	SPRAY WATER FROM BFP INTERSTAGE	6100
35	80	436	SPRAY WATER TO LPBP DESH	7200
36	80	439	TURBINE FLASH TANK DRAIN TO CONDENSER	1000
37	80	442	GLAND STEAM COOLER DRAINS	500
38	80	443	LP HEATER-1 TO CONDENSER	4900
39	80	444	LP HEATER DRAINS	8100

40	80	446	DEAERATING HEATER OVER FLOW AND DRAIN	5900
41	80	447	HP HEATER DRAINS	18900
42	80	448	DRAIN FROM UNLISTED EQPT/VESSEL-TG SCOPE	11900
43	80	449	TG CYCLE PIPING DRAINS AND VENTS	12500
44	80	457	MANIFOLDS FOR HP FLASH BOX AND CONDENS	2200
45	80	459	HP FLASH TANK DRAIN TO CONDENSER	2100
46	80	463	TG AUX COOLING WATER	91250
47	80	468	MAIN CIRCULATION WATER PIPING	132500
48	80	493	HP FLASH TANK VENT TO CONDENSER	4200
49	80	494	LP FLASH TANK VENT TO CONDENSER	3600
50	80	495	LP FLASH TANK DRAIN TO COND	2900
51	80	601	LOW PRESSURE DOSING PIPING	1000
52	80	610	SERVICE AIR-COMP SUCT & DIS TO RECEIVER	2500
53	80	673	LUBE OIL PIPING SYSTEM	8400
54	80	927	H&S FOR TEMPORARY PIPING - STEAM BLOWING	9000
55	80	928	H&S FOR BOILER LIGHT UP - TG	210000
56	80	930	H&S FOR SYNCHRONISATION - TG	40000
57	80	933	H AND S FOR LP PIPING	25000
58	81	036	CW STORAGE TANK 16-25 CUM	6900
59	81	041	IMPURE CONDENSATE TANK	4100
60	81	060	SPECIAL TANKS AND VESSELS	10000
61	81	110	COOLING WATER PUMP	400
62	81	415	TEST THERMOWELLS	400
63	81	416	PERFORMANCE GUARANTEE TEST MATERIALS	1200
				1133750
			Total for one unit	**1134 MT**
B.			**INSULATION**	
	81	325	MINERAL WOOL MATTRESS	60000
	81	341	SEALING COMPOUND FOR INSL	600
	81	350	ALUMINIUM CLADDING FOR INSULATION	40000
				100600
			Thermal Insulation(PEM supply)	**300000**
			Total for one unit	**401 MT**

NOTE:

a) All the above systems of piping include the erection of pipes, bends, valves, fittings, impulse piping and including root valves, sampling lines, drains, hangers and supports & other accessories so as to make the systems complete in all respect.

b) Above system of piping can be regrouped / renamed or any addition / deletion in the system can be made in order to make system complete as per requirement. No extra cost shall be entertained on this account.

c) The piping systems mentioned above are only indicative and does not cover all the piping systems to be erected / commissioned. Contractors are however required to erect commission all piping systems shown in drawings & other documents which may be necessary for erection, completion & overall commissioning of unit at the accepted unit rates.

Chapter - XI: RATE SCHEDULE

RATE SCHEDULE FOR PACKAGE –A

S.No.	Description of Item	Qty.	UNIT RATE in Rupees	Total Amount (in RS.)
AA	**PACKAGE-A Part I: BARA**			
1	**Lumpsum price** for complete scope of work as per tender specification for items indicated under **Annexure-IA / IC for** 2 **x 660 MW TG** sets at Bara including integral piping, & auxiliaries	**LUMPSUM**		
2	**Rate in Rs / MT** for complete work as per tender specification for **TG piping systems indicated under Annexure-II-Item A**	**2268 MT**		
3	**Rate in Rs / MT** for complete work as per tender specification for insulation & sheeting **indicated under Annexure-II-Item B**	**802 MT**		
4	**Rate in Rs / MT for fabrication** and installation of additional platforms, structures, ladders as per site requirement and which are not indicated in the drawing	**100 MT**		
BB	**PACKAGE-A Part II: LALITPUR**			
5	**Lumpsum price** for complete scope of work as per tender specification for items indicated under **Annexure-IB / IC for** 1 **x 660 MW TG** set including integral piping, & auxiliaries	**LUMPSUM**		
6	**Rate in Rs / MT** for complete work as per tender specification for **TG piping systems indicated under Annexure-III-Item A**	**1134 MT**		
7	**Rate in Rs / MT** for complete work as per tender specification for insulation & sheeting **indicated**	**401 MT**		

	under Annexure-III-Item B			
8	**Rate in Rs / MT for fabrication** and installation of additional platforms, structures, ladders as per site requirement and which are not indicated in the drawing	**50 MT**		
9.	**GRAND TOTAL PRICE For Package A (Part I+II)**			

NOTES:

1. The quantities indicated above are tentative and are liable to vary depending upon the site requirement. The contractor has to handle / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work.

2. Evaluation of bids shall be done on total price of Package A (Part I + Part II) against this Rate Schedule / BOQ.

RATE SCHEDULE FOR PACKAGE –B

S.No.	Description of Item	Qty.	UNIT RATE in Rupees	Total Amount (in RS.)
	PACKAGE-B: Part I: LALITPUR			
1	**Lumpsum price** for complete scope of work as per tender specification for items indicated under **Annexure-IB/IC for** 2 **x 660 MW TG** sets at Bara including integral piping, & auxiliaries	**LUMPSUM**		
2	**Rate in Rs / MT** for complete work as per tender specification for **TG piping systems indicated under Annexure-II-Item A**	**2268 MT**		
3	**Rate in Rs / MT** for complete work as per tender specification for insulation & sheeting **indicated under Annexure-II-Item B**	**802 MT**		
4	**Rate in Rs / MT for fabrication** and installation of additional platforms, structures, ladders as per site requirement and which are not indicated in the drawing	**100 MT**		
	PACKAGE-B: Part II: BARA			
5	**Lumpsum price** for complete scope of work as per tender specification for items indicated under **Annexure-IA/IC for** 1 **x 660 MW TG** set including integral piping, & auxiliaries	**LUMPSUM**		
6	**Rate in Rs / MT** for complete work as per tender specification for **TG piping systems indicated under Annexure-II-Item A**	**1134 MT**		
7	**Rate in Rs / MT** for complete work as per tender specification for insulation & sheeting **indicated under Annexure-II-Item B**	**401 MT**		

8	**Rate in Rs / MT for fabrication** and installation of additional platforms, structures, ladders as per site requirement and which are not indicated in the drawing	**50 MT**		
9.	**GRAND TOTAL PRICE For Package B (Part I+II)**			

NOTES:

1. The quantities indicated above are tentative and are liable to vary depending upon the site requirement. The contractor has to handle / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work.

2. Evaluation of bids shall be done on total price of Package B (Part I + Part II) against this Rate Schedule / BOQ.

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ BARA & LALITPUR/TG/853

FOR

ERECTION ,TESTING, COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF STEAM TURBINE, GENERATOR AND ITS AUXILIARIES & PIPING ETC. FOR UNIT NO.1, 2&3 AT 3X660 MW PSTPP OF PPGCL AT BARA ,ALLAHABAD , U.P. & UNIT NO. 1, 2&3 AT 3X660 MW LALITPUR TPS OF LPGCL AT LALITPUR ,U.P.

PART- II OF TCC

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301 (INDIA)

PART-II

Sl	DESCRIPTION	Chapter No.	PAGES
	Part-II: Technical Specifications		
1.	GENERAL	Chapter-I	
2.	CIVIL WORKS, FOUNDATION, GROUTING	Chapter-II	
3.	ERECTION	Chapter-III	
4.	WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT	Chapter-IV	
5.	APPLICATION OF INSULATION	Chapter-V	
6.	PAINTING INCLUDING FINISH PAINTING	Chapter-VI	
7.	TESTING, PRE-COMMISSIONING, COMMISSIONING, A POST-COMMISSIONING	Chapter-VII	

PART- II
Chapter - 1: GENERAL

1.0 GENERAL

1.1 The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / lump sum price shall deem to be inclusive of all such contingencies.

1.2 The contractor shall carry out the work in accordance with standard practices / codes / instructions / drawings / documents / specification supplied by BHEL from time to time.

1.3 The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during execution. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be affected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.

1.4 Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices.

1.4.1 Provision as required of all types of labour, supervisors, engineers, watch and ward, tools & tackles, calibrated inspection, measuring and test equipments as specified and otherwise required for the work, consumables for erection, testing and commissioning including material handling.

1.4.2 Proper out-turn as per BHEL’s plan and commitment

1.4.3 Completion of work as per BHEL Schedule.

1.4.4 Good quality and accurate workmanship for proper performances of equipment.

1.4.5 Repair and rectification

1.4.6 Preservation / Re-conservation of all components during storage / erection till handing over.

1.4.7 HOUSE KEEPING-The contractor is supposed to carryout house keeping of the work area on regular basis to keep the work place neat and tidy and available for the SAFE Working. The scrap, generated daily during the Execution activities, is to be dumped at designated area as decided by BHEL/ PPGCL on daily basis. The erection materials issued to the contractor and kept near the work area should also be staged properly at site. Compliance report on above shall be submitted by the

contractor to BHEL on Daily basis. In case the contractor fails to do so, BHEL have rights to carryout the same from the other party at the Risk and cost of the contractor. The cost applicable with BHEL overheads shall also be recovered from the monthly running bills of contractor.

1.5 PRELIMINARY WORKS

1.51 The contractor shall, as a first field activity check the foundations for turbine, generator and all auxiliaries for the correctness of the same as per the drawings and satisfy himself in all aspects. He should ensure location of foundations, their consolidation, absence of voids, levels, correctness of boltholes, pockets levels and centerlines etc. All measurements should be recorded and submitted to Engineer for approval before erection

1.52 Before starting erection job, contractor shall ensure that TG area is sufficiently enclosed against ingress of dust and water, and all debris have been cleared off from the floor to a designated area as per instruction of Engineer. The contractor shall arrange to get the working area and surroundings cleaned daily to ensure a dust free atmosphere for working.

Contractor shall first cover all openings on operating floor and put temporary hand railings on all sides of the floor to avoid any accident to the personal working. Material for above work, if available can be issued by BHEL on returnable basis.

1.53 The contractor shall provide his tool stores for special tools and instruments at a convenient location near to the place of working in TG hall. Necessary area shall be provided to contractor by BHEL. This is to be cleared after completion of the work. If so required he will have shift the same if required to give fronts to other agencies engaged at site.

1.54 The contractor shall set up longitudinal and transverse axes and two or more level bench marks accurately on TG floor. BHEL Engineer shall certify these. The certified TG-Center lines and datum level shall be the reference for TG and all auxiliaries' erection and alignment work. The contractor shall transfer these axes to all the floors to facilitate further execution.

1.55 All matching surfaces of components shall be well cleaned with cleaning agent and burrs shall be removed by filing and blue matched wherever required. Wherever necessary sealing/ lubricating/ anti-seize compounds shall be applied as per recommendation of Engineer. Machining/ grinding required for fitting of keys, pins, packers & dowels etc. shall be carried out by contractor at his cost. The contractor is expected to have his own arrangements for machining activities.

1.56 The accuracy of all equipment/ instruments and their functioning shall be established before they are permitted for use on the job. If the Engineer doubts the accuracy of the precision tools, any time during erection, the contractor shall arrange the checking/ calibration of tools/ equipment/ instruments at his cost.

2.0 CIVIL WORKS, FOUNDATION, GROUTING

2.1 BHEL shall provide all equipment foundations. For the correctness of these foundations as per drawings, the contractor shall check the dimensions & locations of the foundations, pockets, anchor-bolt pitch. Further, top elevation of foundations shall be checked with respect to benchmark. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 50 mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.

2.2 While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with prussian blue to get the required contact with frames.

2.3 The contractor shall ensure perfect matching of packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer. If required the packer plates may have to aligned and fixed on the foundations using special high strength, non-shrinking and quick-setting grouts. The minimum thickness below the packer plate should be 20 mm. The material required for this has to be arranged for by the contractor at his cost.

2.4 FOR Package A part I & Package B Part II:

The Grouting of BFP, TG and other equipments will have to be carried out by the Contractor. The contractor has to arrange for all materials required for carrying out the grouting except supply of the Special Grout as indicated in the drawings and as approved by the Engineer. Cement for grouting will be provided by customer M/s PPGCL.

FOR Package A part II & Package B Part I:

The Grouting of BFP, TG and other equipments will have to be carried out by the Contractor. The contractor has to arrange for all materials required for carrying out the grouting including the supply of the Special Grout as indicated in the drawings and as approved by the BHEL Engineer. **Although supply and application of approximately 20 MT of approved Non- Shrink Grout per unit has been envisaged, the contractor will be required to supply and apply actual quantity as per the site requirement without any extra cost.**

2.5 The contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor

2.6 The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.

2.7 Besides grouting as above, any civil works required for safe and efficient operation of tools and tackles like grouting / excavation/ casting of foundation / anchor points for derricks, winches, guy ropes fastening, etc / foundations required for chemical cleaning pumps, tanks and any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement and required facilities will have to be arranged by contractor at his own cost.

Chapter - III: ERECTION

3.0 ERECTION

3.1 All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include,

- Scaffolding and rigging operations,
- Machine / flame / electric cutting, grinding, welding, radiography and stress relieving
- Fitting, filing, straightening, chamfering chipping, scrapping, reaming, as cleaning, checking, leveling, blue matching, aligning and assembly.
- Machining, surface grinding, drilling, doweling, shaping.
- Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication.

3.2 Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost.

3.3 No members of any ladder / structure / platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / customer without any additional cost.

3.4 The contractor shall erect scaffolding / temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion & removed from work site.

3.5 Corrections like straightening of ladders, tube support plates adjustment / removal of ovulates in pipes and opening or closing the fabricated bends of piping to suit the layout shall be considered part of the work and the contractor is required to carry out such work within finally accepted price / rate as per instructions of Engineer.

3.6 The contractor shall carry out assembly and erection of condenser components normally on the condenser foundation directly. This includes

- Assembly and welding of bottom plate, side plates, hot well, springs and steam throw device.
- Complete fabrication and welding of shell out of loose side-walls dome walls, and stand pipes.
- Assembly and welding of water chambers and water-boxes.
- Assembly and welding of support plates, baffles and stiffening structure,
- Tubes insertion, expansion and cutting/ trimming.

Hydraulic test and water fill test and any other fitting/ assemblies required to complete the assembly.

3.7 The contractor shall carry out the condenser tube insertion and expansion at site after the installation of condenser on its foundation. Condenser tubes shall be handled strictly as per instructions of BHEL Engineer. Before installation of tubes, the contractor shall check for any dents, mechanical damages or any other defects of tubes caused during storage. These should be thoroughly internally and externally cleaned for all extraneous matter as per the directions of the engineer.

3.8 Before insertion of tubes, the contractor shall clean the surface of the holes in the main tube plates and tube support plates for paint, corrosion spots oxide scale etc. as per the instructions of the engineer. Even reaming of support plates if required for smooth insertion of tubes is to be carried out by contractor at his cost and reaming and its arrangement is to be arranged by contractor.

The contractor shall carry out the tube insertion & expansion of the condenser strictly in accordance with the instructions issued by the engineer. Tubes may require adjustment of length on both ends. The contractor shall ensure to provide covering above the top row of tubes to avoid any damage to the tubes prior to tube insertion as per instruction of BHEL Engineer at his cost.

3.9 The contractor shall carry out the condenser neck welding with casing only after final installation of casing. However the contractor shall adjust the gap between condenser neck and LP exhaust hood uniformly by suitably lifting the condenser as directed by engineer. Also the makeup pieces required for this purpose shall be fabricated and welded to the dome walls by the contractor.

3.10 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

3.11 Erection of platform and supporting structures around FST / Deaerator is covered in the scope of contract and shall be erected by the contractor within the quoted rate

3.12 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

3.13 Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with petrol or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the

dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.

3.14 All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary by dismantling and refitting before erection. If, in the opinion of Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.

3.15 All the shafts of rotating equipment shall be properly aligned to those of the matching equipment to as perfect and as accurately as practicable. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

3.16 All the motors and equipment shall be suitably doweled after alignment of shafts with tapered/parallel machined dowels. The contractor at his own cost shall arrange for the machining of dowel pins required for the same. However the materials for dowel pins shall be issued by BHEL free of cost.

3.17 The bearings shells will be blue matched at site and checked for bearing clearances. The contractor shall carry out scraping of bearing housing, if required to any extent. No extra claim for blue matching of any two surfaces up to 1mm initial gap will be entertained. The contractor shall also check air gap and adjustment of stator/ rotor to magnetic center shall be carried out as part of erection.

3.18 The contractor shall fabricate and weld pipes, special bends, as required for installing lube oil systems. The contractor shall also service the lube oil system, carry out the hydraulic test of oil coolers and piping systems as required.

3.19 The contractor as part of the scope of work if required or if directed by BHEL shall carry out the servicing and realignment of skid-mounted equipment.

3.20 All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR value, before they are installed and energized. Bearings, slip rings commutators and other exposed parts shall be protected against ingress of moisture and corrosion during storage and periodically inspected.

3.21 The contractor shall completely erect and test all the piping systems including their hangers, supports, valves, insulation, and accessories including sampling lines and coolers as per specifications and drawings. The services will include welding, pre-heating, stress relieving, bolting, testing, cleaning insulation and painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings

3.22 Most of the pipes shall be supplied un-fabricated in running lengths without beveling. It shall be responsibility of contractor to carry out fabrication by cutting to size, bevel / prepare edges, fabricate support pads, drill holes for drains, vents and other stubs, welding, carryout NDT & SR as per site requirement & as directed by BHEL. Pipes

sent in standard length shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends upto 80 mm nb will be fabricated at site wherever required.

3.23 The connection to the pipes terminal points including edge preparation, fit-up, welding applicable NDE etc are in the scope of work. Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh at no extra cost. Minor adjustment like removal of ovality in pipes is in the scope of work. All drains / vents / relief tubes / escape pipes / air relief valves/ safety valve/ piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc from the piping and equipments erected by the contractor is completely covered in the scope of work.

3.24 Certain adjustments in length may be necessary while erecting high-pressure pipelines. The contractor should remove the extra lengths/ add extra lengths to suit the final layout after preparing edges a fresh by adopting specified heat treatment procedures, at no extra cost.

3.25 It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.

3.26 The contractor shall be responsible for any modifications of shop fabricated pipes prior to installation to accommodate minor site alteration in pipe routing at no extra cost

3.27 All vents and drains for piping equipment covered in the scope whether shown in the drawings or not, shall be terminated outside the TG hall in atmosphere and at sump-pit as directed by the engineer.

3.28 Wherever piping erected by the contractor is connected to equipment/ piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor of this specification.

3.29 Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like `T' pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes/valves for welding.

3.30 The valves will have to be checked, cleaned or overhauled (including lapping of seat) in full or in part before erection and/or after chemical cleaning and during commissioning.

3.31 The contractor shall be responsible for correct orientation of all valves so that seats, stems & hand wheels are in desired direction. It is the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.

3.32 Steel for suspensions for piping, will be supplied in running lengths. These are to be cut to suitable sizes and adjusted as per requirement.

3.33 No temporary supports should be welded on the piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases heat treatment, if required, shall be carried out by the contractor

3.34 All hangers, supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and erected by the contractor. The raw materials required for fabricating such supports shall be supplied by BHEL free of cost and contractor shall be eligible for payment of such additional supports as per applicable rate for item No 5 of rate schedule.

3.35 Spring suspensions/ constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrestors / lockers etc., have to be carried out as and when required.

3.36 Contractor shall install piping in such a way that no excessive or destructive expansion forces exist either in the cold condition or under conditions of maximum temperature and pressure. All bends, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.

3.37 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The procedure to be followed, the tools and the equipment deployed shall be subject to the approval of Engineer. All the torque wrenches shall be calibrated as per requirement and before they are put in use on any job.

3.38 The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer. The contractor shall inspect the hangers associated with the piping systems as follows:

- After hydraulic test, with the piping in the cold position, with all travel stops removed, with the pipe completely insulated and complete in all respect ready for start up.
- Piping in the hot position with the unit operating at the maximum load.
- Piping in the cold position during the first complete shut down.

3.39 The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Separate temporary supports shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the building structure.

3.40 Layout of small bore piping as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above

pipelines even after completion of erection or from aesthetic point of view. Contractor at no extra cost should carry this out.

3.41 Erection, testing and commissioning of power cylinders, electrically operated valves and their actuators etc. coming under various groups is covered under the scope of this specification

3.42 All valves, including valves, flap valves, dampers and actuators, shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates

3.43 The contractor shall also or grind the valve seat, if required, to ensure satisfactory performance of valves at no extra cost. All parts such as gaskets, gland packing which form the permanent part of equipment shall be supplied by BHEL free of cost.

3.44 Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermo-wells, valves, battery of first root valves, condensing vessels, flow nozzles and control valves to be provided on TG, auxiliaries and pipe lines covered within the scope of this specification, will also be the responsibility of the contractor. The welding of all the above items will be contractor's responsibility even if the:

- Product groups, under which these items are released, are not covered in the scope of this tender.
- Items are supplied by any agency other than BHEL.

NOTE: ADDITIONAL THERMOWELLS AS REQUIRED FOR CONDUCTANCE OF THE PERFORMANCE GUARANTEE TEST ARE TO BE INSTALLED BY THE CONTRACTOR.

3.45 Erection of CO_2 and H_2 systems complete in all respects, including cylinders stands, connecting piping, valves, distribution headers, main control panels etc is in the scope of contractor. The delivery gas cylinders is to be taken from BHEL / its client stores, their handling and filling of gases in the system as and when required, till unit is commissioned and handed over, shall be the responsibility of the contractor. The empty cylinders are to be returned to BHEL/its client stores.

3.46 Additional platforms and ladders of permanent nature incidental to the job for approaching different equipment / valves as per site requirement, which may not be indicated in drawings, shall be fabricated and installed by the contractor. The materials required will be supplied by BHEL free of cost. The contractor will be eligible for payment for such additional platform and ladders at the rate applicable rate against item No. 5 of the rate schedule.

3.47 The contractor shall carry out Kerosene oil / dye penetration tests of all the bearing housing of turbine & generator. The Kerosene oil DPT kit for the tests shall also be arranged by the contractor at his cost.

3.48 The contractor is strictly prohibited in using the TG / Aux. Components for any temporary supporting or scaffolding woks etc. In case of such misuse a sum of determined by Engineer will be recovered from contractor’s bills

3.49 The calibration of skid mounted instruments shall be arranged by BHEL through other agency engaged for C&I. Contractor will be informed by BHEL engineer about the details of C&I agency. The contractor shall coordinate with the C&I agency for removal, calibration and re-installation of the instruments. Though C&I agency will remove and reinstall the instruments after calibration, the contractor for this package will maintain the list of all the instruments removed & reinstalled. Instruments prior to removal and after reinstallation shall be considered in custody of the contractor for this package. All instruments such as pressure gauges/ temperature gauges, switches etc. forming part of product group (PG) are under the erection scope of this contract and shall be installed and commissioned by the contractor of this package at no extra cost to BHEL, however the calibration of these instruments shall be done by C&I agency as above

3.50 The feed storage tank will be received in 3 pieces and is to be assembled, welded and tested at site. Besides the provisions under T&P Clause, all other arrangements for erection of feed storage tank and deaerator has to be made by contractor with in their finally accepted price

3.51 The contractor shall assist BHEL in preparation of as built piping drawing.

4.0 WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

4.1 The equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.

4.2 Welding of equipment, piping, high tensile structural steel shall be done by certified high pressure welders who posses valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for high-pressure works.

4.3 All welders like structural and high pressure welder shall be tested as per ASME section IX / IBR and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid IBR certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

4.4 Engineer may stop any welder from the work if his performance is unsatisfactory for any reason or if there is a high percentage of rejection in the joints welded by him. The welder having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

4.5 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor’s expense. The Engineer, prior to any repair being made, shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the engineer.

4.6 The contractor shall carry out the root run welding of all HP / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.

4.7 All expenses for testing of contractor's welders including destructive and nondestructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of raw material required for making test pieces will be supplied by BHEL free of cost.

4.8 The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.

4.9 **Only BHEL/ CUSTOMER approved electrodes and filler wire are to be arranged and used by the contractor, within the finally quoted price.** BHEL/ UPRVUNL reserve the right to test from the certified lab of approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number/ batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved/ accredited test house traceable to National/ International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same.

4.10 All butt / fillet welds shall be subject to dye penetration test as per the instructions of the engineer at no additional cost.

4.11 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to 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 other wise of the welds shall be final.

4.12 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer.

4.13 All welds shall be painted with anticorrosive red oxide paint once radiography and stress reliving works are over. Necessary consumables and scaffolding etc including paints shall be provided by contractor at his own cost.

4.14 Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.

4.15 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like

asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. The contractor should take a note of the following,

- Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
- All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.

The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of SR operations.

4.16 The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test/Ultrasonic testing etc. as required as per welding schedules / drawings within the finally accepted price / rates.

4.17 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.

4.18 Contractor for radiography work shall use iridium-192/cobalt-60/any other source as may be required/ specified. The geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).

4.19 Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0.

4.20 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.

4.21 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.

4.22 Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification.

4.23 The joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld.

4.24 For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.

4.25 Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by

Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.

4.26 All arrangements for carrying out radiography work including dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.

4.27 The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories.

4.28 Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out

4.29 All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer.

4.30 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC / DRP certificate to be provided before taking up the work.

4.31 Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.

4.32 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.

4.33 However, if the defect persists after first repair, further repair work followed with 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 contractor's cost.

4.34 If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.

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

4.36 The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules.

4.37 The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.

4.38 Check shots as per the requirement of BHEL/ customer will be taken at the contractor's cost.

5.0 APPLICATION OF INSULATION

5.1 All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length. Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work.

5.2 The mineral wool mattresses (bonded / un-bonded) / LRB mattresses are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.

5.3 The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec.

5.4 The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing.

5.5 The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important.

5.6 It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions. Closed / semi closed sheds or any other arrangements required for this will by him at his cost. If any damage occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.

5.7 Aluminum sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets, crowning the sheets if necessary will be carried out by him. Two coats of anti-corrosive black bituminous paint are to be applied on inner surfaces of the cladding. Bitumen sealing compound on the joints if necessary is included in the scope of this work. **Contractor may note that he will also supply anti-corrosive black bituminous paint & bituminous sealing compound required for above works at his cost.**

5.8 Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractors responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract.

5.9 A logbook shall be maintained by the contractor to obtain clearance for application of insulation. If the contractor does the work on his own accord without prior permission the area may have to be redone at his cost.

5.10 Contractor is liable for the exact accounting of the material issued to him and he shall make any unaccountable losses good. Wastage allowance for the material issued are as below:

1. Wool / LRB mattresses and cladding sheets 2%
2. Insulation bricks and mortar 2%
3. Castable refractory 1%

5.11 The entire surplus, unused materials etc., supplied by BHEL shall be returned to BHEL after the work is over. Materials like gunny bags and packing materials, empty containers may be returned at periodical intervals.

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

5.13 If during erection and commissioning any of the parts are to be insulated temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature the same may necessitate removal and re-application of insulation and sheet metal cladding, which shall be done by the contractor and the erection rate quoted shall be inclusive of such contingencies.

5.14 Removable type of insulation shall be provided for valves, fittings, expansion joints etc as per the drawings or as directed by BHEL Engineer.

5.15 All temporary pipelines required during testing, pre-commissioning and commissioning should be insulated as directed by BHEL at no extra cost to BHEL. However required insulation material shall be issued by BHEL free of cost.

6.0 PAINTING INCLUDING FINISH PAINTING

6.1 All exposed metal parts of the equipment, structure, auxiliaries, piping, and other items (covered within the scope of this contract) after installations are to be painted after thoroughly cleaning the dust, rust, scales, grease, oil and other foreign materials by wire brushing, scrapping and any other method approved by BHEL Engineer.

Mostly the equipment / components installed are with one coat each of primer paint and synthetic enamel / heat resistant paint. However, due to aging, the same may have got deteriorated for peeled off. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL. The same will be inspected and approved by the engineer before painting.

6.2 After applying the primer paints all structure / equipment / items, shall be finish painted with two coats of alloyed resin machinery enamel paints as specified by BHEL engineer. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish is achieved. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer.

6.3 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.

6.4 Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job site shall be permitted only at times and locations approved by Engineer.

6.5 Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for finish painting. Paint is to be BHEL approved make only and painting should be as per colour scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work. No paint whose shelf life has expired should be used for painting.

6.6 The contractor may be required to fill up dents / marks by applying putty before final painting of equipment. All materials and arrangements have to be made within quoted lump sum price/rates.

6.7 The contractor shall provide legends with direction of flow on equipment and piping in size specified by Engineer. Letter writing shall be done in Hindi / English or in both languages.

6.8 The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work.

6.9 The contractor shall ensure availability of

- Ford Cup-4 to measure consistency of paint,
- Automatic magnetic gauge to measure the dry film thickness and
- SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.

6.10 All paints should be stored in well-ventilated store. The painters and other personnel deployed should use proper protective equipment to avoid inhalation of fumes.

6.11 CONDENSER PAINTING

6.11.1 The condenser main tube plates will be dispatched to site from the works with surface protection only on water box side. The same shall be removed adopting one of the suitable methods indicated elsewhere in this specification. The contractor shall do the surface protection of these tube plates after the completion of the tube insertion and expansion activities. The surface shall be first painted with at least two or more coats of approved quality chemical resistant epoxy zinc chromate primer after thoroughly cleaning all such parts of al dirt, rust scales greases, oils and other foreign materials by adopting suitable methods as approved by BHEL. Afterwards the above parts shall be finished with two or more coats of approved quality high build black coal tar coating. Before the painting is taken up, the contractor shall plug all the holes with suitable tapered plastic / wooden plugs to avoid any damage to the tube ends. The plastic / wooden plugs and paints required for the above operations shall have to be arranged by the contractor at his cost. The above paints are also to be applied on water chamber / box. The thickness is to be confirmed by suitable measurement.

6.11.2 The condenser steam space shall be surface protected with at least two coats of suitable steam washable paint. Before the painting is taken up, the contractor shall clean the surfaces to be coated by adopting suitable methods. The contractor at no extra cost shall procure paint to BHEL

7.0 TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING

7.1 The contractor shall carry out the following tests & activities for commissioning of Steam Turbine Generator & its auxiliaries:

(1) TRIAL RUN OF FEED PUMPS, CEP, AND VARIOUS ROTATING MACHINERIES / PUMPS.

(2) TRIAL RUN OF MOTORS/ DRIVES FOR VARIOUS AUXILIARIES.

(3) HYDRAULIC TEST OF PIPELINES, CLOSED SYSTEMS, TANKS AND VESSELS.

(4) FLUSHING OF ALL PIPELINES BY AIR/OIL/WATER/STEAM AS THE CASE MAY BE.

(5) SERVICING OF ALL VALVES AND FITTINGS.

(6) MANUAL/ MECHANICAL CLEANING OF OIL TANKS, DEAERATOR, FST, SUCTION STRAINERS /FILTER ELEMENTS OF CEP, BFP, BOOSTER PUMP AND OTHER VARIOUS EQUIPMENTS ANDTANKS ERECTED BY THE CONTRACTOR. THIS MAY HAVE TO BE REPEATED SEVERAL TIMESDURING THE COMMISSIONING PROCESS.

(7) CHEMICAL CLEANING OF PIPING SYSTEMS, DEAERATOR AND FST AS PER REQUIREMENT.CONTRACTOR SHALL CARRY OUT DISASSEMBLY AND REASSEMBLY OF VULNERABLECOMPONENTS LIKE DEAERATOR SPRAY NOZZLES, GAUGES, INSTRUMENTS ETC. ASINSTRUCTED BY BHEL DURING THIS PROCESS.

(8) PUTTING TURBINE ON BARRING GEAR.

(9) ROLLING AND SYNCHRONISATION.

(10) FULL LOAD OPERATION.

(11) TRIAL OPERATION

These would also include hydraulic test of condenser, land flow test, chemical cleaning, alkali flushing and water flushing of piping, oil flushing of oil system etc. as instructed by BHEL.

All the chemicals required for carrying out these activities will be supplied by BHEL free of cost.

All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications.

Specialized test equipment, if any, shall be provided by BHEL / its client free of hire charges. However contractor has to take proper care of the equipment issued to him.

7.2 The contractor shall carry out the air-tightness test on assembled generator to the satisfaction of BHEL Engineer. The necessary arrangement for testing with dry-clean air shall be made by the contractor at his cost. Compressed air for testing can be taken by the contractor from the existing system

7.3 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall repairs all joints (shop welded or site welded) failed during testing.

7.4 All items / material required for conducting hydraulic test, Detergent flushing, oil flushing, steam blowing etc., will be supplied by BHEL / its customer.

While the Detergent cleaning operation including the required looping in piping , draining and disposal will be carried out by another agency , the Contractor will have to ensure the readiness and availability of CEP , associated systems and the piping which is to be cleaned . Any work required on the permanent system will have to be carried out by the Contractor.

All temporary piping along with their supports for steam blowing in the systems erected by the Contractor, and the required loops for chemical cleaning of the piping erected by the contractor will have to be erected within the quoted rates.

For completing the chemical cleaning contractor may have to do some temporary piping /welding will be in the scope of work.

The Contractor will also be responsible for their installation wherever required. He will dismantle the total system and return the same to BHEL / their customer store as directed. No separate payment will be released for erection & dismantling of the required equipment & piping.

7.5 Thermal shocks will be required during oil flushing operations. The contractor is required to make all arrangements for the same. This would include fabrication of heating tank with nozzles and requisite piping with supports. Complete erection with pumps, tanks, electrical fittings including and other accessories is to be carried out. All material and equipment will be provided on returnable basis by BHEL.

7.6 The scope of pre-commissioning activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning, steam blowing or for any other tests as the case may be and will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the off site disposal of effluents

7.7 All arrangement required for steam blowing including removal, reinstallation and welding of CRH NRV and installation of steam blowing arrangements including steam blow off piping is included in the scope of work.

7.8 It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement.

7.9 The pre-commissioning activities will start prior to oil flushing of the TG and various trials, commissioning operations shall continue till the TG is handed

over to customer. Simultaneous commissioning checks, activities will be in progress in various areas like trial run of various equipment, checking of equipment erected, making ready for trial runs, filling up of lubricants, Chemicals etc.
All these works need specialised gangs including electricians, instrument technicians, fitters, in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted. The mobilisation of these commissioning gangs shall be sufficient so that planned commissioning activities are taken up in time and also completed as per schedule and the work is to be undertaken round the clock if required.

Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

7.10 It shall be specifically noted that the employees of the contractor may have to work round the clock along with BHEL/Customer Engineers and hence overtime payment by the contractor may be involved. The contractor's finally accepted rates/ price shall be inclusive of all these factors also.

7.11 In case, any rework is required because of contractor’s faulty erection that is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle/open up the equipment / part and reassemble / redo the work without any extra claim.

7.12 During commissioning, opening / closing of valves, changing of gaskets, realignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. This is included in the scope of work.

7.13 The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on al piping equipment covered in the specification at no additional cost.

7.14 The water boxes of the condenser will be tested hydraulically to 1.5 times the design pressure after its assembly at site. The arrangement of all the blanking for carrying out the hydraulic test shall be the responsibility of the contractor at no additional cost. However only the main blanking flanges with fasteners for CW inlet and CW outlet of the condenser shall be provided by BHEL free of cost. Fabrication of blanks will be carried out by the contractor.

7.15 The water-fill test of the steam space shall be carried out by filling the water upto 1 Meter or as required above the top row of tubes to facilitate leak detection. Hydraulic testing shall be carried out on the condenser water boxes. Dummy plates shall be provided by BHEL.

7.16 The contractor shall fill the condenser upto the specified level as many times as called for by the Engineer for checking of the turbine at no additional cost

7.17 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment including repair, rectification and replacement work are necessary, the contractor shall carry out the same as per Engineer's instructions. The parts to be replaced shall be provided by BHEL.

7.18 During hydraulic testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.

7.19 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced.

7.20 Cleaning & servicing of all the filters / strainers, toppings of oils coming in the system shall be done by the contractor till the completion of trial operation and handing over of the unit within the quoted price .

7.21 The contractor shall incorporate all the changes / decisions proposed by BHEL Engineer at no additional cost.

DRAWING NO. PE-DG-350-100-M006

CUSTOMER'S DRAWING NO.

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM

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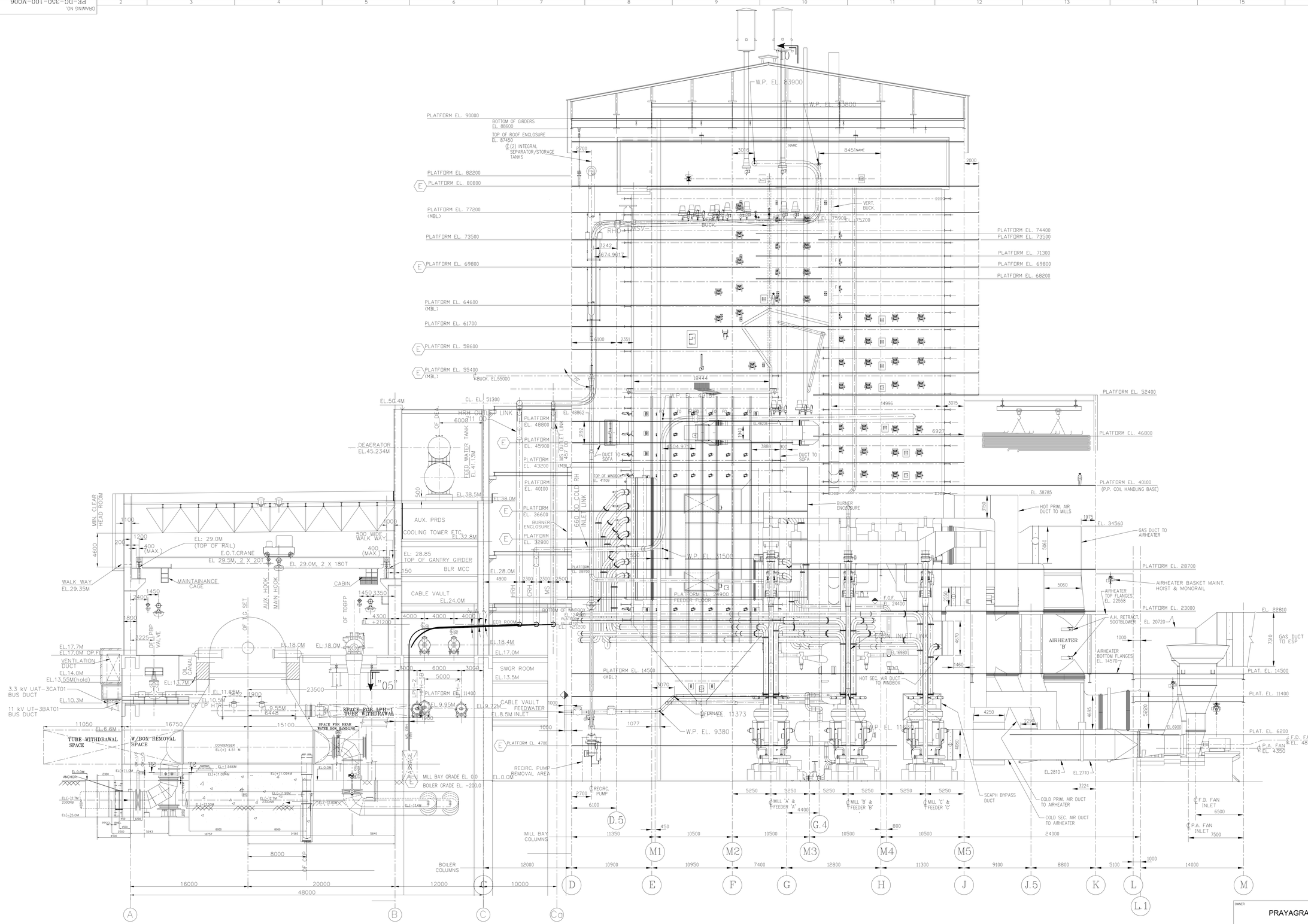
COMPUTER FILE NAME: 350_100_M006_SH1_R3



REV	DATE	ALTD	CHD	APPD

REV	DATE	ALTD	CHD	APPD
3	25.11.10	RC	RM	SKA

1. DRAWING REVISED AS PE THE MOM HELD ON 08 & 09.11.10 AT TCE OFFICE BANGALORE.

REV	DATE	ALTD	CHD	APPD
2	24.09.10	RC	RM	SKA

1. C/W ROUTING HAS BEEN MODIFIED.

REV	DATE	ALTD	CHD	APPD
1	08.08.10	RC	RM	SKA

1. TCE COMMENTS RECEIVED VIDE REF. NO. TCE.5871A-BHEL-PEM -004 AND TCE.5871A-CV-BHEL (PEM)-VDT-001 INCORPORATED.

OWNER
PRAYAGRAJ POWER GENERATION COMPANY LIMITED

CONSULTANT
TATA Consulting Engineers Limited
MUMBAI

PROJECT
PRAYAGRAJ STPP AT BARA (U.P.)
PHASE I : 3 X 660 MW

CONTRACTOR
BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

JOB NO.	350
STATUS	CONTRACT
DISTRIBUTION	
TO	
No.OF	

DEPT		NAME	SIGN	DATE
CODE	DRN	RC	-sd-	03-06-10
M	DSN	RC	-sd-	03-06-10
	CHD	RM	-sd-	03-06-10
	APPD	SKA	-sd-	03-06-10

TITLE
MAIN PLANT CROSS SECTION

DEPT.	SCALE	DRAWING NO.
SIGN		PE-DG-350-100-M006
DATE		SHEET 01 OF 01 REV 3

SIZE-A0

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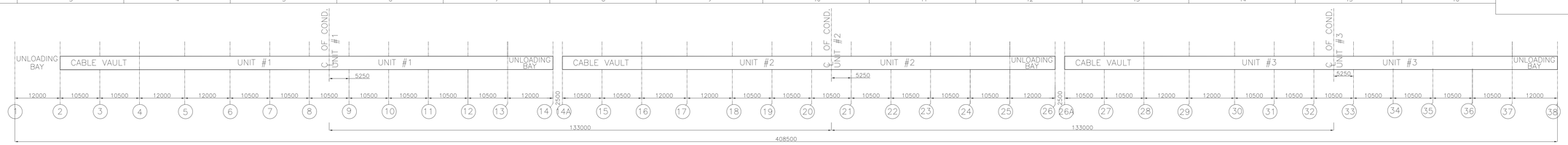
DRAWING NO. PE-DG-350-100-M002

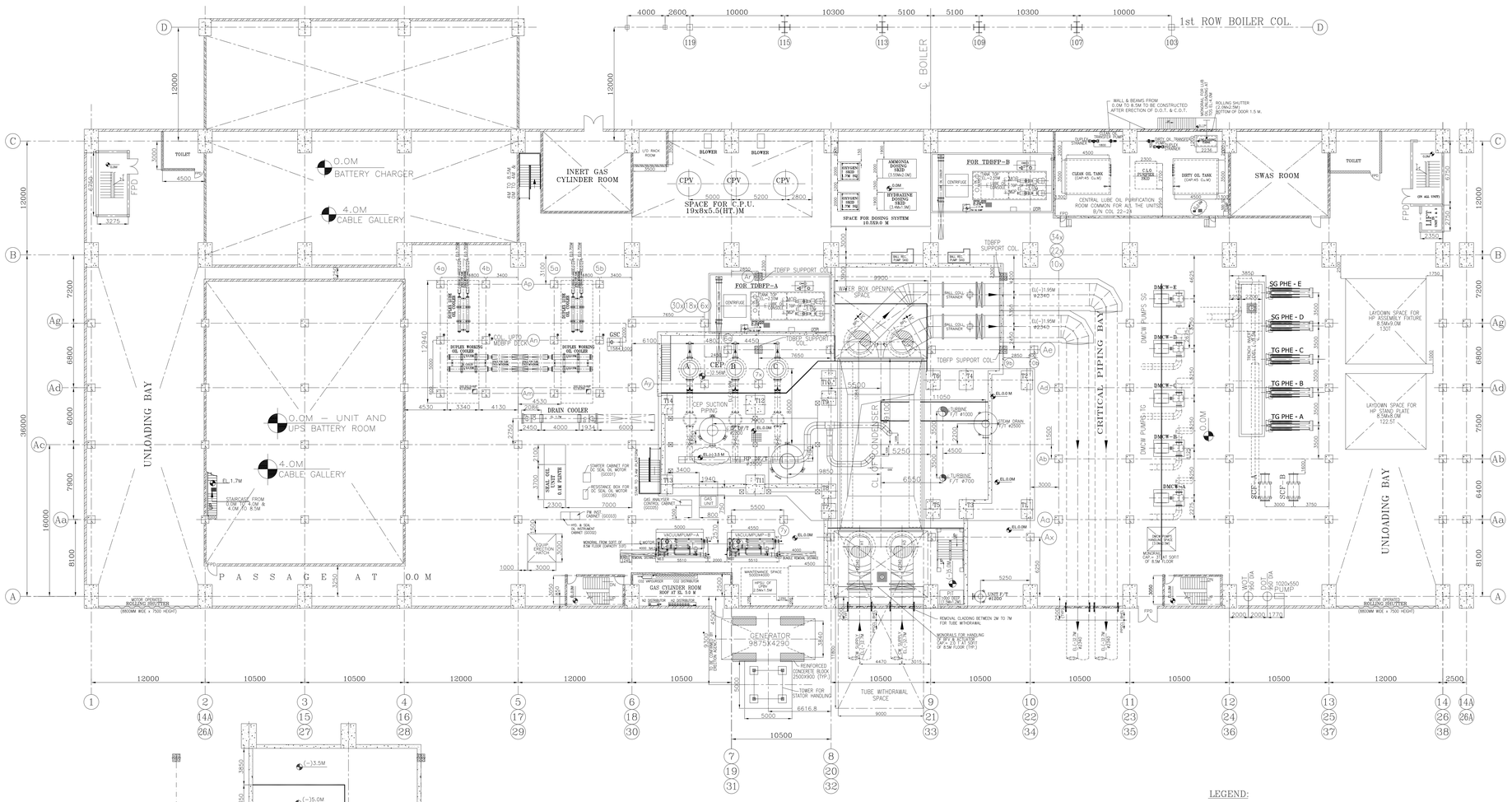
CUSTOMER'S DRAWING NO.

FIRST ANGLE PROJECTION — ALL DIMENSIONS ARE IN MM

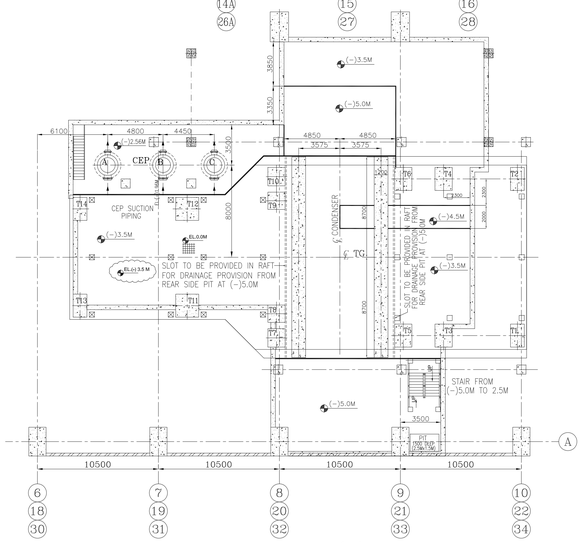
N



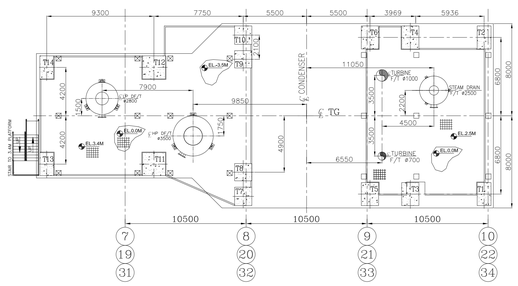
TG BUILDING KEY PLAN



PLAN AT EL. 0.0 M



PLAN AT EL (–)3.5M
IN TG FOUNDATION AREA



PLAN AT EL 2.5M/3.4M
IN TG FOUNDATION AREA
(DETAIL –'A')

REFERENCE DRAWINGS:

1.	EQUIPMENT PLAN AT 8.5M & 12.0M	PE-DG-350-100-M003
2.	EQUIPMENT PLAN AT 17.0M	PE-DG-350-100-M004
3.	EQUIPMENT PLAN AT 24.0M,32.8M & 38.0M	PE-DG-350-100-M005
4.	CROSS SECTION OF MAIN PLANT	PE-DG-350-100-M006
5.	CONDENSER ASSEMBLY	01601070059 C179 (HWR)
6	TG FOUNDATION ARRANGEMENT	12679-9801111 (HWR)
7.	GLAND STEAM CONDENSER	01620570014 C179 (HWR)
8	FOUNDATION DETAILS OF GEN. AUXILIARY EQUIPMENTS	– (HWR)
9.	FOUNDATION ARRANGEMENT OF CEP	HY-DG-1–18100–57156 (HYD)
10.	GENERAL ARRANGEMENT OF DRAIN COOLER	– (HWR)
11.	FOUNDATION DETAILS OF HPSU (FOR IV, ESV & OV)	3–13100–U1105 (HWR)
12.	FOUNDATION DETAILS OF HPSU (LPBP VALVE)	3–13100–U1106 (HWR)
13.	VACUUM PUMP	– (HWR)
14.	G.A. OF CENTRAL OIL PURIFICATION UNIT	– (HWR)
15.	PLOT PLAN OF TDBFP	– (HYD)
16.	GA OF HP DRAIN F/T	– (BPL)
17.	GA OF LP DRAIN F/T	– (BPL)
18.	GA OF STEAM DRAIN F/T	– (BPL)
19.	GA OF UNIT F/T	– (BPL)
20.	G. A. OF CLEAN OIL TANK	0–17052–40223 (BPL)
21.	G. A. OF DIRTY OIL TANK	0–17052–40224 (BPL)
22.	ARRAGT. & ASSY. OF OIL UNLOADING VESSEL	0–17052–40357 (BPL)
23.	UNIT AIR RECIVER	– (PEM)
24.	CPU SKID	– (PEM)
25.	GA OF DOSING SKID	– (PEM)

NOTES

1. ALL DIMENSIONS ARE IN MM'S AND LEVELS ARE IN METRES.
2. ALL ELEVATIONS INDICATED IN THE DRG. ARE W.R.T. POWER HOUSE GROUND FLOOR ELEVATION AS 0.00M. EL 0.00M CORRESPONDS TO RL (+)129.50M
3. EQUIPMENTS SHOWN IN THIS DRAWING WHICH ARE NOT COVERED UNDER TG PACKAGE ARE INDICATIVE ONLY.
4. EQUIPMENTS & FACILITIES SHOWN FOR PACKAGES OTHER THAN TG PACKAGE ARE SUGGESTIVE ONLY HOWEVER IT IS PREFERRED THAT SIMILAR DETAILS BE ENSURED FORM RESPECTIVE PACKAGE VENDORS.
5. LIFT IS TO BE PROVIDED ONLY IN UNIT NO. 1 and 3.
6. CHEQUERED PLATE, ABLE TO TAKEUP THE LOAD OF 10 TONS(BFV) IS TO BE GIVEN ON CW PIT.

LEGEND:

- CHEQUERED PLATE FLOORING
- REMOVABLE CHEQUERED PLATE
- GRATED FLOORING
- REMOVABLE GRATING
- CONCRETE BLOCK
- HAND RAILING
- PARAPET WALL
- GLASS PARTITION
- CUT OUTS
- BRICK WALL

PROGRESS DRAWING
AS ON 21.06.2011

REV	DATE	ALTD	CHD	APPD
3A	21.02.11	VK	RC/BKA	AO
1.	PROGRESS DRAWING.			

REV	DATE	ALTD	CHD	APPD
3	25.11.10	RC	SJ/– RM	SJ/– SKA
1.	DRAWING REVISED AS PE THE MOM HELD ON 08 & 09.11.10 AT TCE OFFICE BANGALORE.			

REV	DATE	ALTD	CHD	APPD
2	24.09.10	RC	RM	SKA
1.	CW RETURN ROUTING AND AUXILIARY COLUMNS LOCATION IN ROW 10x REVISED.			

REV	DATE	ALTD	CHD	APPD
1	08.08.10	RC	RM	SKA
1.	TCE COMMENTS RECEIVED VIDE REF. NO. TCE.5871A–BHEL–PEM –004 AND TCE.5871A–CY–BHEL (PEM)–VDT–001 INCORPORATED.			

OWNER: PRAYAGRAJ POWER GENERATION COMPANY LIMITED

CONSULTANT: TATA Consulting Engineers Limited, MUMBAI

JOB NO. 350
STATUS CONTRACT
DISTRIBUTION
TO
No.OF

PROJECT: PRAYAGRAJ STPP AT BARA (U.P.)
PHASE I : 3 X 660 MW

CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD, POWER SECTOR, PROJECT ENGINEERING MANAGEMENT, NOIDA

DEPT CODE		NAME	SIGN	DATE
M	DRN	RC	–sd–	11/06/10
	DESN	RC	–sd–	11/06/10
	CHD	RM	–sd–	11/06/10
	APPD	SKA	–sd–	11/06/10

TITLE: TG EQUIPMENT LAYOUT AT 0.0M

DEPT. | SCALE | DRAWING NO. PE-DG-350-100-M002
SIGN
DATE | SHEET 01 OF 01 | REV 3A

SIZE–A0

COMPUTER FILE NAME: 350_100_M002_R3A

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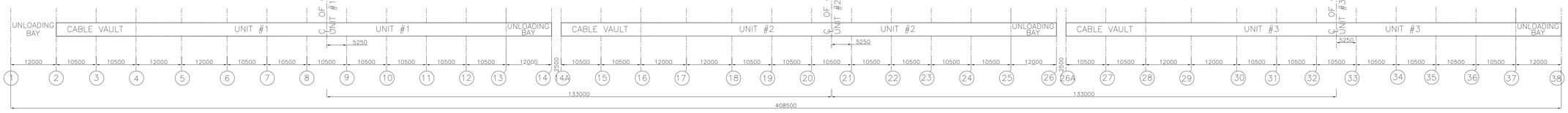
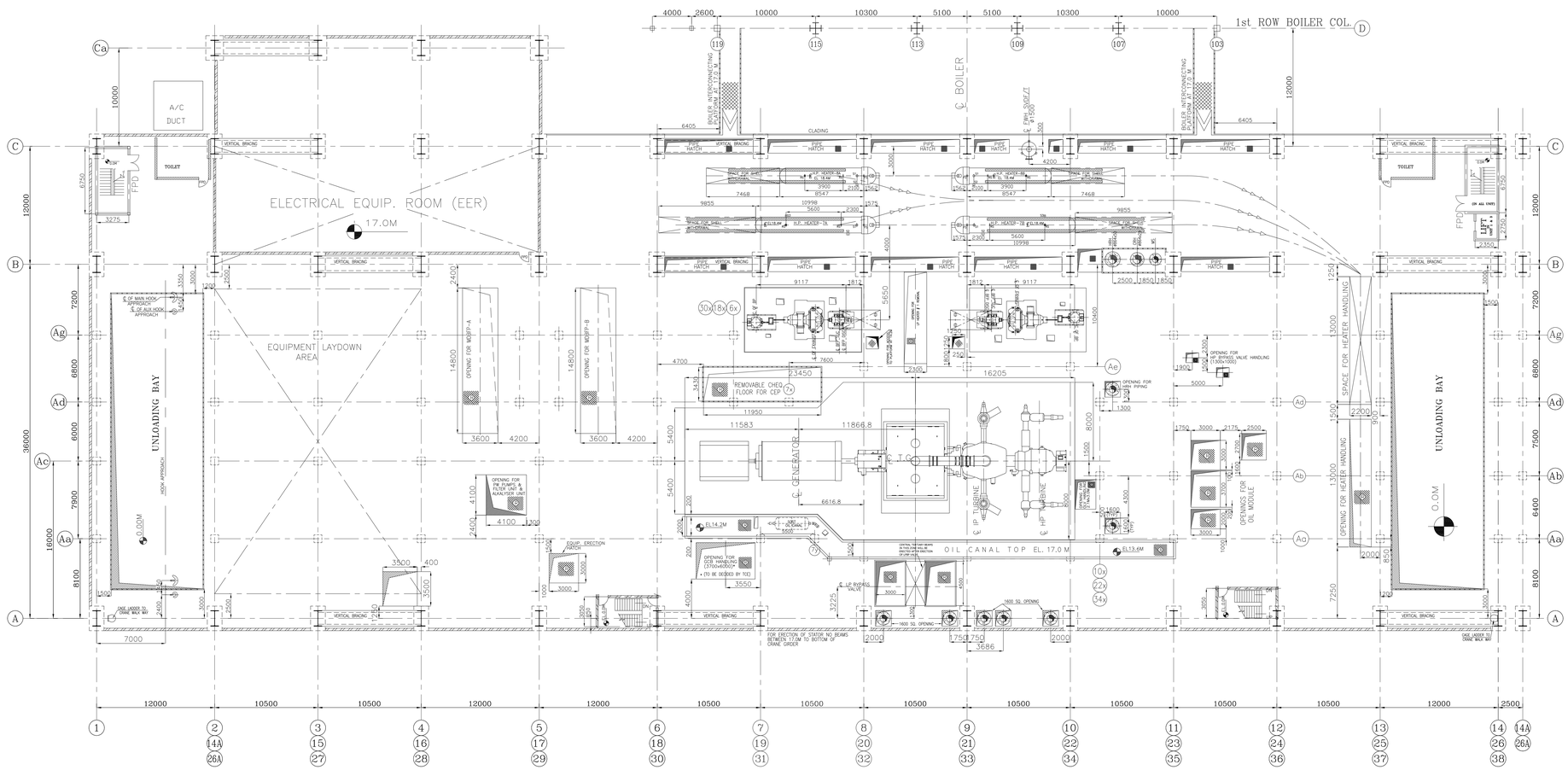
DRAWING NO. PE-DG-350-100-M004

CUSTOMER'S DRAWING NO.

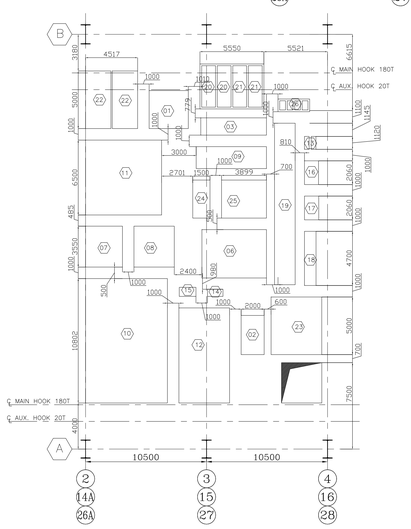
FIRST ANGLE PROJECTION — ALL DIMENSIONS ARE IN MM

N





PLAN AT EL. 17.0M



EQUIPMENT LAYDOWN DETAIL

DETAIL OF LAY-DOWN SPACE FOR TG COMPONENTS.

R.No	DESCRIPTION	WT.IN Kg	AREA M x M
(01)	HP OUTER CASING (EXHAUST PART)	25000	3.4 X 3.3
(02)	HP INNER CASING UPPER HALF	17000	3.4 X 2.0
(03)	HP SHAFT	20000	5.5 X 1.3
(04)	HP STAND PLATE (LOCATED AT 0.0M FLOOR)	122500	8.0 X 8.5
(05)	HP ASSEMBLY FIXTURE (LOCATED AT 0.0M FLOOR)	130000	9.0 X 8.5
(06)	IPT OUTER CASING UPPER HALF	35000	5.6 X 4.2
(07)	IPT INNER CASING UPPER HALF	30000	3.55 X 3.2
(08)	IPT INNER CASING LOWER HALF	35000	3.55 X 3.5
(09)	IP SHAFT	32000	5.9 X 1.7
(10)	LP OUTER CASING UPPER HALF	46000	10.8 X 7.1
(11)	LP INNER CASING II UPPER HALF	58000	6.6 X 6.5
(12)	LP SHAFT	120000	8.05 x 4.2
(13)	LP SHAFT SEAL CASING (TE & GE)	500 x 2	0.405 x 1.12
(14)	PEDESTAL COVER-HP(BEARING CASING HP FRONT)	600	1.344 x 0.62
(15)	PEDESTAL COVER HP-IP(BEARING CASING HP REAR	1000	1.45 x 0.79
(16)	PEDESTAL COVER IP-LP(BEARING CASING IP REAR)	2300	2.06 x 1.215
(17)	PEDESTAL COVER LP-GE(BEARING CASING LP REAR)	2500	2.06 x 1.235
(18)	GUIDE BLADE CARRIER ASSEMBLY LP STAGE 2-3 (UPPER PART, LEFT & RIGHT)	7000 x 2	4.7 x 1.0
(19)	GENERATOR ROTOR WITH BASE FRAME	80000	14.020 x 1.79
(20)	END SHIELD UPPER & LOWER HALF (ES)	8000 x 2	1.2 x 3.6
(21)	END SHIELD UPPER & LOWER HALF (TS)	8000 x 2	1.2 x 3.6
(22)	HYDROGEN COOLER (2 NOS. TWIN TYPE)	10000 x 2	5.0 x (2.2+2) = 5.0 x 4.4
(23)	HYDROGEN COOLERS HOUSING	19000	5.0 x 4.4
(24)	SLIP RING SHAFT ASSLY.	8500	3.3 x 1.5
(25)	COVER FOR SLIP RING ASSLY.	3000	3.9 x 3.3
(26)	BEARING SHELLS (TS&ES-UPPER & LOWER HALF)	500 x 4	0.5 x 0.8

NOTES

1. ALL DIMENSIONS ARE IN MM'S AND LEVELS ARE IN METRES.
2. ALL ELEVATIONS INDICATED IN THE DRG. ARE W.R.T. POWER HOUSE GROUND FLOOR ELEVATION AS 0.00M. EL 0.00M CORRESPONDS TO RL (+)129.5M
3. EQUIPMENTS SHOWN IN THIS DRAWING WHICH ARE NOT COVERED UNDER TG PACKAGE ARE INDICATIVE ONLY.
4. DIMENSIONS OF AUXILIARY BUILDINGS SHOWN IN THIS DRAWING ARE TENTATIVE. ACTUAL DIMENSION WILL BE FURNISHED DURING DETAIL ENGINEERING STAGE.
5. EQUIPMENTS & FACILITIES SHOWN FOR PACKAGES OTHER THAN TG PACKAGE ARE SUGGESTIVE ONLY HOWEVER IT IS PREFERRED THAT SIMILAR DETAILS BE ENSURED FORM RESPECTIVE PACKAGE VENDORS.

REFERENCE DRAWING:

1.	EQUIPMENT PLAN AT 0.0M	PE-DG-326-100-M002
2.	EQUIPMENT PLAN AT 8.5M	PE-DG-326-100-M003
3.	EQUIPMENT PLAN AT 24.0M,32.8M & 38.0M	PE-DG-326-100-M005
4.	CROSS SECTION OF MAIN PLANT	PE-DG-326-100-M006
5.	GENERAL ARRANGEMENT OF HP HEATER No. 7A	- (HYD)
6.	GENERAL ARRANGEMENT OF HP HEATER No. 7B	- (HYD)
7.	GENERAL ARRANGEMENT OF HP HEATER No. 8A	- (HYD)
8.	GENERAL ARRANGEMENT OF HP HEATER No. 8B	- (HYD)
9.	FOUNDATION PLAN	- (HWR)
10.	GENERAL ARRANGEMENT OF TD BFP SET	- (HYD)
11.	GA OF STEAM DRAIN F/T	- (BPL)
12.	OIL CANAL DETAIL	- (HWR)
13.	LAYDOWN SPACE FOR GENERATOR COMPONENTS	- (HWR)
14.	LAYDOWN SPACE FOR STEAM TURBINE COMPONENTS	- (HWR)
15.	OIL ROOM ARRANGEMENT	- (HWR)
16.	LP BYPASS ARRANGEMENT	- (HWR)

LEGEND:

- CHEQUERED PLATE FLOORING
- REMOVABLE CHEQUERED PLATE
- GRATED FLOORING
- REMOVABLE GRATING
- CONCRETE BLOCK
- HAND RAILING
- PARAPET WALL
- GLASS PARTITION
- CUT OUTS
- BRICK WALL

PROGRESS DRAWING AS ON 21.02.2011

REV	DATE	ALTD	CHD	APPD
3A	21.02.11	VK	RC/BKA	AG
3	25.11.10	RC	Sd/-RM	Sd/-SKA
2	24.09.10	RC	Sd/-RM	Sd/-SKA
1	08.08.10	RC	Sd/-RM	Sd/-SKA

1. PROGRESS DRAWING.
1. DRAWING REVISED AS PE THE MOM HELD ON 08 & 09.11.10 AT TCE OFFICE BANGALORE.
1. AUXILIARY COLUMNS LOCATION IN ROW 10x HAS BEEN REVISED.
1. TCE COMMENTS RECEIVED VIDE REF. NO. TCE.5871A-BHEL-PEM -004 AND TCE.5871A-CY-BHEL (PEM)-VDT-001 INCORPORATED.

OWNER: PRAYAGRAJ POWER GENERATION COMPANY LIMITED

CONSULTANT: TATA Consulting Engineers Limited, MUMBAI

JOB NO. 350
STATUS CONTRACT
DISTRIBUTION
TO
No.OF

PROJECT: PRAYAGRAJ STPP AT BARA (U.P.)
PHASE I : 3 X 660 MW

CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD, POWER SECTOR, PROJECT ENGINEERING MANAGEMENT, NOIDA

DEPT CODE		NAME	SIGN	DATE
M	DRN	RC	-sd-	11/06/10
	DESN	RC	-sd-	11/06/10
	CHD	RM	-sd-	11/06/10
	APPD	SKA	-sd-	11/06/10

TITLE: TG EQUIPMENT LAYOUT AT 17.0M

DEPT. | SCALE | DRAWING NO. PE-DG-350-100-M004
SIGN | DATE | SHEET 01 OF 01 | REV 3A

SIZE-A0

COMPUTER FILE NAME: 350_100_M004_R3A

DRAWING No. 01390001375

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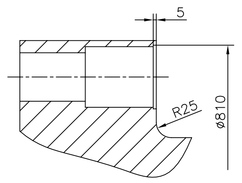
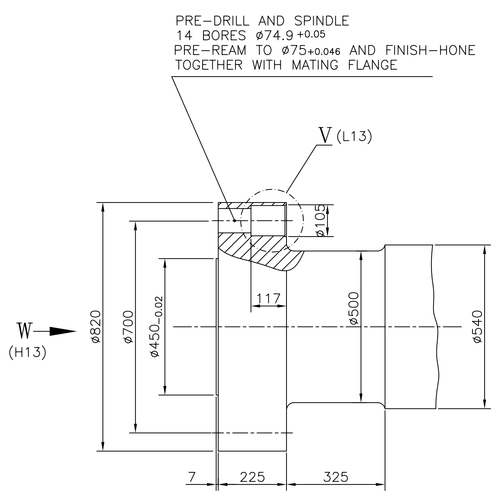
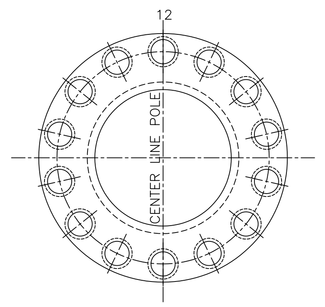


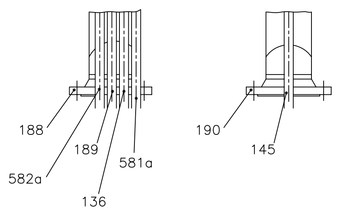
DETAIL V (K14)
(SCALE 1:5)



COUPLING SECTION
(STANDARD COUPLING 700X14)
(SCALE 1:10)

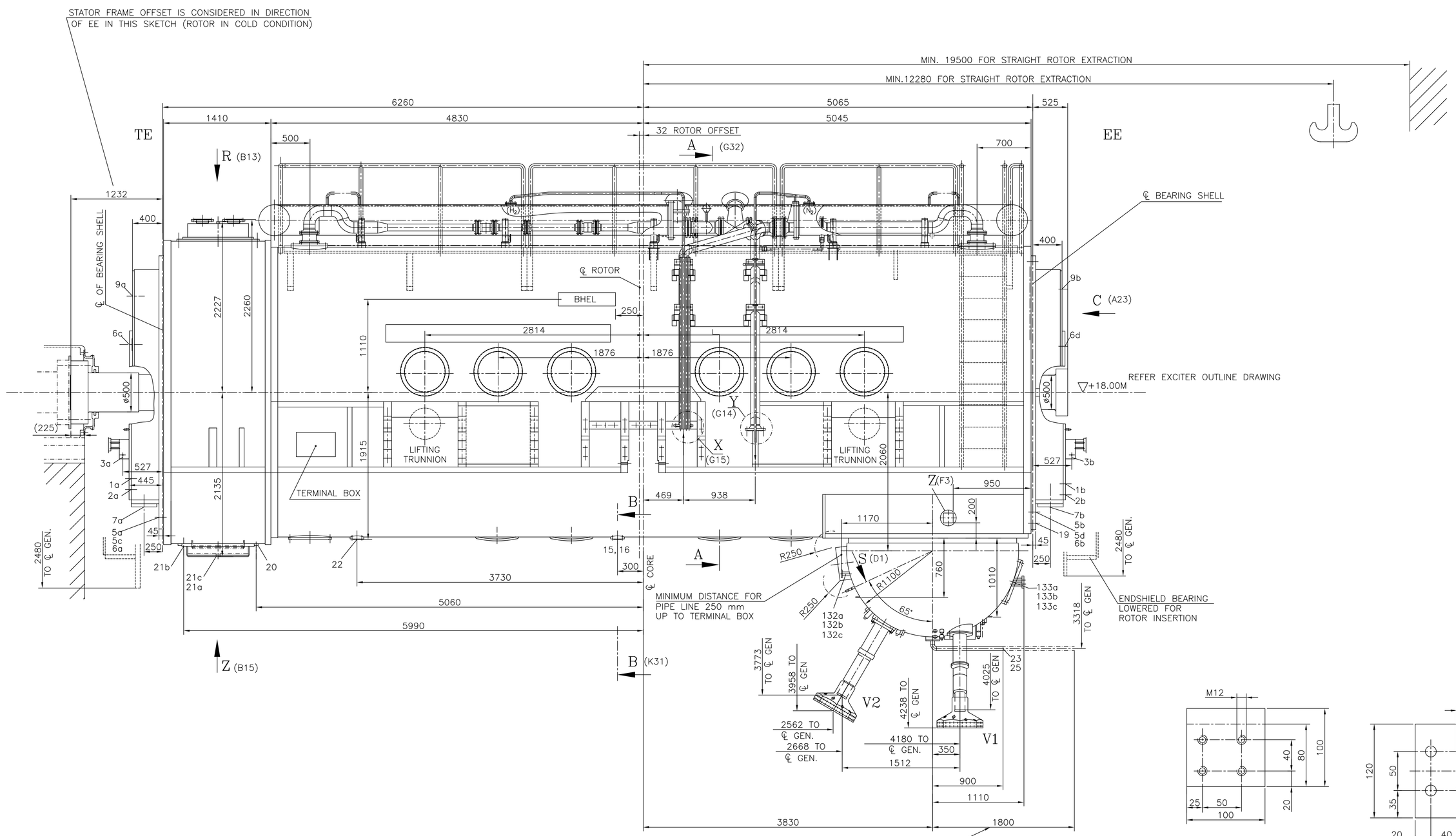


VIEW W (J16)
(SCALE 1:10)



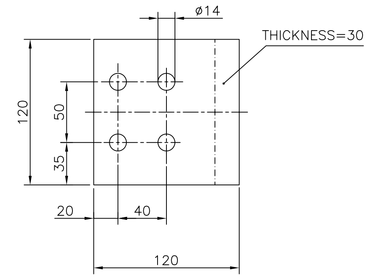
DETAIL X (H7)
(SCALE 1:10)

DETAIL Y (H6)
(SCALE 1:10)

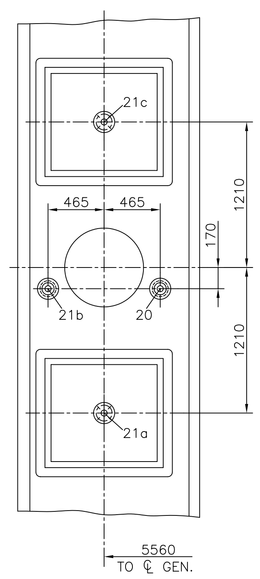


DETAIL Z (H5)
(SCALE 1:2.5)

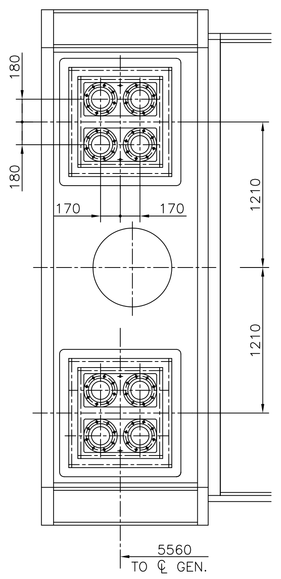
CONNECTION FOR GENERATOR GROUNDING (AT BOTH SIDES)
TIN OUTER SURFACE
THICKNESS=20



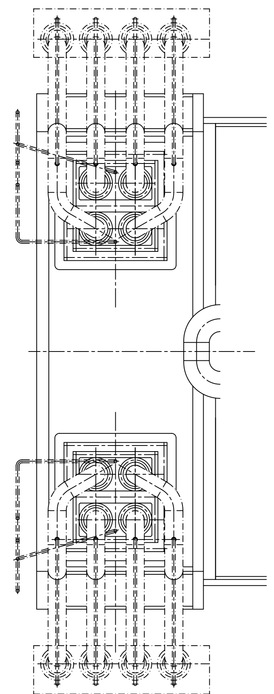
VIEW S (H6)
(SCALE 1:2.5)



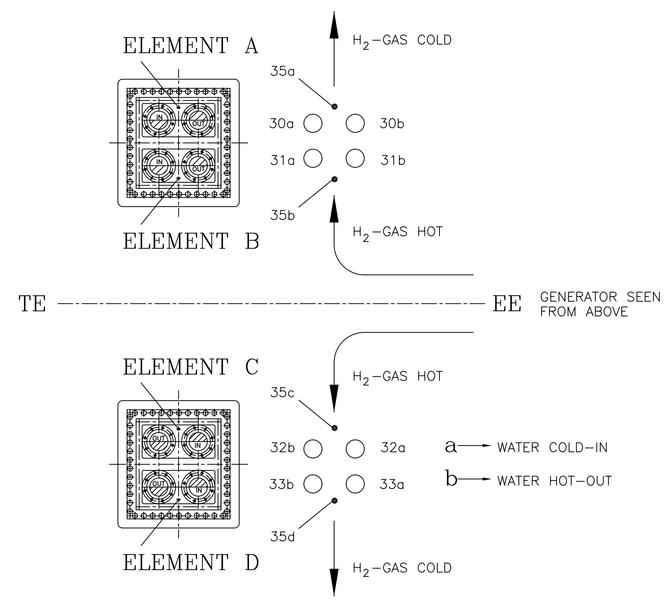
VIEW Z (G10)



VIEW R (L10)



VIEW P (M19)
(TURNED)



INTERFACES AT H_2-COOLER

DRAWN CONDITION:

AFTER ROTOR ASSEMBLY AT AMBIENT TEMPERATURE, OFFSET OF STATOR=32MM.

DESIGNATION OF PHASE TERMINALS U1,V1,W1 AND OF CORRESPONDING NEUTRAL POINT TERMINALS U2,V2,W2.
GENERATOR FIELD ROTATES CLOCKWISE AS SEEN FROM TE.
TERMINAL VOLTAGE GETS ITS MAXIMUM IN SEQUENCE U1,V1,W1.

NOTES

1. THIS DRAWING CONTAINS DESIGN DIMENSIONS ONLY.
2. AXIAL THRUST DUE TO THERMAL EXPANSION OF THE GENERATOR ROTOR AND TURBINE SHAFT AS WELL AS ROTOR OFFSET HAVE BEEN APPROXIMATELY TAKEN INTO CONSIDERATION.
3. ASSEMBLY SHOULD TAKE PLACE ACCORDING TO "AXIAL & RADIAL ROTOR CLEARANCES" DRAWING.
4. COUPLING BOLTS ARE PART OF TURBINE SCOPE OF DELIVERY. DRILL COUPLING HOLES AS PER DRILL JIG. HONING OF COUPLING HOLE IS IN TURBINE SCOPE OF DELIVERY.
5. ROTOR BODY IS NOT AXIALLY GUIDED IN THE BEARINGS (RIGID COUPLING GUIDANCE IN TURBINE BEARING).
6. AT COOLING WATER FLANGES 30A TO 33A AND 30B TO 33B, A LOAD OF 5kN MAX. VERTICALLY AND 4kN MAX. HORIZONTALLY IS ALLOWED. ALLOWABLE BENDING MOMENT 1.4kNm MAX., TORQUE 3kNm MAX., PER COOLER FLANGE.

TYPE	: THDF 115/67
RATING	: 777MVA/660MW
VOLTAGE	: 21 KV
CURRENT	: 21362 A
COSϕ	: 0.85
FREQUENCY	: 50 Hz
OPERATING SPEED	: 3000 RPM
H_2 PRESSURE	: 5.0 bar
ROTOR CURRENT	: 5710 A
ROTOR VOLTAGE	: 463 V

OIL AMOUNT REQUIREMENT PER GEN. BEARING : 5.86 litre/sec.
OIL PRESSURE BEFORE BEARING CONNECTION : 0.5 BAR
JACKING OIL PRESSURE WITH UN-LIFTED SHAFT (Pe) : 102 KG/CM²
JACKING OIL PRESSURE AFTER LIFTING : 97 KG/CM²
JACKING OIL FLOW (COMBINED REQUIREMENT FOR BOTH BEARINGS AT 45°C) : 0.3 litre/sec.

GAS VOLUME OF GENERATOR	: 85 M³
WEIGHT OF STATOR INCLUDING ENDSHIELD, COOLERS AND TERMINAL BOX	: 369 MT
WEIGHT OF ROTOR	: 75 MT
MAXIMUM CRANE LOAD WITH COOLER HOUSING, TERMINAL BOX & WITH LIFTING TRUNNIONS	: 326MT

GRADE OF UNTOL.DIM	
M/CG.-℄/M/F	AA0230208
WELDING-K/B/E/℄	AA0621104
GAS CUTTING-T3	AA0621101

GMS No./ —	C.B.O.M —	STATUS OF DRG
AGREED DEPT	NAME	SIGN	DATE

REV	DATE	ALTERED / CHECKED
REV	DATE	ALTERED / CHECKED
REV	DATE	ALTERED / CHECKED

OWNER: PRAYAGRAJ POWER GENERATION COMPANY LIMITED.
CONSULTANT: TATA CONSULTING ENGINEERS LIMITED
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: PRAYAGRAJ SUPER THERMAL POWER PROJECT
BARA, 3x660MW (PHASE-I), ALLAHABAD DISTRICT, U.P.
BOILER TURBINE GENERATOR (BTG) PACKAGE AND STATION C&I

BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR

	NAME	SIGN	DATE	NO. OF VAR
DRN	ASHISH	-sd-	17.06.10	—
CHD	R.C.S.	-sd-	17.06.10	—
APPD	RAKESH KR.	-sd	17.06.10	—

DEPT	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
TGE	NTS	—	—	—	—

CODE 4133

TITLE : GENERATOR OUTLINE

CARD CODE 7 22 23 24

DRAWING NO. 01390001375

SHEET No. 01 | No. OF SHEETS 02

A0 SIZE

REF.DRAWING No. | SIGN & DATE | INVENTORY No.

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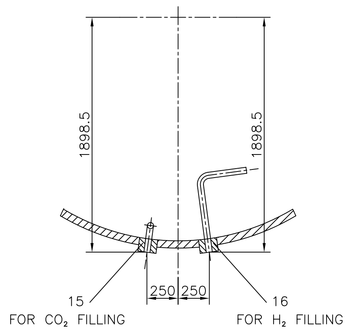
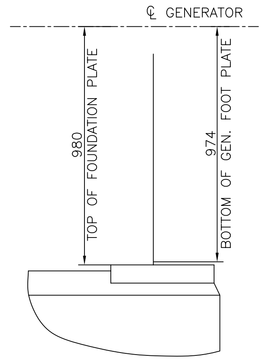
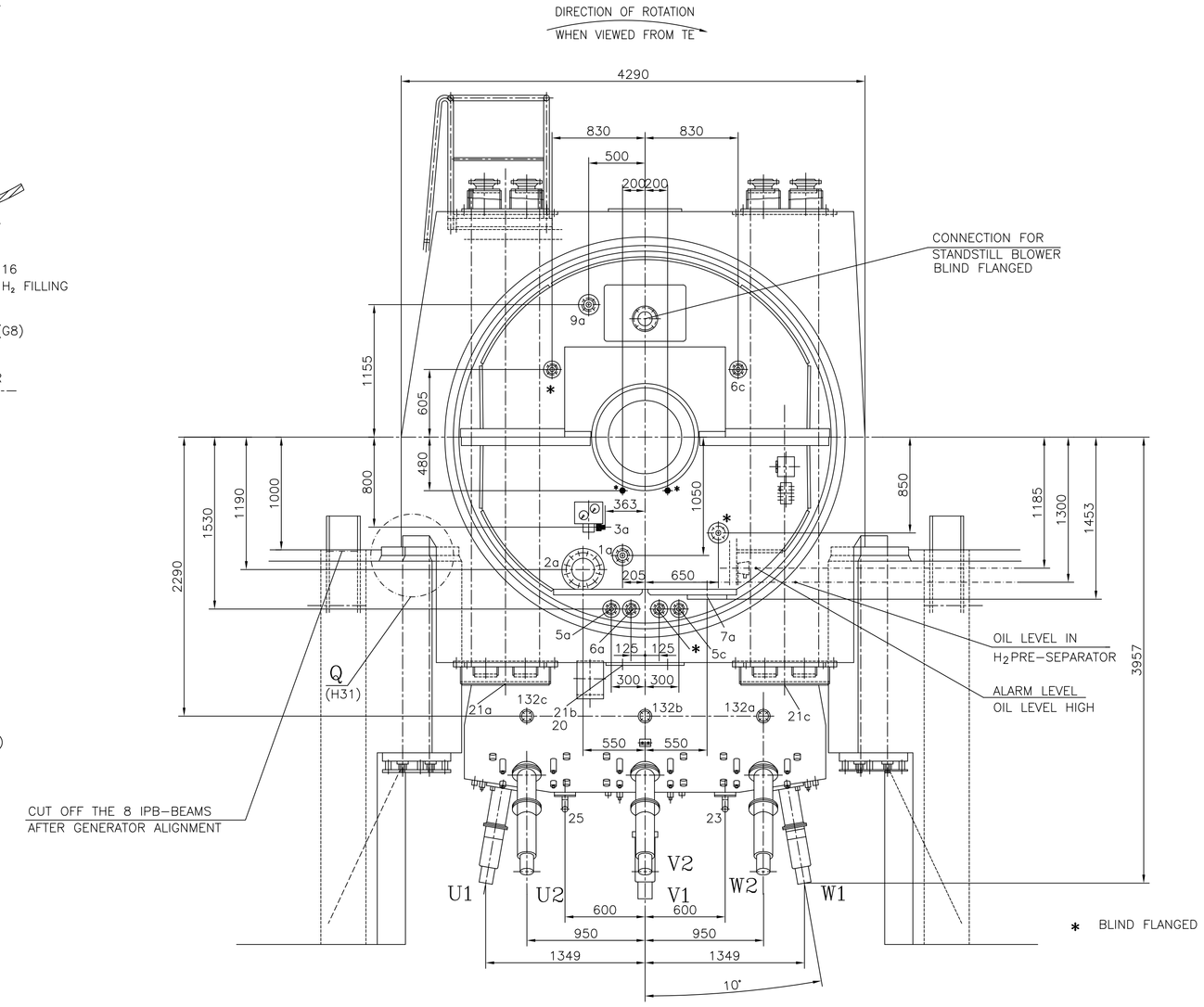


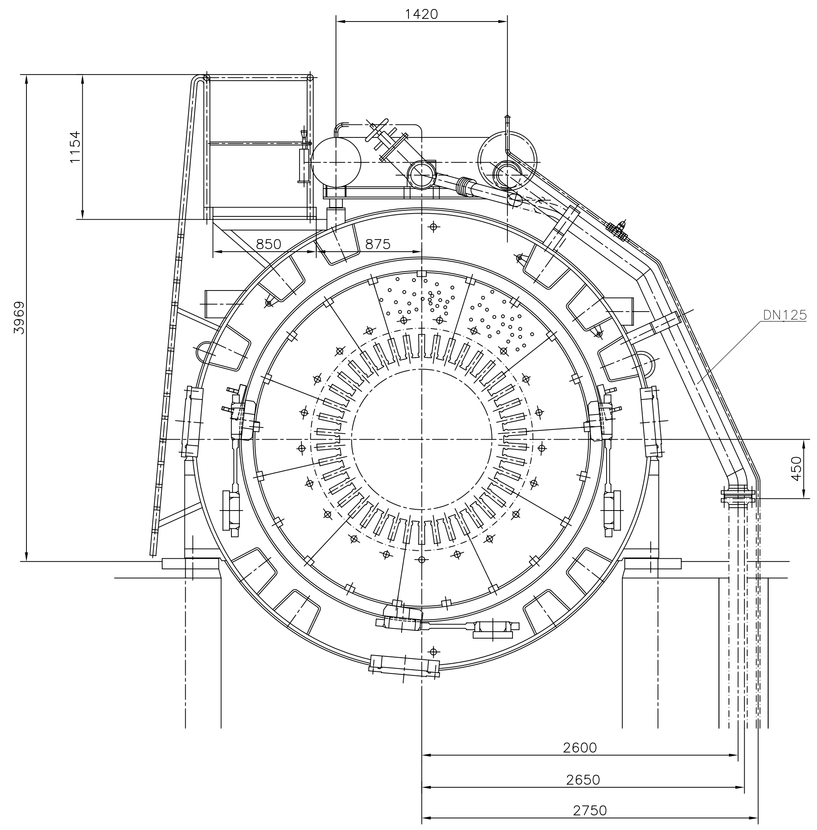
SECTION BB (G8)



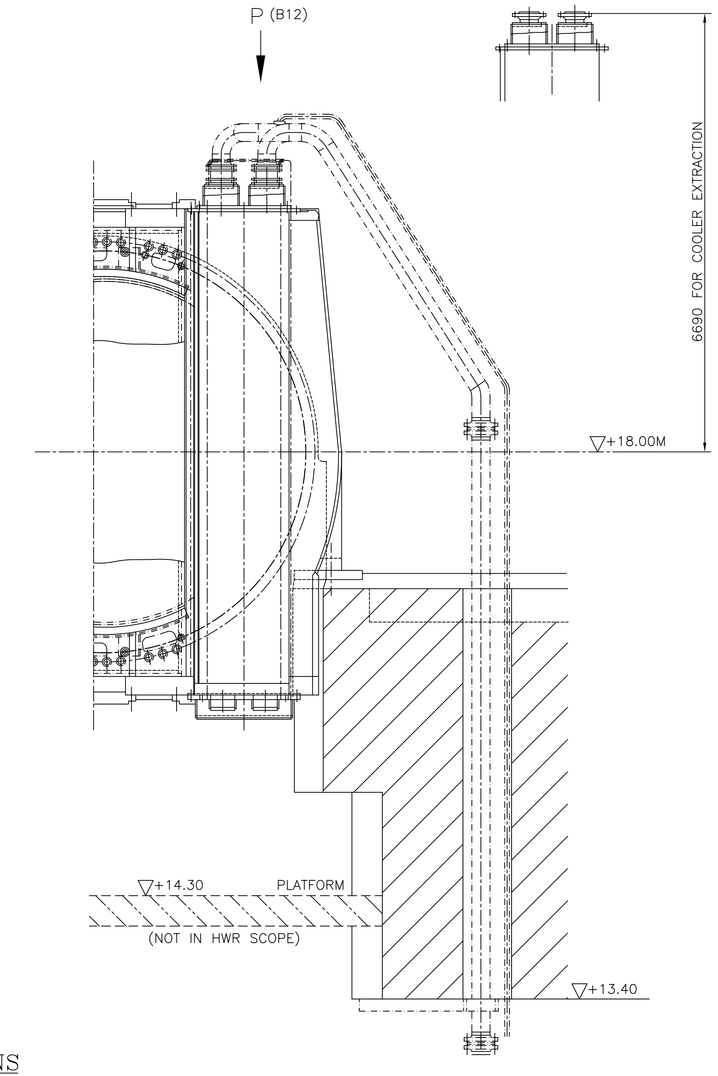
DETAIL Q (H29)
(SCALE 1:10)



VIEW ON TO ENDSHIELD TE
WITHOUT PRIMARY WATER TANK



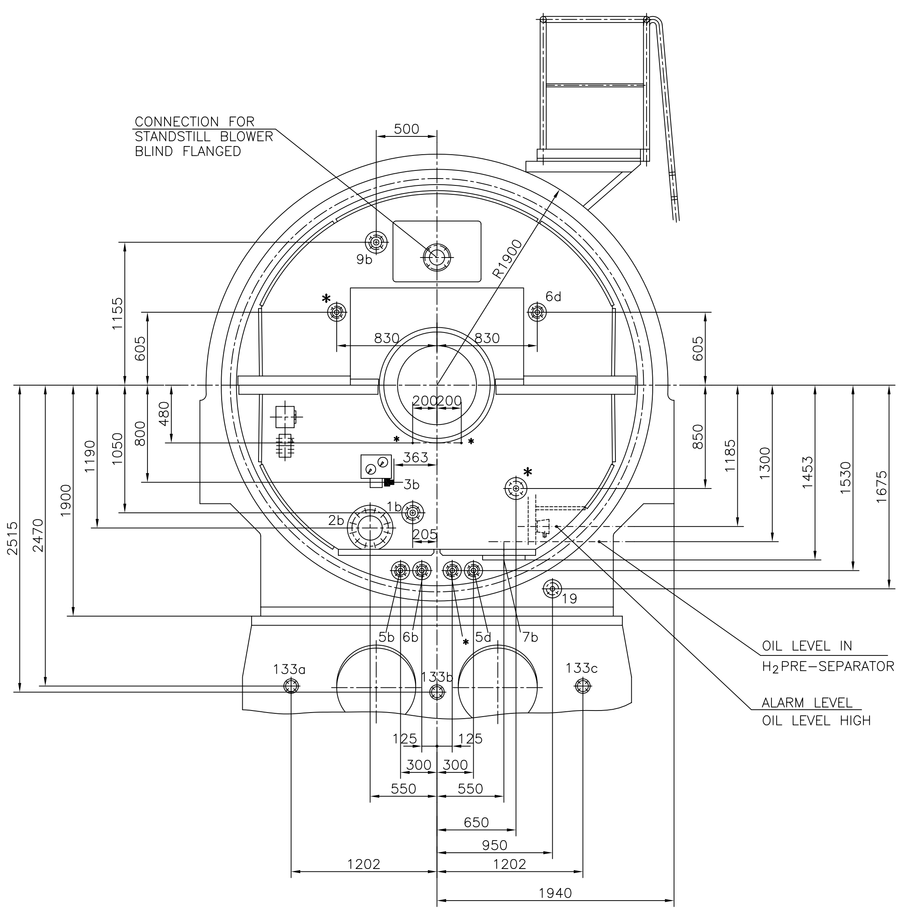
SECTION A–A (L7)



VIEW FROM TE

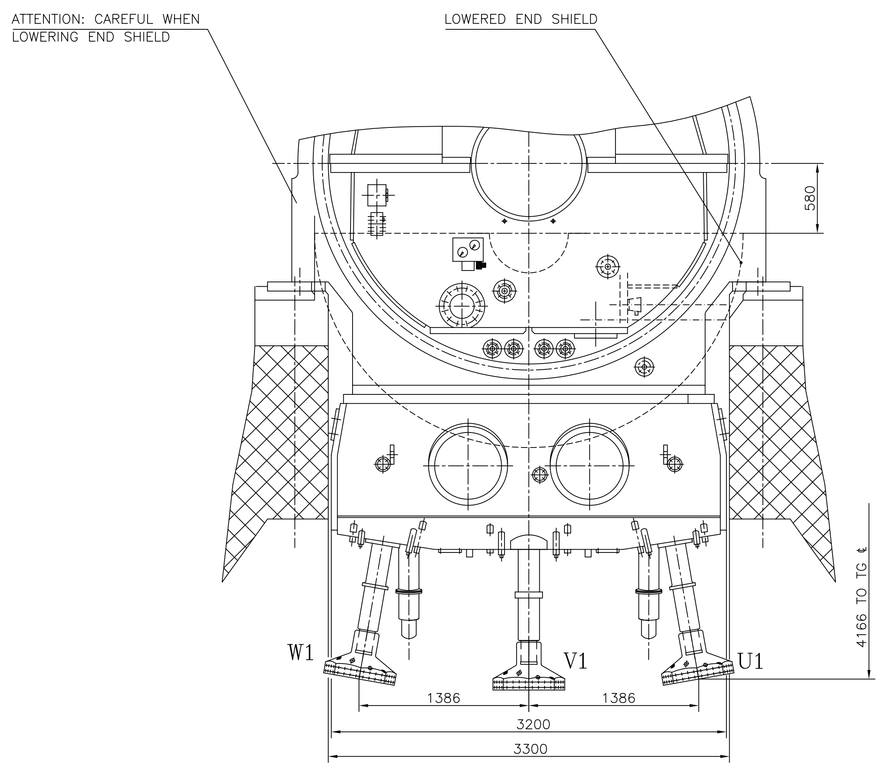
LIST OF TERMINATIONS

1a	FLANGED	80	BRG. OIL INLET TE
1b	FLANGED	80	BRG. OIL INLET EE
2a	FLANGED	200	BRG. OIL OUTLET TE
2b	FLANGED	200	BRG. OIL OUTLET EE
3a	WELDED	15	JACKING OIL INLET TE
3b	WELDED	15	JACKING OIL INLET EE
5a,5c	FLANGED	40	SEAL OIL INLET TE
5b,5d	FLANGED	40	SEAL OIL INLET EE
6a,6c	FLANGED	40	RING RELIEF INLET TE
6b,6d	FLANGED	40	RING RELIEF INLET EE
7a	FLANGED	50	H_2 SIDE SEAL OIL DRAIN TE
7b	FLANGED	50	H_2 SIDE SEAL OIL DRAIN EE
9a	FLANGED	80	BRG. VAPOUR EXHAUSTER TE
9b	FLANGED	80	BRG. VAPOUR EXHAUSTER EE
15	FLANGED	50	FOR CO_2 FILLING
16	FLANGED	50	FOR H_2 FILLING
19	FLANGED	50	TO GAS DRIER
20	FLANGED	50	FROM GAS DRIER
21a,21c	FLANGED	25	TO LIQUID LEVEL DETECTOR RACK
21b	FLANGED	50	TO LIQUID LEVEL DETECTOR RACK
22	FLANGED	50	TO LIQUID LEVEL DETECTOR RACK
23	WELDED	50	TO LIQUID LEVEL DETECTOR RACK
25	WELDED	50	TO LIQUID LEVEL DETECTOR RACK
30a,31a,32a,33a	WELDED	150	COOLING WATER INLET
30b,31b,32b,33b	WELDED	150	COOLING WATER OUTLET
35a,35b,35c,35d	THREADED	1/2" BSP	COOLER VENT
132a,b,c	WELDED	25	PW INLET FOR BUSHINGS
133a,b,c	WELDED	25	PW OUTLET FROM BUSHINGS
136	WELDED	8	IMPULSE LINE FOR PW PRESSURE
145	WELDED	20	N_2 GAS INLET
188	FLANGED	125	PW INLET TO HEADER
189	WELDED	20	TO WASTE GAS
190	FLANGED	125	PW TANK OUTLET
581a	WELDED	8	TO DPT
582a	WELDED	8	TO DPT



VIEW ON TO ENDSHIELD EE
WITHOUT PRIMARY WATER TANK

* BLIND FLANGED



LOWERING OF END SHIELD BEARING
VIEW–C (J4)

GRADE OF UNTOL. DIM.:–
M/CG– V/C/M/F AA 0230208
WELDING–A/B/C/D–AA621104
GAS CUTTING–'T3'AA0621101

REV.	DATE	ALTERED	CHECKED

CBOM NO.				STATUS OF DRG.
–				
AGREED DEPT.	NAME	SIGN	DATE	

REV.	DATE	ALTERED	CHECKED

OWNER: PRAYAGRAJ POWER GENERATION COMPANY LIMITED.

CONSULTANT: TATA CONSULTING ENGINEERS LIMITED

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT: PRAYAGRAJ SUPER THERMAL POWER PROJECT
BARA, 3x660MW (PHASE-I), ALLAHABAD DISTRICT, U.P.
BOILER TURBINE GENERATOR (BTG) PACKAGE AND STATION C&I

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DRN	ASHISH	–sd–	17.06.10		
CHD	R.C.S.	–sd–	17.06.10		–
APD	RAKESH KR.	–sd–	17.06.10		73, 74

DEPT.	SCALE	WEIGHT(Kg.)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
TGE	NTS	–	–	–	–
CODE 4133					75, 77

TITLE: GENERATOR OUTLINE

DRAWING NO. 01390001375

SHEET NO. 02 | NO.OF SHEETS 02

SIZE A0

INVENTORY NO. | SIGN & DATE | REV. DRG NO. 24-3102-123573