
TENDER SPECIFICATION

TENDER NO. BHEL/ NR/SCT/ GVK GOINDWAL/TG/752

FOR

ERECTION, TESTING, COMMISSIONING TRIAL OPERATION AND HANDING OVER OF 2X270 MW TG SET ALONG WITH RELATED AUXILIARIES AND PIPING AT GVK, GOINDWAL TPS, DISTT. TARAN TARAN, PUNJAB.

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 and
OHSAS 18001 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: 0091-0120-2515476 / 2515464 /
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Email: msd@bhelsnr.co.in/swapan@bhelsnr.co.in

TENDER NO. BHEL/ NR/SCT/ GVK GOINDWAL/TG/752

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





ISO 9001-2000, ISO 14001
and OHSAS 18001
certified company

Bharat Heavy Electricals Limited

(A Govt. Of India Undertaking)

PS-NR, Plot No. 25 , Sector - 16A , Noida

Distt. Gautam Budh Nagar, NOIDA – 201 301.(U P)

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NOTICE INVITING TENDER

LAST DATE OF SALE: 06/01/2011

DUE DATE OF SUBMISSION: 06/01/2011

NIT NO. / NAME OF WORK

TENDER NO. BHEL/ NR/SCT/ GVK GOINDWAL/TG/752

Sealed tenders are invited from the contractors fulfilling qualifying requirements for the ERECTION, TESTING, COMMISSIONING TRIAL OPERATION AND HANDING OVER OF 2X270 MW TG SET ALONG WITH RELATED AUXILIARIES AND PIPING AT GVK, GOINDWAL TPS, DISTT. TARAN TARAN, PUNJAB.

NOTES

1. Please visit our website at www.bhel.com for details.
2. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper

SDGM / SCP

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

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To

Dear Sir/Madam,

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	TENDER NUMBER	<i>BHEL/NR/SCT/GVK GOINDWAL/TG/752</i>	
ii	Broad Scope of job	Erection, Testing, Commissioning Trial Operation and Handing Over of 2X270MW TG Set along with Related Auxiliaries and Piping at GVK, Goindwal TPS, Distt. Taran Taran, Punjab.	
iii	DETAILS OF TENDER DOCUMENT		
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i>	<i>Applicable</i>
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i>	<i>Applicable</i>
c	Volume-IC	<i>General Conditions of Contract (GCC)</i>	<i>Applicable</i>
d	Volume-ID	<i>Forms and Procedures</i>	
e	Volume-II	<i>Price Schedule (Absolute value).</i>	<i>Applicable</i>
iv	Issue of Tender Documents	1. <u>Sale from BHEL PS Regional office at :</u> <i>Start : 17.12.2011 , Time :10.00 hours</i> <i>Closes: 06.01.2011 , Time :12.30hr.</i> 2. From BHEL website (www.bhel.com) Tender documents can however be downloaded from website till due date of submission	<i>Applicable</i>
v	DUE DATE & TIME OF OFFER SUBMISSION	<i>Date : 06.01.2011 , Time : 16.00 hours</i> <i>Place : BHEL / PSNR / Noida</i>	<i>Applicable</i>
vi	OPENING OF TENDER	<i>1/2 hour after the latest due date and time of Offer submission</i> <i>Notes:</i> <i>(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.</i> <i>(2) Bidder may depute representative to witness the opening of tender</i>	<i>Applicable</i>
vii	EMD AMOUNT	<i>Rs 2,00,000/-</i>	<i>Applicable</i>

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viii	COST OF TENDER	Rs 2000/-.	Applicable/Not Applicable
ix	LAST DATE FOR SEEKING CLARIFICATION	Date: 01.01.2011 Along with soft version also, addressing to undersigned & to others as per contact address given below	Applicable
x	SCHEDULE OF Pre Bid Discussion (PBD)	Date : _ _ / _ _ / _ _ _ _ , Time : Place :	Applicable / Not applicable.
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)		Applicable/Not Applicable
xii	Latest updates	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) and not in the newspapers . Bidders to keep themselves updated with all such information	

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

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at 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 : BHEL/NR/SCT/GVK GOINDWAL/TG/752 NAME OF WORK : ETC Trial Operation & Handing Over of 2X270MW TG Set along with related Aux. & Piping PROJECT: GVK, GOINDWAL TPS, Sistt. Taran Taran , Punjab. DUE DATE OF SUBMISSION:	

	CONTAINING THE FOLLOWING:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in 'No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. Note: a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : <u>Technical</u> 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
	<u>ENVELOPE-III</u> 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	
	<u>ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE)</u> superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING:
i	<ul style="list-style-type: none"> o Envelopes I o Envelopes II o Envelopes III

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

- 7.0 No Deviation with respect to tender clauses and no additional clauses/ suggestions/ in Techno-commercial bid/ Price bid shall normally be considered by BHEL. Bidders are requested to positively comply with the same.
- 8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).
- 9.0 **Assessment of Capacity of Bidders: Shall not be applicable for this tender**
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**

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

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

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

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

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

(where "X₁, X₂, X₃,...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

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- 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.

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- 20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.
- 21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.
- 22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.
- 23.0 In case Consortium Bidding is allowed as per Pre Qualifying Requirement, then Prime Bidder and Consortium Partner shall enter into Consortium Agreement. Validity period of Consortium Agreement shall be 6 months after which the same can be re validated.
- 'Stand alone' bidder cannot become a 'prime bidder' or a 'consortium bidder' in a consortium bidding. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected. .
- 24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements" duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.
- 25.0 The bidder may have to produce original document for verification if so decided by BHEL.
- 26.0 Order of Precedence
In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:
- a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
 - b. Notice Inviting Tender (NIT)
 - c. Price Bid
 - d. Technical Conditions of Contract (TCC)—Volume-1A
 - e. Special Conditions of Contract (SCC)—Volume-1B
 - f. General Conditions of Contract (GCC)—Volume-1C
 - g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(SCT)Enclosure

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

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	ERECTION, TESTING, COMMISSIONING TRIAL OPERATION AND HANDING OVER OF 2X270 MW TG SET ALONG WITH RELATED AUXILIARIES AND PIPING AT GVK, GOINDWAL TPS, DISTT. TARAN TARAN, PUNJAB.
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SL NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document
A	Submission of Integrity Pact duly signed (if applicable)	Not Applicable	
B	Assessment of Capacity of Bidder to execute the work as per sl no. 9 of NIT (if applicable)	Not Applicable for this tender. Shall be applicable for evaluation for the bids opened after 01.02.2010.	
C	Technical Bidder who wish to participate should have executed similar works of 195 MW STG or of higher rating during last 7 years, as on the date of opening of Technical Bid.(Relevant document in support of above shall be submitted.) “OR” Should be executing works of similar nature in at least two units of 195 MW each and above rating against BHEL's direct order.		
D	<u>Financial</u> <u>TURNOVER</u> Tenderers should have an average annual turnover of minimum of Rs 270 Lac (Rs. Two Hundred Seventy Lac only) based on the audited accounts of last three financial years (2007-08, 2008-09 & 2009-10). Bidders shall submit audited annual accounts (balance sheets and		

	profit and loss account) in support of this.		
E	Approval of Customer (if applicable) Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	Applicable	
F	Consortium criteria (if applicable)	Not Applicable	
	Explanatory Notes for QR 1. 'Executed' mentioned above means that unit has been synchronized. 2. 'Executing' means that work has already started at site. 3. If the Qualifying work is executed in the 7 years period as specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.		

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

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (<input checked="" type="checkbox"/>) 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 annexures, appendices etc are read understood and signed	Applicable/Not Applicable	YES/NO
10	Integrity Pact	Applicable/Not Applicable	YES/NO
11	Declaration by Authorised Signatory	Applicable/Not Applicable	YES/NO
12	No Deviation Certificate	Applicable/Not Applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable/Not Applicable	YES/NO
14	Declaration for relation in BHEL	Applicable/Not Applicable	YES/NO
15	Non Disclosure Certificate	Applicable/Not Applicable	YES/NO
16	Bank Account Details for E-Payment	Applicable/Not Applicable	YES/NO
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)

FOR OFFICIAL USE ONLY
NOT FOR PUBLICATION

TENDERER'S COPY
ORIGINAL COPY

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ GVK GOINDWAL/TG/752

FOR

ERECTION, TESTING, COMMISSIONING TRIAL OPERATION AND HANDING OVER OF 2X270 MW TG SET ALONG WITH RELATED AUXILIARIES AND PIPING AT GVK, GOINDWAL TPS, DISTT. TARAN TARAN, PUNJAB.

PART- I OF TCC



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
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ISO 9001-2000, ISO 14001 and
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THIS TENDER SPECIFICATION ISSUED TO:

M/S-----

PART-I OF TCC

S.No.	DESCRIPTION	Chapter No.	PAGE NO.
	Part-I: Contract specific details		
1.	Project Information	Chapter-I	4
2.	Scope of Works	Chapter-II	5-15
3.	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	16-20
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Chapter - 1: Project Information

1. PROJECT INFORMATION

Name of the Owner		GVK POWER (GOINDWAL SAHIB) Pvt. LIMITED
Address	:	GVK Goindwal Sahib TPS, District Taran Taran, Punjab
Location	:	Taran Taran- Kapurthala road about 3 Kms from Goindwal Sahib
Capacity	:	2X270 MW
Route	:	By Road from Jalandhar via Kapurthala By Road from Amritsar via Taran Taran
Nearest City	:	Taran Taran -24 KM Kapurthala- 25 KM Jalandhar -40 KM Amritsar -45 KM
Maximum Temperature	:	47.7 Deg C
Minimum Temperature	:	(-) 3.3 Deg C
Relative Humidity	:	25%-75%

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 package of **2x270 MW units at GVK, Goindwal TPS, Distt. Tarn taran, Punjab.** 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.

The scope of work under this tender for 2X270 MW set TG package 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.
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 (Motor Driven)
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 Gland Steam Condenser, Drain Cooler, LP Heaters, HP Heaters
9. Erection and Commissioning of Condenser with extraction steam piping and air extraction piping inside condenser steam space upto condenser walls, erection of CW piping from GVK battery limit to condenser water boxes including Erection, Commissioning, load testing of Condenser water box handling arrangement.
10. Erection, Commissioning of Condenser on load tube cleaning systems, plate heat exchangers and self cleaning strainers.
11. Erection and Commissioning of Deaerator and Feed Storage Tank with platform and accessories.

12. Erection and Commissioning of Misc. Pumps (ACW, DMCW, ECW, Lube Oil Transfer) Misc Tanks, Piping and other BOP packages with their accessories.
13. Grouting, painting, insulation of all equipments as per requirement along with supply of required materials, machineries and other resources as required to carry out the job.
14. Arranging statutory co-ordination for IBR related activities.
15. Erection, Commissioning, statutory load testing of Misc. Hoists (both mechanical and electrical) through accredited agency who are authorised to issue such kinds of certificates.
16. Erection and Commissioning of Auxiliaries of Turbine, Generator, BFPs and other systems.
17. Erection, Commissioning of Turbine lub 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.
18. Vacuum pumps with connected piping and other integral piping.
19. Erection and Commissioning of MS, HRH Strainers, Coolers, CRH-NRVs, Extraction NRVs with associated pipelines etc.
20. Preservation of TG & Aux. Components after receipt from BHEL Store.
21. Chemical cleaning (assistance) and associated testing plus related activities of different system and normalization
22. Arrangement of fixing of steam blowing and hydro-test blanks and restoration.
23. Arrangement for hydro-test/ steam blowing in strainers including removal/restoration in MS & HRH lines etc.
24. 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.
25. Setting and commissioning of governing system.

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

27. Trial run of motor, equipments, systems, 270 MW Unit (s) as a whole.

28. 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.

29. Unit trial operation, resolving any deficiencies observed and handing over of **2x270 MW units at GVK, Goindwal TPS, Distt. Tarntaran, Punjab.**

2.2 The contractor has to provide the following manpower services for 126 manmonths exclusively for BHEL within the quoted price:

- a) Skilled computer operator – 18 manmonths
- b) Skilled worker - 36 manmonths
- c) UnSkilled worker - 72 manmonths

Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed.

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; recovery at the rate of the prevailing minimum wages at GVK,Goindwal for the categories given plus 10% will be made from the final bill of the contractor.

The scope of work will also include providing qualified Supervisors for direct supervision of various works other than the scope covered under this tender. These qualified Supervisors shall be provided for Eighteen man-months as per site conditions.

The supervisors shall possess a minimum qualification of a mechanical engineering diploma. They shall be deployed in all areas covered under various specifications as well as other related areas as may be deemed essential based upon work requirements, though not specified. They shall be guided by BHEL Engineers to ensure smooth work progress as and when /where required /deployed. No separate payment shall be paid for providing the services as per this clause. The contractor shall provide these free of cost services within the quoted rates as per Rate Schedule.

In case contractor fails to provide above-mentioned engineers 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. In case BHEL is not able to utilize the man months as per provision, a lump sum of Rs.20,000/-

(Rupees Twenty Thousand Only) per man month for the un-utilized man months will be recovered from the bills of the contractor.

2.3 Contractor shall ensure following:

- I. Contractor has to maintain contact with local hospital having ambulance facility, scanning & other ultra modern medical facilities required during emergency.
- II. Contractor has to ensure pre employment medical check for all staff & workers.
- III. 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 2.3 (I).

2.4 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 Discrimination/ 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.

- 2.5 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least 100 trees or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers.

2.6 Major Equipment to be Installed, Tested and Commissioned under this specification is given below:

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.

Approx. weight of major components has been indicated in Annexure I & II

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 on finally accepted rates.

(A) CONDENSER

Condenser complete with all accessories such as

- Hot-well, hinge assemblies, nozzles for various connections along with baffles.
- Steam throw off devices, air extraction piping,
- Stand pipes along with fittings including gauge glasses for level indication, hangers & supports to make the system complete in all respects.

(B) STEAM TURBINE

- High Pressure, intermediate pressure and low pressure steam turbines complete with sole plates, foundation holding down bolts, bearing, bearing pedestals, rotors, couplings, main oil pumps, steam gland seals, hydraulic turning gear and hand barring gear.
- Combined main steam stop and control valves, combined reheat stop and control valves, steam strainers (including its housing & blanking arrangement) for main and reheat steam lines etc., LP bypass stop and control valves along with their servomotors necessary supports for Integral piping and secondary structure if required.
- Cold reheat and extraction NRV 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.

- **Complete High Pressure 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.

(C) GENERATOR

- Generators complete with its auxiliary systems.
- Installation of hydrogen and air coolers.
- Insertion of rotor, levelling, alignment & coupling with LPR.
- Erection of Bushings.
- Brush less excitation system along with PMG, placement, levelling, centring and coupling with generator rotor.
- End shields, Shaft seals, gas coolers, terminal bushings, connected piping, valves, fittings, hangers and supports etc.
- **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 85 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 220 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.

- DRG. NO 304-100-M003 (R2),
- DRG. NO 304-100-M004 (R2)
- DRG. NO 304-100-M005 (R2)
- DRG. NO 304-100-M006 (R2)

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 220 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.

(D) STATIC AUXILLIARIES

- Flash tanks and all other misc. tanks with drains & vents.
- Deaerator & feed storage tank (in three pieces), complete with ladders platform and other accessories.
- Condensate storage tank.
- 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 H₂ dryers, gas control units and gas stands, racks and distributors to make the system complete in all respects.
- Exciter air cooler.
- 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.
- Any other static auxiliaries supplied by PEM or other BHEL supplying units to complete the TG system integration.

(E) ROTATING AUXILIARIES

- AC motor driven boiler feed pumps mounted on common frames, hydraulic couplings, and BFP motors, BFP booster pumps, working oil and lube oil coolers including integral piping.
- AC Motor driven condensate extraction pumps complete with associated motor and its accessories including integral piping.
- 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.
- AC & DC motor driven jacking oil pumps including DC motors starters along with resistance box.
- Unit oil centrifuging and purification equipment machines.
- Seal oil pumps with drives and fittings to make the system complete in all respects.
- Oil vapour and gland steam exhausters.
- Gas Driers.
- Pumps of Control Fluid System
- HP/LP dosing skids. Accessories
- Condenser on load tube cleaning system with drives and fittings to make the system complete in all respects.

Any other static auxiliaries supplied by PEM or other BHEL supplying units to complete the TG system integration.

(G) PIPING

Major PIPING SYSTEMS including LP Piping systems to be erected, tested and commissioned under this specification are given below. Indicative weights of some of the major items are **as per Annexure-II**.

Bidders are required to quote rate in per metric tonne for entire work as per tender specification for **pipng systems as per item no. 2 and 3 of rate schedule**.

INTEGRAL & SYSTEM PIPING***i. INTEGRAL PIPING SYSTEMS***

- Turbine lube Oil system.
- Generator lube oil system.
- Seal steam system.
- Spray water system.
- Drains & vents.
- Control Fluid piping.

- Jacking oil system.
- Turbine water drainage system.

ii. GENERATOR PIPING

- Seal oil piping.
- H₂ & CO₂ gas piping.
- H₂ coolers and exciter cooler ACW piping

TG- CYCLE PIPING

- Main condensate suction.
- Main condensate discharge including excess return and minimum re-circulation.
- 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.
- Condensate supply from condensate surge tank to CEP sealing and makeup to condenser and valve gland sealing.
- Steam extraction to HPH 5 & 6.
- Steam extraction to deaerator from turbine & CRH line.
- Steam extraction to LPH – 1, 2 & 3.
- Cascading piping between heaters to condenser and to deaerator.
- Boiler feed discharge between heaters.
- Drains from GSC, LPH-1 through drain cooler.
- Deaerator overflow and drain
- HP & LP flash box vent and drain.
- Steam from aux. Steam header to turbine sealing system and its drain to flash box.
- Condenser air piping to vacuum pumps.
- Aux. Steam for initial heating of FST and deaerator pegging.
- Vent pipes from HPH – 5 & 6 to flash box and start up vents.
- Vent pipes from LPH – 1, 2 & 3 to condenser.
- Vent pipe from CEP to condenser.
- Vent pipe from GSC to atmosphere.
- Drain & vents from above piping.
- Condenser hot well drain.
- Turbine wet steam-washing system.

iii. MISCELLANOUS PIPING

- HP/LP dosing skid piping including dressing drains to neutralizing pit.

- Impulse piping up to and including first battery of root valves.

v. LP PIPING

- CW Piping from 'A' row to condenser.
- ACW piping from header in TG area to TG Aux.
- Condenser air evacuation piping through vacuum pumps and steam jet air ejectors.
- Service and Instrument Air Piping from header in TG area.
- Misc. drains up to pits & vents to return to CST / atmosphere.
- DM water make-up line to condenser.

vi. Miscellaneous / BOIs supplied by BHEL MU's /PEM /Venders required for TG and Auxiliaries packages.

NOTES:-

- 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.
- 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.
- 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.

(H) 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 Rs per MT against **ITEM NO.-4 of RATE SCHEDULE** 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.

(I) 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. Bidders are required to quote rate in Rs per MT against **ITEM NO.-5 of RATE SCHEDULE** for entire insulation work. Only spray insulation wherever applicable is not covered in this scope of work.

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		Remarks
		BHEL	CONTRACTOR	
1.1.0	ESTABLISHMENT			
1.1.1	FOR CONSTRUCTION PURPOSE			
A.	Open space for office	YES		Limited space. (Free) As and where made available by M/s GVK
B.	Open space for storage	YES		Limited space.(Free) As and where made available by M/s GVK
1.1.2	FOR LABOUR COLONY			
A	Open space	YES		Limited space.(Free) As and where made available by M/s GVK
1.2.0	ELECTRICITY			
1.2.1.	Electricity for construction purposes (chargeable/free)			Chargeable PSEB tariff rates prevailing on the date of the award will be applicable. The applicable rates for Bulk Supply for HT

				consumers i.e. 409 paise/kWh of Energy Rate and Rs.192/kVA MMC charges will be applicable
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 & execution		YES	
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:			
1.2.2.1	Distribution from single point including supply of materials & service		YES	
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	
1.3.0	WATER SUPPLY			
1.3.1	FOR CONSTRUCTION & LABOUR COLONY:			
1.3.1.1	Making the water available at single point		YES	Contractor to make Borewell himself
1.3.1.2	Further distribution as per the requirement		YES	

	of work including supply of materials & execution			
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 compressor & compressed air system including pipes, valves, storage system etc.		YES	
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	YES		

	Equipments covered under this scope			
2.1.2	Drawings for construction method	YES	YES	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
2.1.4	Shipping lists etc for reference & planning the activities	YES	YES	do
2.1.5	Preparation of site erection schedules and other input requirements		YES	do
2.1.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	YES	YES	do
2.1.7	Weekly erection schedule based on Sl. No.2.1.5		YES	do
2.1.8	Daily erection/work plan based on Sl. No.2.1.7		YES	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	
2.1.10	Preparation of preassembly bay		YES	

- 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 GVK at his 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 levelled 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 expanses 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

4.0 T&P AND MMD DEPLOYED BY CONTRACTOR

INDICATIVE LIST OF T&P/MMD TO BE DEPLOYED BY CONTRACTOR				
S.NO.	EQUIPMENT		CAPACITY	QTY
1.	Welding Generators, Transformers, Rectifiers & TIG Welding Machine			APR*
2.	Mobile crane		18 / 20 T	2 NOS
3.	Low Bed Trailer		60 MT	APR
4.	Trailer with Pulling Unit		10 / 20 MT	2 NOS
5.	Hydra		12/14 MT	2 NOS
6.	Hydraulic Jack (Low Height)		25/50/100T	APR
7.	Screw Jacks		5/10/25/50T	APR
8.	Hydraulic Pipe Bending Machine (Manual and Motorised)			1 no. each.
9.	Stress Relieving Sets, including oil cooled transformers, heating coils, panels Recorders Etc.			APR
10.	Vacuum Cleaner (Industrial)			1 number.
11.	Surface Grinder and other Workshop Equipment			1 set.
12.	Electric Winches			APR
13.	Arrangement of Generator Stator lifting by Strand Jack method			
14.	Torque Tension Meter/ Wrench Upto 1000ft Lbs Range			1 number.
15.	Electronic / Electrical Tube Expander Tools)			3 number.
16.	Air Compressor		140/210 CFM	1 number.
17.	Scaffolding material			APR
18.	Chain Pulley blocks		Adequate capacity	APR
19.	Hand operated Megger	Up to 200 M ohms 500V/ 1000V	±5% at center ±10% at end of	2 Nos.

20.	Digital Multimeter 3½ digit	Voltage 200 mV to 1000V	±1%+1 digit	2 Nos.
21.	Digital Multimeter 3½ digit	Current 200 mA to 10A DC	±0.8%+1 digit	2 Nos.
21.	Digital Multimeter 3½ digit	Current 20 mA to 20A AC	±0.8%+1 digit	2 Nos.
22.	Digital Multimeter 3½ digit	Resist 200 ohms to 20M ohms	±0.5%+1 digit	2 Nos.
23.	Dumpy level	0 to 350 mm	LC-0.01	1 No.
24.	Surface plate	Up to 1.0 Sq. Mtr	Grade 1,2,3	1 No
25.	Straight Edge	Up to 2 Mtr long	Grade 1,2,3	1 No.
26.	Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable			2 Sets
27.	Master pressure gauge	0 – 4 Kg/cm2	0.02	1 No.

***APR-As per requirement**

NOTES:

1. The above list specifies only major T&P/MMD (may not be complete to be deployed by the contractor. All additional/ other tools and plants which are required for satisfactory & timely completion of work 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

Chapter - V: T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

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

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
T&Ps			
1.	EOT Crane (in T.G. hall)	85T / 25T	1 No.
2.	Crawler crane (for lifting of FST & De-aerator)	200 / 250 T	AS PER REQUIREMENT
3.	Crawler crane FOR SUITABLE PACKAGES	100 T/SUITABLE	AS PER REQUIREMENT
4.	Motorised hydraulic test pump		One Set
5.	Bolt stretching device		One Set
6.	Chemical Cleaning Arrangement	By BHEL agency	1 set
SPECIAL T&Ps			
8	Slings for lifting turbine rotors with lifting beam		One Set
9	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 contractor. BHEL may also provided 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 SI No 2 , 3 will be provided as per requirement and for special package handling only at the discretion of the BHEL Engineer**
4. **The contractor shall make necessary arrangement like lying of steel plates (all provided by BHEL),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

6.1 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 Entire work as detailed in the tender specifications shall be completed within **18 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.
In case due to reasons not attributable to the contractor, the work gets delayed and additional manpower / resources have to be mobilized so as to expedite the work to meet various milestones, same shall be done within the quoted rates as per Rate Schedule, at no extra cost to BHEL. In the event the contractor fails to respond to these requirements, BHEL shall take appropriate actions to meet customer's commitments in line with the provisions of General Conditions of Contract.

6.3 The various milestones dates to be achieved under this tender is as :

MILE STONES	MONTHS
Erection Start	ZERO
Box – up for oil flushing	NINE
Oil Flushing Completion.	TEN
Barring Gear	TWELVE
Rolling & Synchronising	THIRTEEN
Trial operation & handing over	FIFTEEN

The milestones of unit-2 shall follow with a time lag of THREE months.

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 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.
- 6.5 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 authorised 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. PROGRESSIVE PAYMENT ON PRORATA BASIS

A) 85% of Lump sum price (item No.1 of rate schedule) :

1.	GENERATOR STATOR UNLOADING,LIFTING & PLACEMENT ON FOUNDATION	2x10%
2.	CONDENSER	2X8%
3.	TURBINE	2X7 %
4.	GENERATOR	2X6%
5.	STATIC AUXILIARIES	2 X 4.5%
6.	ROTATING AUXILIARIES	2 X 6%
7.	INTEGRAL PIPING	2X1%

- NOTE 1. 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.
2. 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.
 3. **10% (Ten percent)** of the lump sum executed value shall be released for each unit after the generator stator unloaded from the carrier, onward lifting, above ground handling, finally lowering & placement /Installation of the stator on TG deck foundation at around 16.4 M level inside power house for Unit No. 1&2, as certified by BHEL Engineer.

B. 85% of UNIT RATE (item No.2 & 3 of rate schedule)
(Applicable on items covered under ANNEXURE – II ITEM A & B)

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 with next activity)	5%
6.	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	5%
7.	HYDRAULIC TEST/PNEUMATIC TEST WHERE EVER APPLICABLE	5%

C. 85% of UNIT RATE (item No.4 of rate schedule)
(Applicable on items covered under ANNEXURE – II ITEM C)

1.	PLACEMENT IN POSITION	50 %
2.	ALIGNMENT	15 %
3.	WELDING/BOLTING/FIXING	20 %

D.85% of UNIT RATE (item No. 5 of rate schedule)
(Applicable on items covered under ANNEXURE – II ITEM D)

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.	5 %

E. STAGE/MILESTONE PAYMENTS (15% of Contract value)

1.	Oil Flushing (TG)	2X0.5%
2.	Barring Gear (TG)	2X0.5%
3.	Rolling and Synchronisation	2X1.5%
4.	Full Load	2X1%
5.	Trial Operation of Unit	2X1%
6.	Painting (including arrow marking, nomenclature, etc)	2X1%
7.	Area cleaning, temporary structures cutting/removal and return of scrap	2X0.5%
8.	Punch List points/pending points liquidation	2X0.5%
9.	Material Reconciliation	2X0.5%
10.	Completion of Contractual Obligations	2X0.5%

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. Payment of retention amount and final bill shall be as per clause No. 2.22 and 2.23.2 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 discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with

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

8.2.2 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 Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

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

own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

Chapter - IX: Others

9.0 OTHERS

- 9.1** For reverse auction/ for Price Bid opening, only those bidders will be considered who will be qualified 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.

Chapter - X: ANNEXURES

TENTATIVE WEIGHT SCHEDULE

SUMMARY OF WEIGHTS PER UNIT

AA TURBINE, GENERATOR & AUXILIARIES

A	CONDENSER	365	MT
B	TURBINE	546	MT
C	GENERATOR & EXCITER	348	MT
D	STATIC AUX.	430	MT
E	ROTATING AUX.	196	MT
F	INTEGRAL PIPING	71	MT

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

Annexure-I

AA WEIGHT OF MAJOR COMPONENTS FOR ONE TG SET

A. CONDENSER

S.NO	DESCRIPTION	DIMENSION	WEIGHT (IN KG.)
1.	CONDENSER (HOTWELL)	11200X1900X1200	6913
2.	BOTTOM PLATE	7150X3450X625	6793
3.	BOTTOM PLATE	7150X3450X625	6793
4.	BOTTOM PLATE	7150X3850X625	8296
5.	BOTTOM PLATE	1900X700X300	221
6.	CONDENSER SUPPORT	1750X1000X1250	3420
7.	CONDENSER SUPPORT	1750X1000X1250	3420
8.	CONDENSER SUPPORT	1750X1000X1250	3420
9.	CONDENSER SUPPORT	1750X1000X1250	3420
10.	Loose Item(COND. SUPPORT)	1600X950X950	4585
11.	WATER CHAMBER (LHS)	5224X3610X360	6065
12.	FRONT WATER BOX (GEN SIDE)	5950X3610X2485	14894
13.	WATER CHAMBER(RHS)	5224X3610X360	6065
14.	FRONT WATER BOX (TUR SIDE)	5950X3610X2485	14899
15.	WATER CHAMBER (RHS)	5224X3610X360	6065
16.	REAR WATER BOX (GEN SIDE)	4760X3610X2025	9032
17.	WATER CHAMBER (LHS)	5224X3610X360	6065
18.	REAR WATER BOX (TUR SIDE)	4760X3610X2025	9032
19.	SIDE WALL(TUR.END)	5248X2480X80	7120
20.	LOOSE ITEM	5850X350X250	682
21.	SIDE WALL(GEN.END)	5248X2480X80	7120
22.	LOOSE ITEM	5850X350X250	682
23.	RODS(Shell Internals)	3650X850X625	4530
24.	RODS(Shell Internals)	3650X850X625	4530
25.	RODS(Shell Internals)	3650X850X625	4530
26.	RODS(Shell Internals)	3650X850X625	4530
27.	RODS(Shell Internals)	1000X750X350	520
28.	RODS(Shell Internals)	3700X850X350	4450
29.	AIR EXTRACTION PIPING	5460X990X410	1065

30.	Support Tube plates(shell internals)	4700X3426X348	5168
31.	Support Tube plates(shell internals)	4700X3426X348	5168
32.	Support Tube plates(shell internals)	4700X3426X348	5168
33.	Support Tube plates(shell internals)	4700X3426X348	5168
34.	Support Tube plates(shell internals)	4700X3426X348	5168
35.	Support Tube plates(shell internals)	4700X3426X348	5168
36.	Support Tube plates(shell internals)	4700X3426X348	5168
37.	LOOSE ITEM	5500X940X630	6993
38.	LOOSE ITEM	4440X260X100	334
39.	LOOSE ITEM	3000X1500X500	4255
40.	LOWER DOME WALL (TUR.END)	11000X3950X910	8767
41.	LOWER DOME WALL (TUR.END)	4000X800X100	668
42.	LOWER DOME WALL (TUR.END)	900X300X300	245
43.	LOWER DOME WALL (GEN.END)	1100X3950X910	7698
44.	LOWER DOME WALL (GEN.END)	4000X800X100	678
45.	LOOSE ITEM	900X300X300	245
46.	LOWER DOME WALL (F.W/B SIDE)	7502X4046X545	6012
47.	LOWER DOME WALL (F.W/B SIDE)	6238X934X1155	1444
48.	LOWER DOME WALL (F.W/B SIDE)	1325X1150X500	511
49.	LOWER DOME WALL (R.W/B SIDE)	7550X4000X1900	6727
50.	LOOSE ITEM	6236X1134X1160	1427
51.	LOWER DOME WALL (R.W/B SIDE) LOOSE ITEMS	1300X1065X305	192
52.	LOOSE ITEM	6016X200X200	726
53.	LOOSE ITEM	6016X200X200	726
54.	LOOSE ITEM	6016X200X200	726
55.	LOOSE ITEM	6016X200X200	726
56.	LOOSE ITEM	3400X200X200	382
57.	LOOSE ITEM	3400X200X200	382
58.	LOOSE ITEM	1760X1480X1230	4073
59.	LOOSE ITEM	2380X1310X1100	3995
60.	LOOSE ITEM	6800X460X310	1083

	WALL(TUR/GEN.SIDE)		
61.	UPPER DOME WALL(TUR/GEN.SIDE)	6800X460X310	1083
62.	UPPER DOME WALL(F/W/B SIDE)	5880X1930X380	3635
63.	UPPER DOME WALL,(LOOSE ITEMS)	5400X350X32	475
64.	UPPER DOME WALL (LOOSE ITEMS)	670X250X450	390
65.	UPPER DOME WALL(RWB SIDE)	5880X1930X448	3270
66.	W/BOX REMOVAL DEVICE	2500X1000X750	2452
67.	W/B REMOVAL DEVICE (CONDENSER)	2000X1500X500	2000
68.	FRAME	1850X840X230	595
69.	FRAME	1840X840X230	595
70.	STEAM THROW DEVICE(IP)	1450X900X700	1030
71.	STEAM THROW DEVICE(IP)	1450X900X700	1030
72.	LOOSE ITEMS	2100x650x700	560
73.	LOOSE ITEMS	2900x956x406	380
74.	LOOSE ITEMS	1000x500x500	225
75.	CONDENSER (FASTENERS)	1000x800x800	1410
76.	CONDENSER LOOSE ITEMS	1000X500X500	4
77.	CONDENSER LOOSE ITEMS	3300X250X200	175
78.	Tools & Tackles(condenser)	1000X500X500	500
79.	STAND PIPE NO.1	2750X420X400	50
80.	CONDENSER STAND PIPE	3150X350X330	284
81.	STAND PIPE NO.2	2750X420X390	52
82.	CONDENSER INSTRUMENTRATION	1500X1000X1000	620
83.	CONDENSER INSTRUMENTATION	1000X750X500	105
84.	CONDENSER INSTRUMENTATION	1400X800X700	58
85.	CONDENSER TUBES SS		90000
86.	TOTAL		365326

B. TURBINE

	DESCRIPTION	DIMENSION	WEIGHT (IN KG.)
	SOLE PLATE PEDESTAL ANCHOR	3400X1200X800	2310
	BASE PLATE ASSEMBLY	4500X1400X1200	3716
	BASE PLATE ASSEMBLY	2300X1250X600	2360

	BASE PLATE L.P.CASING	2300X2075X981	2230
	LP OUTER CASING PARTS	7060X1480X2760	8070
	LP OUTER CASING PARTS	7060X1480X2760	8070
	LPC OUTER CASING PARTS	4570X3230X980	2455
	LPC OUTER CASING PARTS	4570X3230X980	2455
	COMPONENTS OF LP CASING UPPER PART	3500X300X300	405
	L.P OUTER CASING PARTS	3450X1000X1100	478
	ASSEMBLY DEVICES	900X700X550	100
	INSPECTION SHAFT FOR IPC	3300X700X700	575
	VALVE SUPPORT FOR HP OVERHAUL	1000X1000X400	690
	COMPONENTS OF ASSY.FIXTURE FOR HPT	3800X2500X1200	6394
	COMPONENTS OF ASSEMBLY FIXTURE OF HPT	2200X1200X850	1511
	COMPONENTS OF ASSY.FIXTURE FOR HPT	3300X1800X1210	2852
	COMPONENTS OF ASSEMBLY FIXTURE FOR H.P.TURBINE	5010X4000X120	2540
	HP-IP BREARING PEDESTAL ASSLY.	4080X2005X2126	12100
	HP/IP BRG.PED.PARTS	1000X600X600	338
	HP/IP BRG.PED.PARTS	500X200X150	12
	AUXILIARIES OF LP TURBINE	3000X1300X1000	1710
	AUXILIARIES OF LP TURBINE	2000X1000X1825	1142
	AUXILIARIES OF LP TURBINE	2000X1000X1825	1142
	LP JOINT COVERING	2300X1800X940	1041
	ASSEMBLY TOOLS	1900X1000X890	560
	CAP(SPRING SUPPORT)	825X500X400	400
	CAP(SPRING SUPPORT)	825X500X400	400
	CAP (COMPEN.ASSY)	3240X1740X1340	3316
	CAP (COMPEN.ASSY)	3240X1740X1340	3512
	CAP(OBLIQUE REDUCER ASSLY)	1400X1400X1200	340
	CAP (MITRE BEND ASSY)	1550X1550X1300	430
	CAP (COMPEN.ASSY)	3240X1740X1340	3512
	CAP (MAN-HOLE ASSLY)	1500X1600X1100	750
	CAP (MAN-HOLE ASSLY)	1500X1600X1100	750
	CAP(MITRE BEND ASSY)	1550X1550X1300	670
	CAP (MITRE BEND ASSY)	1550X1550X1300	670
	CAP (PIPE ASSLY)	2000X1100X1200	645
	CAP (MITRE BEND ASSY)	1550X1550X1300	435
	PIPE FOR CAP (VALVE END)	1050X600X600	210
	PIPE FOR CAP (VALVE END)	1050X600X600	210
	LONGITUDINAL GIRDER (LEFT)	6800X1820X1570	15107
	LONGITUDINAL GIRDER (RIGHT)	6800X1820X1570	15107
	LP FRONT WALL (TS)	6820X3750X910	9878
	LP FRONT WALL (GS)	6820X3750X910	9878
	LP SHAFT SEALING FRONT	1800X1700X740	1801
	LP SHAFT SEAL COMPENSATOR ASSY.(TS)	1440X1420X520	1351
	LP SHAFT SEALING REAR	1800X1700X740	1801
	LP SHAFT SEAL COMPENSATOR ASSY.(GS)	1440X1420X520	1351
	LP CASING ASSY.FASTENERS	1800X1700X740	2190

LP CASING ASSY.PARTS	3760X2060X860	4511
LP CASING ASSY.PARTS	450X450X250	65
INNER GUIDE PLATE OF DIFFUSER(TS)	2600X2400X1000	1334
INNER GUIDE PLATE OF DIFFUSER(GS)	2600X2400X1000	1334
DIFFUSER(TS)	4880X1730X2340	3630
DIFFUSER(GS)	4880X1730X2340	3630
AUXILIARIES OF I.P. TURBINE	1100X500X650	320
AUXILIARIES OF I.P. TURBINE	1100X500X650	204
AUXILIARIES OF I.P. TURBINE	1100X500X650	204
LP-GEN. PEDESTAL ASSEMBLY	3220X2285X2075	9300
IP-LP PEDESTAL ASSEMBLY	3700X1860X2100	13500
LP INNER OUTER CASING (U/H)	6720X3150X2325	20800
LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2350	29207
LP INNER CASING ASSY.FASTENERS	1800X1700X740	1300
LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000	10800
STEAM INLET PIPE (LPT)	2700X1300X900	512
L.P. ROTOR	7210X3300X3350	58277
BEARING PEDESTAL ARRANGT.PARTS	1800X900X800	850
STUD HEATING DEVICE AND BREECH NUT HEATING DEVICE	1500X1200X250	190
GROMMET SLINGS	1500X1500X350	230
IP TURBINE	4860X3753X3210	80000
HP TURBINE	5060X3100X2900	54000
HP INLET ASSEMBLY	450X450X200	20
H.P.EXHAUST ASSEMBLY	1625X1335X675	1187
HPT RELATED PARTS	1000X1000X500	120
HP FRONT BRG. PEDESTAL	3500X3000X2050	11228
HP FRONT BRG. PEDESTAL PARTS	1800X1700X1000	767
I.P TURBINE PARTS	700X700X500	250
RATING,COLLABORATION AND MONOGRAM PLATES	850X550X150	25
OIL FLUSHING AND PRESSURE TEST DEVICE	750X400X550	102
SUPPORT FOR IV VALVE	1500X1000X750	330
LP VALVE SUPPORT	2500X2100X1000	4455
STEAM BLOWING & HYD TEST DEV	2900X2100X1140	2000
TOOLS & PACKING DEVICES	1750X1200X980	384
ASSEMBLY DEVICES FOR VALVES	920X1000X450	123
ESV & CV CASING WITH VALVES	3000X3000X1900	8500
ESV & CV CASING WITH VALVES	3000X3000X1900	8500
IV & CV CASING WITH VALVES.	4500X3500X2600	17500
IV & CV CASING WITH VALVES.	4500X3500X2600	17500
LP STOP & CONTROL VALVE CASING WITH VALVES	2400X2500X1250	3220
LP STOP & CONTROL VALVE CASING WITH VALVES	2400X2500X1250	3220
INJECTOR FOR SUC. PIPE NB350	3300X1750X1210	529
MAIN OIL TANK & NOZZLE ARRGT. ASSY.	5180X3260X2650	9100
MAIN OIL TANK & NOZZLE ARRGT	4200X1100X800	390
OIL STRIPPER	600X600X850	83
OIL STRAINERS	2050X1200X1410	168

VARIABLE ORIFICES THROTTLE VALVES & FLUSHING PARTS	1000X500X250	100
HOUSING FOR MS STRAINER	1700X1025X900	3000
HOUSING FOR MS STRAINER	1725X1250X730	3000
STEAM STRAINER ASSEMBLY DEVICE MS,HRH&LP	2140X1400X500	800
HOUSING FOR HRH STEAM STRAINER	2200X1450X1100	3450
HOUSING FOR HRH STEAM STRAINER	2200X1450X1100	3450
STEAM STRAINER (MS)	1100X700X350	184
STEAM STRAINER (HRH)	1600X1450X750	594
BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000X900X800	776
BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING	1600X1200X1000	1740
BLANKING ARRANGEMENT FOR LP STRAINER HOUSING	1600X1200X1000	1750
STEAM STRAINER HOUSING GASKETS	1000X1000X500	30
COMPENSATOR	600X600X900	27
LEAKAGE OIL TANK	1000X1000X3000	515
WASTE OIL TANK	1000X1000X3000	515
INJECTOR FOR SUC. PIPE NB 400	3500X750X750	472
STEAM STRAINER (MS)	1100X700X350	184
STEAM STRAINER (HRH)	1600X1450X750	594
LP STEAM STRAINER	1700X1520X700	368
LP STEAM STRAINER HOUSING	1750X1150X750	820
TURBINE INSTRUMENTS RACKS	2750X1000X800	658
TURBINE INSTRUMENTS RACKS	2300X750X750	615
IMPULSE PIPES(CARBON STEEL)	6900X650X650	1385
PRESS.TRANSMITTERS,SWITCHES&GAUGES	2800X1250X1250	575
PRESS.TRANSMITTERS,SWITCHES&GAUGES	2800X1000X1000	200
TRANSMITTERS&J.B. OF BEARING	500X300X200	60
IMPULSE PIPES(ALLOY STEEL)	6900X300X300	300
TOTAL		546986

C. GENERATOR

S.NO	DESCRIPTION	DIMENSION	WEIGHT (IN KG.)
1	FOUNDATION ITEMS OF GENERATOR	3550X715X880	4306
2	FOUNDATION ITEMS OF GENERATOR	3100X1050X850	2974
3	CONSUMABLES FOR FOUNDATION	500X500X200	5
4	GENERATOR STATOR	7520X4200X4870	220000
5	GENERATOR ROTOR	10550X1560X1660	43230
6	END SHIELD (TE) LOWER HALF	3640X1140X2000	5050

7	END SHIELD (EE) LOWER HALF	3640X1140X2000	5050
8	H.V.BUSHING	2000X950X600	480
9	LOOSE ITEMS OF WOUND STATOR	1500X1200X1000	860
10	GENERATOR ACCESSORIES	1800X1000X550	1046
11	GENERATOR ACCESSORIES (TERMINAL BUSHING BOX)	3500X1800X1250	3325
12	GAS BAFFLE RING,INSERT COVER	3700X3500X1340	2388
3	BEARING SHELLS	1100X835X950	782
14	END SHIELD (EE) UPPER HALF	3640X1140X2000	4650
15	END SHIELD (TE) UPPER HALF	3640X1140X2000	4650
16	SEAL RINGS	600X600X200	48
17	DEVICE FOR ROTOR INSERTION IN STATOR	2240X940X1220	691
18	ERECTION DEVICES	2250X1180X800	535
19	WIRE ROPES	1800X1450X200	102
20	DRY AIR BLOWER	1350X1250X800	40
21	TERMINAL CONNECTORS	1840X660X400	186
22	CONSUMABLES	500X600X300	20
23	BRUSHLESS EXCITER SET	5670X2390X2810	20047
24	EXCITER FRONT COVER	4310X2950X2950	1487
25	RR WHEEL COVER	1800X1600X1600	770
26	EXCITER REAR COVER	4330X3050X2950	1881
27	EXCITER BED PLATE ACCESSORIES	5500X1050X800	2430
28	EXCITER ACCESSORIES	2000X500X500	150
29	COOLER RACK ASSY	3000X1800X1100	801
30	SEAL OIL UNIT	6000X2500X3000	7825
31	SEAL OIL STORAGE TANK	3500X1300X1280	1025
32	GAS UNIT	2550X1790X2560	572
33	HYDROGEN DISTRIBUTOR	3480X1540X440	150
34	CO2 DISTRIBUTOR	2770X1240X440	116
35	LIQUID DETECTOR RACK	1700X900X1800	238
36	LOOSE VALVES	2000X1000X1000	759
37	LOOSE INSTRUMENTS	500X500X300	25
38	CO2 VAPOURISER	1520X640X840	145
	GENERATOR PIPING	6500X1200X1000	6174
	GENERATOR PIPING	6500X1000X800	1626
	GENERATOR PIPING	1900X1500X800	1365
	TOTAL WEIGHT		348004

D. STATIC AUXILIARIES

H2 CYLINDER	120 NOS	7000
CO2 CYLINDER	63 NOS	3000
DUPLEX OIL FILTER	1 SET	500
JACKING OIL FILTER	1 SET	500
GLAND STEAM CONDENSER	1 SET	785
STAND PIPE/LOOSE ITEM (GSC)	1 SET	150
LOOSE ITEMS OF GSC (FRAGILE)	1 SET	50
LOOSE ITEMS GSC(NON FRAGILE)	1 SET	210
DRAIN COOLER	1 SET	3300
LOOSE ITEMS(DRAIN COOLER)	1 SET	78
DRAIN COOLER LOOSE ITEM	1 SET	14
DRAIN COOLER LOOSE ITEM	1 SET	1
LP HEATER NO.1	1 SET	11800
LP HEATER NO.1&STAND PIPES	1 SET	100
LP HEATER NO.1 STAND PIPE	1 SET	45
LPH1 PANAL MOUNTED INSTRUMENT	1 SET	35
LOOSE ITEMS LP HEATER NO. 1	1 SET	100
LP HEATER NO.2	1 SET	9896
LP HEATER NO.2&STAND PIPES(LOO	1 SET	88
LP HEATER NO.2, INSTRUMENTS	1 SET	100
LP HEATER NO.2, STAND PIPES	1 SET	90
LOOSE ITEMS, LP HEATER NO.2	1 SET	150
LP HEATER NO.3	1 SET	9825
LP HEATER NO.3&STAND PIPES(LOO	1 SET	88
LP HEATER NO. 3, INSTRUMENTS	1 SET	200
LP HEATER NO. 3, STAND PIPES	1 SET	90
LP HEATER NO. 3,INSTRUMENTS	1 SET	100
INJECTOR FOR SUC. PIPE NB350	1 SET	529
MAIN OIL TANK & NOZZLE ARRGT.	1 SET	9100
MAIN OIL TANK & NOZZLE ARRANGE	1 SET	390

OIL STRAINERS	1 SET	168
VARIABLE ORIFICES THROTTLE VAL	1 SET	100
WASTE OIL TANK	1 SET	515
OIL STRIPPER	1 SET	83
TUBRINE OIL COOLER	1 SET	8000
TUBRINE OIL COOLER	1 SET	8000
TOC (LOOSE ITEMS)	1 SET	62
TOC (LOOSE ITEMS)	1 SET	40
UNLOADING OIL TANK	COMMON	600
CLEAN OIL TANK	COMMON	10200
DIRTY OIL TANK	COMMON	10200
CONDENSATE STORAGE TANK	1 NO	21000
DEAERATORSTORAGE TANK(3 PIECES)	1 SET	55000
DEAERATOR HEADER	1 SET	16000
RE JOINT ASSEMBLY	4 SET	68000
BUTTERFLY VALVES	4 SET	24000
HPHEATER 5	1 SET	31600
HPHEATER 6	1 SET	40500
HP FLASH TANK	1 NO	4550
LP FLASH TANK	1 NO	900
LP DRAINS FLASH TANK	1 NO	3200
PLATFORMS FOR ACTUATER / EQUIPMENT / DEAERATOR	SET	25000
HP/LP DOSING SYSTEM SKID MOUNTED	3 nos	15000
RETURN OIL PUMP WITH MOTOR SET	1nos	1500
Aux PRDS		5000
Plate heat Exchangers		22500
TOTAL (in KG)		430032

E. ROTATING AUXILIARIES

AUX. OIL PUMP WITH DRIVE	2 NOS	1500
EMERGENCY OIL PUMP	1 NOS	1000
JACKING OIL PUMP WITH DRIVE (AC/DC)	02 NOS	200
VACUUM PUMPS	2 NOS	26000
FAN EXHAUSTER WITH MOTOR FOR GSC	2 NOS	500
OIL VAPOUR EXHAUSTER	2 NOS	250
OIL CENTRIFUGE (SKID MOUNTED)	1 NO	4500
CENTRAL OIL CENTRIFUGE (SKID MOUNTED)	COMMON	4500
LPBP STOP+CV WITH EHA & WATER INJECTION VALVES	1 SET	10000
DUPLEX GAS DRIER WITH CONTROLS	2 SET	200
BFP Skid (Pump Assly + Base Plate +Tubing + Seal Coolers)	3 SETS	17310
BP Skid (Pump Assly + Base Plate +Tubing)	3 SETS	7533
BFP MOTORS WITH COOLERS & ACCESSORIES	3 SETS	36000
Hydraulic Coupling + Loose Items	3 SETS	10680
Hydraulic Coupling Working Oil Cooler	3 SETS	4425
Hydraulic Coupling Lube Oil Cooler	3 SETS	2325
Suction Strainer at BP Suction	3 SETS	2400
BFP Recirculation Valve	3 SETS	1050
DMCW Pumps	3 SETS	12500
CEP Assly	2 SETS	6300
CEP MOTORS WITH COOLERS & ACCESSORIES	2 SETS	15000
Canister	3 SETS	1530
CEP Foundation Ring	2 SETS	555
CEP Suction Strainer	2 SETS	2400
ACW Pumps	3 SETS	12500

Grillage

3 SETS 15090

TOTAL (in KG)

196248

F. Integral Piping

	DESCRIPTION	WT (IN KG)	REMARKS
	LUB. OIL	17000	
	CONTROL OIL	17000	
	COND. SPRAY	4000	
	TURBINE DRAINAGE	9000	
	SEAL SYSTEM	15000	
	GEN. PIPING SEAL OIL,GAS SYSTEM,WASTE GAS SYS ETC	9000	
	TOTAL	71000	

Annexure-II

BB. TENTATIVE WEIGHT SCHEDULE(PIPING)

SUMMARY OF WEIGHTS (PER UNIT)

A.	POWER CYCLE PIPING	248 MT
B.	LP PIPING	100 MT
C.	PLATFORMS/STRUCTURE	5 MT
D.	INSULATION(ON PPG/EQP)	65 MT

SNO	DESCRIPTION	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
A.	POWER CYCLE PIPING			
80312	LPBP VALVE UPSTREAM AND DOWNSTREAM	1	28,900	28900
80322	CRH PIPING TO DEAERATING HEATER	1	5,000	5000
80330	EXTRACTION STEAM TO LP HEATER 1	1	6,800	6800
80331	EXTRACTION STEAM TO LP HEATER 2	1	3,400	3400
80332	EXTRACTION STEAM TO LP HEATER 3	1	4,600	4600
80335	EXTRACTION STEAM TO DEAERATING HEATER	1	12,900	12900
80336	EXTRACTION STEAM TO HP HEATER NO.1	1	2,900	2900
80337	EXTRACTION STEAM TO HP HEATER 2	1	1,600	1600
80371	UNLISTED SV EXHAUSTS TG SCOPE	1	4,600	4600
80381	HP HEATER VENTS TG SCOPE	1	900	900
80382	LP HEATER VENTS	1	1,500	1500
80385	VENT FROM UNLISTED PPG/EQPT TO COND	1	2,300	2300
80387	CONDENSATE PUMP VENT	1	1,100	1100
80388	CONDENSER AIR EVACUATION PIPING	1	3,300	3300
80398	TURBINE WASHING STEAM	1	3,700	3700
80400	CONDENSATE SUCTION	1	3,200	3200
80401	CD FROM PUMP TO LPH1/DC INLET TEE AND	1	10,000	10000

80402	CD FROM LPH1/DC INLET TEE TO TG TP	1	6,300	6300
80407	CONDENSATE FOR SEALING OF VACUUM	1	1,300	1300
80408	CONDENSATE DUMP FROM HEADER	1	2,200	2200
80411	CONDENSATE/MAKE UP TO CONDENSER	1	2,000	2000
80413	UNLISTED CONDENSATE	1	1,100	1100
80420	BFP SUCTION	1	8500	8500
80421	BFP RECIRCULATION	1	3200	3200
80423	BFP TO HPH INCLUDING BYPASS	1	26400	26400
80424	BFP BETWEEN HTRS AND GROUP PROTECTION	1	20000	20000
80440	CONDENSER DRAINS	1	200	200
80442	GLAND STEAM COOLER DRAINS	1	300	300
80443	LP HEATER 1 TO CONDENSER	1	1,500	1500
80444	LP HEATER 2/3/4/5 DRAINS AND DRIP PUMP I	1	3,000	3000
80446	DEAERATING HEATER OVER FLOW AND DRAIN	1	2,900	2900
80447	HP HEATER DRAINS	1	9,200	9200
80449	TG CYCLE PIPING DRAINS AND VENTS	1	7,300	7300
80601	LOW PRESSURE DOSING PIPING	1	1000	1000
80673	LUBE OIL PIPING SYSTEM	1	4,300	4300
80921	H AND S FOR LIGHT UP STEAM LINE	1	8000	8000
80922	H AND S FOR LIGHT UP NON STEAM LINES	1	4500	4500
80923	H AND S FOR STEAM BLOWING	1	35000	35000
80924	H AND S FOR SYNCHRONISATION STEAM LINES	1	1250	1250
80925	H AND S FOR SYNCHRONISATION NON STEAM	1	2000	2000
80992	IMPORTED ELECTRODES	1	63	63
80415	TEST THERMOWELLS	1	100	100
80416	PG TEST MATERIALS	1	150	150
	TOTAL(IN KG)			248463

B.	<u>LP PIPING</u>			
80463	TG AUX COOLING WATER	1	44000	44000
80464	MAIN CIRCULATION WATER PIPING	1	20000	20000
80612	SERVICE AIR FOR INDIVIDUAL UNITS	1	6000	6000
80616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	1	8000	8000
80933	H AND S FOR LP PIPING	1	22000	22000
	TOTAL(IN KG)			100000
C.	<u>PLATFORMS AND STRUCTURES</u>			
	ADDITIONAL PLATFORMS AND STRUCTURES INCLUDING FRAMES, BEAMS,LADDERS,STAIRS,HANDR AILS ETC.	1	5000	5000
	TOTAL(IN KG)			5000
D.	<u>INSULATION</u>			
	INSULATION FOR PIPING / EQUIPMENTS	1	65000	65000
	TOTAL(IN KG)			65000

NOTES:

Weights of piping systems include supports, valves and fittings.

1All the above systems include pipe, bends, valves, fittings etc. to make the system complete in all respect.

2 Above system of piping can be re-grouped/renamed or any addition/deletion in the system can be made in order to make the system complete as per requirements.

3.Piping systems mentioned above are only indicative and does not cover all the systems to be erected / commissioned. Contractors are however are required to erect/commission all piping systems shown in the drawings and other document which may be necessary for erection, completion and overall commissioning of entire work.

4 During the course of fabrication and supply it is possible that similar materials of different codes can be used. No compensation is payable onthis account.

5 Out of above pipings indicated, stainless steel piping is approx.6 MT, Alloy steel piping is approx. 20 MT. The remaining pipings are of carbon steel.

6 The tonnages indicated are tentative only and may vary during execution of work. Payment shall be released on the basis of actual work executed as per final accepted rates.

7. The bidders may not above while quoting/accepting tonnage rates for subject work.

8. In case weight for any item is not available the contractor shall submit the approx. weight based on physical dimensions and relevant standards, for approval of the Construction Manager. His decision matter shall be final.

ANNEXURE-III

TERMINAL POINTS

STEAM TURBINE AND AUXILIARY SYSTEM

SYSTEMS	TERMINAL POINTS
Main Steam	Inlet / Outlet of Strainers,ESV-CV
Hot reheat	Inlet / Outlet of Strainers,Inlet of IV
Cold reheat	Only CRH NRV including both side welding joints (including spool piece for Steam Blowing)
Aux. Steam	Inlet of seal steam system.
Feed water	Feed discharge from BFP's to HP Heaters, between HP heaters and upto HP heaters outlet.
Electrical	Terminals of all drive motors junction boxes and panels to which owner's cables are to be connected.
Generator	Outlet end of Generator terminal bushing.
DM make-up water	D M make-up line at terminal point
CW system	Customer terminal point near A row.
ACW piping	Inlet on the common water supply line and outlet on the common water return line on the water-cooling system supply & return headers.
Instrument air	Terminal joint on the common air supply being provided by the Customer
Service air	Terminal joint on the common air supply being provided by the Customer

ANNEXURE-IV

EXCLUSIONS

- 1 All civil works other than dressing and chipping of foundation surfaces, fixing of supports and hangers in trenches, walls & grouting of equipments
- 2 All cabling work other than those supplied by BHEL with the equipment.
- 3 Complete control and instrumentation work other than those specifically included in this specification.
- 4 All AC & DC motor starters, switchgears and associated controls center unless otherwise specifically mentioned in the specification.
- 5 Application of spray insulation for steam turbine and other equipment.
- 6 Supply of lubricating oil for TG set.
- 7 Supply of chemicals required for chemical cleaning.
- 8 Supply of CO2 gases for generator protection.
- 9 Supply of all shims and gaskets, which go finally as part of equipment.

ANNEXURE –V

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 taxes except service tax in line with the NIT conditions for the subject work in Indian Rupees (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 - VI

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	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN REVERSE AUCTION	

Chapter - XI: RATE SCHEDULE

RATE SCHEDULE

SL.NO.	DESCRIPTION	LS PRICE/ RATE IN RUPEES	AMOUNT IN RUPEES
1	Lumpsum price for complete scope of work as per tender specification for items indicated under Annexure-I for 2 x 270 MW TG sets including integral piping, & auxiliaries. (Items as per Annexure- I.)	N A	Lumpsum price for 2 x 270 MW TG sets including integral piping, & auxiliaries. Rs. _____
2	Rate in Rs / MT for complete work as per tender specification for TG piping systems indicated under Annexure-II item-A.		
2A	Carbon Steel Piping system (Approximately 470 MT)		
2B	Alloy Steel Piping (Approximately 20 MT)		
2C	Stainless Steel Piping system (Approximately 6 MT)		
3	Rate in Rs / MT for complete work as per tender specification for LP piping systems indicated under Annexure-II item-B. (Approximately 200 MT)		
4	Rate in Rs / MT for fabrication and installation of additional platforms, structures, ladders and H&S as per site requirement and which are not indicated in the drawing indicated under Annexure-II item-C. (Approximately 10 MT)		
5	Rate in Rs / MT for complete work as per tender specification for application of insulation of equipments, auxiliaries and piping etc. indicated under Annexure-II item-D. (Approximately 130 MT)		
	TOTAL PRICE IN RUPEES		

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 against this Rate Schedule / BOQ.
3. In case of any mismatch in Rate and amount on Price discrepancy, the same will be dealt as per clause No. 1.4 of GCC.

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/ GVK GOINDWAL/TG/752

FOR

ERECTION, TESTING, COMMISSIONING TRIAL OPERATION AND HANDING OVER OF 2X270 MW TG SET ALONG WITH RELATED AUXILIARIES AND PIPING AT GVK, GOINDWAL TPS, DISTT. TARAN TARAN, PUNJAB.

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

SI	<u>DESCRIPTION</u>	<u>Chapter No.</u>	<u>PAGES</u>
	Part-II: Technical Specifications		
1.	GENERAL	Chapter-I	59-61
2.	CIVIL WORKS, FOUNDATION, GROUTING	Chapter-II	61-62
3.	ERECTION	Chapter-III	63-68
4.	WELDING, HEAT-TREATMENT, RADIOGRAPHY AND N	Chapter-IV	69-73
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6.	PAINTING INCLUDING FINISH PAINTING	Chapter-VI	76-77
7.	TESTING, PRE-COMMISSIONING, COMMISSIONING, POST-COMMISSIONING	Chapter-VII	78-80
8.	Drawings. <ul style="list-style-type: none"> • DRG. NO 304-100-M003 (R2), • DRG. NO 304-100-M004 (R2) • DRG. NO 304-100-M005 (R2) • DRG. NO 304-100-M006 (R2) 		

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.
- A** 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.
 - B** Proper out-turn as per BHEL's plan and commitment
 - C** Completion of work as per BHEL Schedule.
 - D** Good quality and accurate workmanship for proper performances of equipment.
 - E** Repair and rectification
 - F** Preservation / Re-conservation of all components during storage / erection till handing over.
 - G** 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/ GVK 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.

Chapter - II: CIVIL WORKS, FOUNDATION, GROUTING

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 The Grouting of all the 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 supply of the Special Grout as indicated in the drawings and as approved by the Engineer. **Although supply and application of approximately 25 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, fettling, 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 ovalates 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 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.

3.11 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.

3.12 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.

- 3.13** 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.
- 3.14** 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.
- 3.15** 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.
- 3.16** 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.
- 3.17** 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.
- 3.18** 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
- 3.19** 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.
- 3.20** 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.
- 3.21** 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.

- 3.22** 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
- 3.23** 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.
- 3.24** 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.
- 3.25** 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.
- 3.26** 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.
- 3.27** 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.
- 3.28** Steel for suspensions for piping, will be supplied in running lengths. These are to be cut to suitable sizes and adjusted as per requirement.
- 3.29** 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
- 3.30** 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.
- 3.31** 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.
- 3.32** 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.

- 3.33** 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.
- 3.34** 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.
- 3.35** 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.
- 3.36** 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.
- 3.37** 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
- 3.38** 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
- 3.39** 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.
- 3.40** 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.

- 3.41** Erection of CO₂ and H₂ 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.
- 3.42** 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.
- 3.43** 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.
- 3.44** All cabling work (system cabling i.e. cables from local control panel to system drives / instruments etc.) including laying of cable trays for oil centrifuge machine, gas drier and on load condenser tube cleaning system is in the scope of subject work.
- 3.45** Wherever cables are to be laid under the scope of subject work the same shall be laid in cable trays, dressed, properly glanded and terminated.
- 3.46** The contractor is strictly prohibited in using the TG / Aux. Components for any temporary supporting or scaffolding works etc. In case of such misuse a sum of determined by Engineer will be recovered from contractor's bills
- 3.47** 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
- 3.48** 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

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

Chapter - IV: WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

4.0 WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT

- 4.1 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.
- 4.2 Welding of pressure parts, equipment, piping, high tensile structural steel shall be done by certified high pressure welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The 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 including tack welders, 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/ GVK 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 relieving 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 etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by BHEL. Necessary help in conducting the UT shall however be rendered by contractor.
- 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. The geometric unsharpness 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/ GVK will be taken at your cost.

Chapter - V: APPLICATION OF INSULATION

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.

Chapter - VI: PAINTING INCLUDING FINISH PAINTING

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. 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** 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.
- 6.4** 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.
- 6.5** 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.
- 6.6** 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.
- 6.7** The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work.
- 6.8** 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.

6.9 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.

6.10 CONDENSER PAINTING

6.10a 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 all 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.

6.10b 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

Chapter - VII: TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING

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

7.1 The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would 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.

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** 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.
- 7.10** It shall be the responsibility of the contractor to provide various category of workmen in sufficient numbers along with supervisors with necessary consumables, T&P, IMTEs etc., along with any other assistance required during pre-commissioning, commissioning and post -commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over.

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

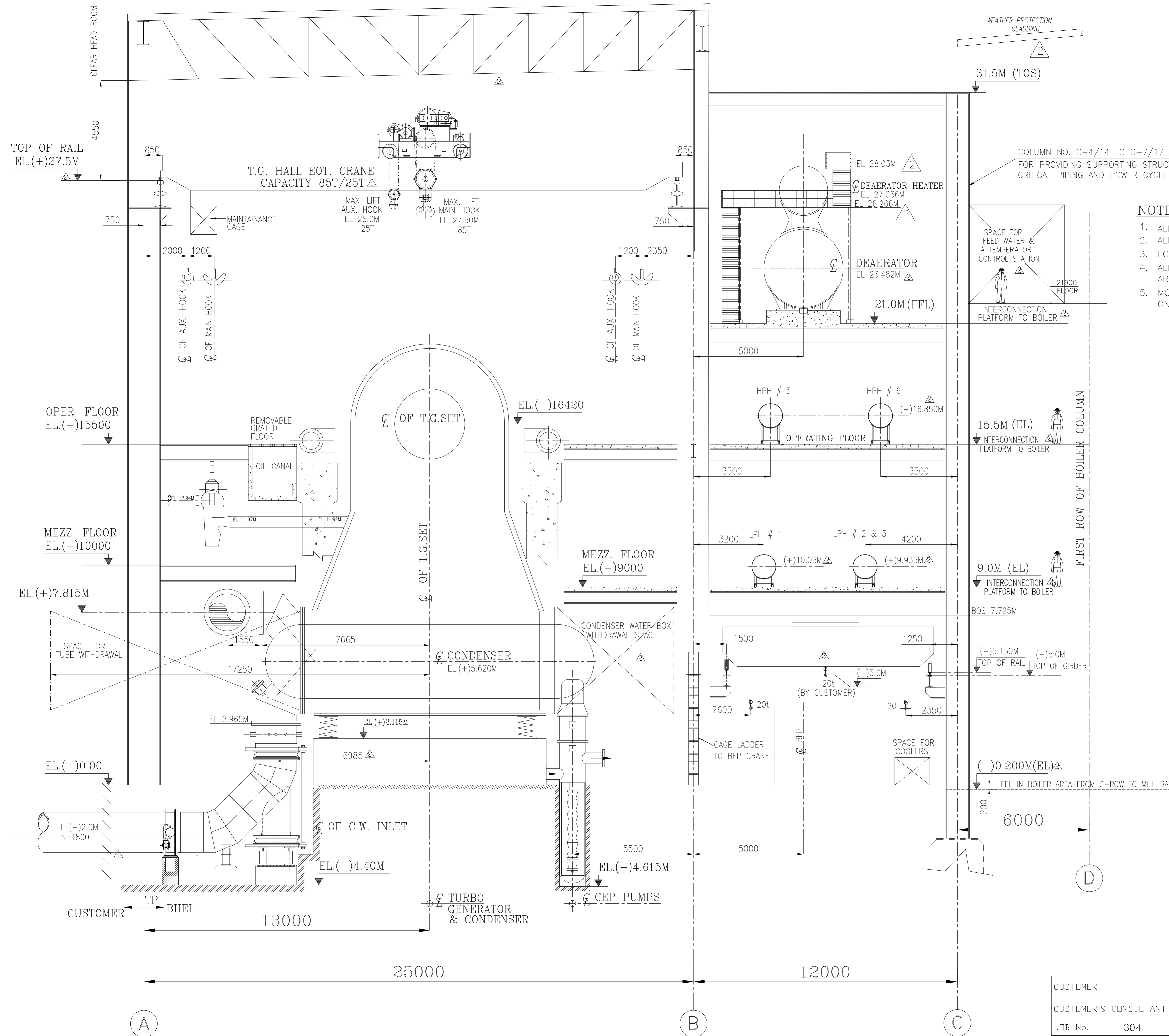
- 7.11** In case, any rework is required because of contractor's faulty erection that is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the 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 all 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.

REFERENCE DRGS:-

- CONDENSER
- GA OF CEP

0-160-10-70055C149 (HWR)
HY-DG-1-18100-56560 (HYD)



NOTES:-

- ALL DIMENSIONS ARE IN MM & ELEVATIONS IN METERS UNLESS STATED OTHERWISE.
- ALL ELEVATIONS ARE WITH RESPECT TO TG HALL 0.0M WHICH CORRESPONDS TO RL 219.85M.
- FOR TG COLS & FLOOR FRAMING REFER CIVIL DRGS SEPARATELY.
- ALL CIVIL DETAILS SUCH AS DOORS/WALLS/CLADINGS/OPENINGS/TOILETS/STAIRCASES ETC. ARE INDICATIVE ONLY & FOR EXACT DETAILS REFER CIVIL/ARCHITECTURE DRAWINGS.
- MONORAIL WILL BE USED TO BRING BFP COMPONENTS IN BAY 3-4 & 13-14 FOR UNIT ONE & TWO RESPECTIVELY AND IT WILL BE DRAGGED OUT THROUGH THE ROLLING SHUTTERS.

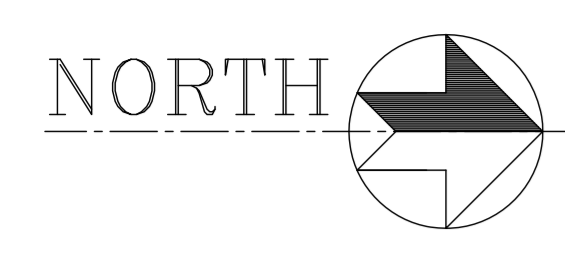
LEGEND:

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

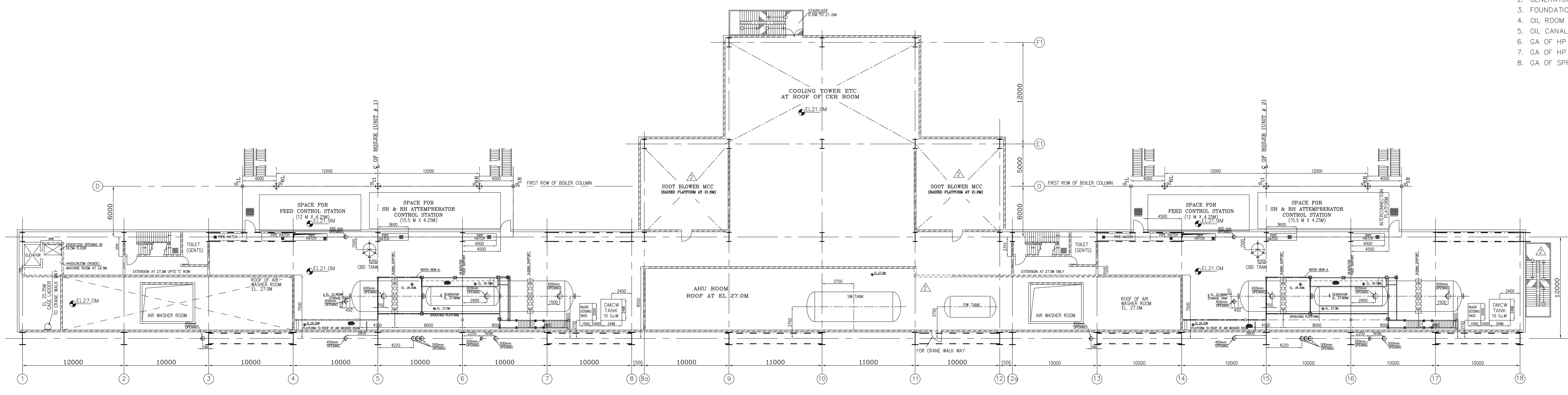
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COMPUTER FILE NAME: 304_100_M006_R2

CUSTOMER		GVK POWER (GOINDWAL SAHIB) LTD.	
CUSTOMER'S CONSULTANT		TCE CONSULTING ENGINEERS LIMITED, BANGALORE	
JDB No.		304	
STATUS		CONTRACT	
DISTRIBUTION		DIST. TARN TARAN, PUNJAB	
TO		BHARAT HEAVY ELECTRICALS LTD	
No.DFF		POWER SECTOR PROJECT ENGINEERING MANAGEMENT NEW DELHI	
REV		DATE	
02	13.08.10	01	01.10.08
1. REVISED AS PER MOM DTD. 4/5-11-2009 & COMMENTS DTD. 05.02.2010. MARKED AS		1. REVISED AS MARKED	
TITLE			
CROSS SECTION OF T.G. HALL			
DEPT.		SCALE 1:100	
SIGN		DRAWING No. PE-DG-304-100-M006	
DATE		SHEET 1 OF 1 REV 02	



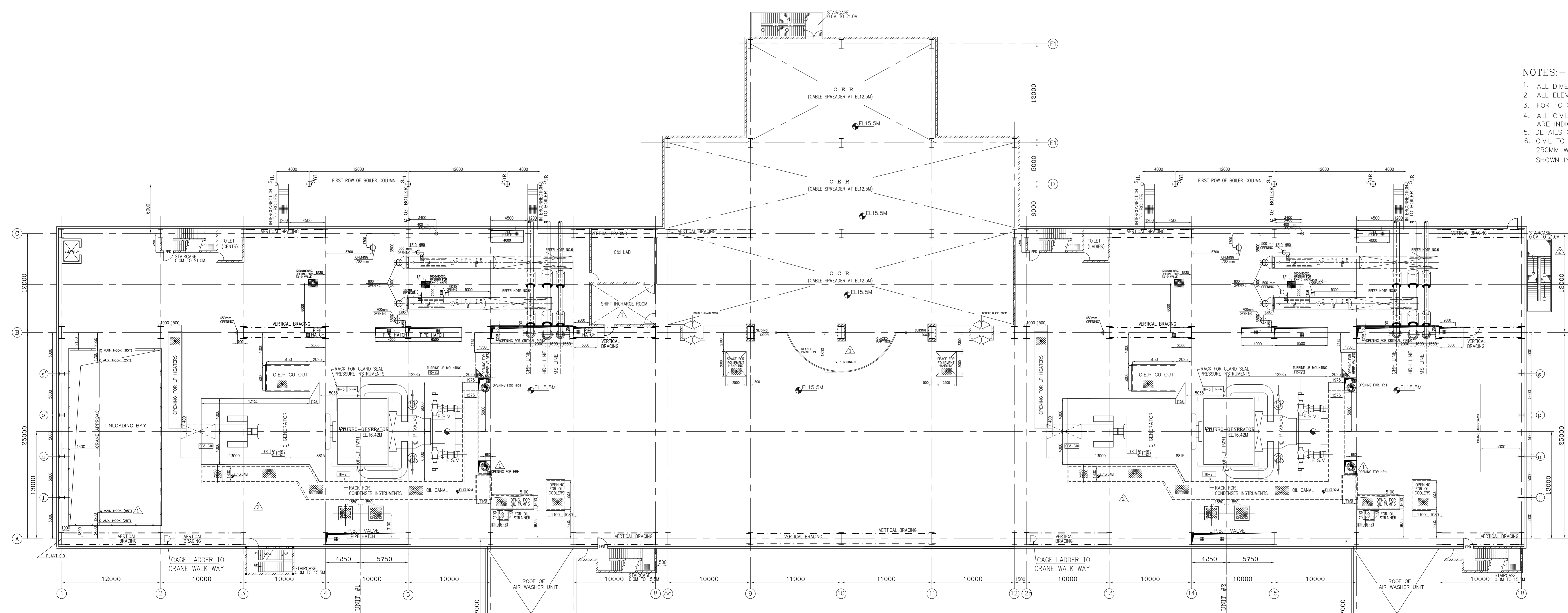
- REFERENCE DRGS:-**
- | | |
|-----------------------------------|--------------------------|
| 1. CONDENSER | 0-160-10-70055C149 (HWR) |
| 2. GENERATOR OUTLINE | 0-139-00-01294 (HWR) |
| 3. FOUNDATION PLAN | 0-13100-B3153 (HWR) |
| 4. OIL ROOM ARRANGEMENT | 0-13100-B3004 (HWR) |
| 5. OIL CANAL DETAILS | 0-13100-B3001 (HWR) |
| 6. GA OF HP HEATER # 5 | -(BPL) |
| 7. GA OF HP HEATER # 6 | -(BPL) |
| 8. GA OF SPRAY CUM TRAY DEAERATOR | -(HYD) |



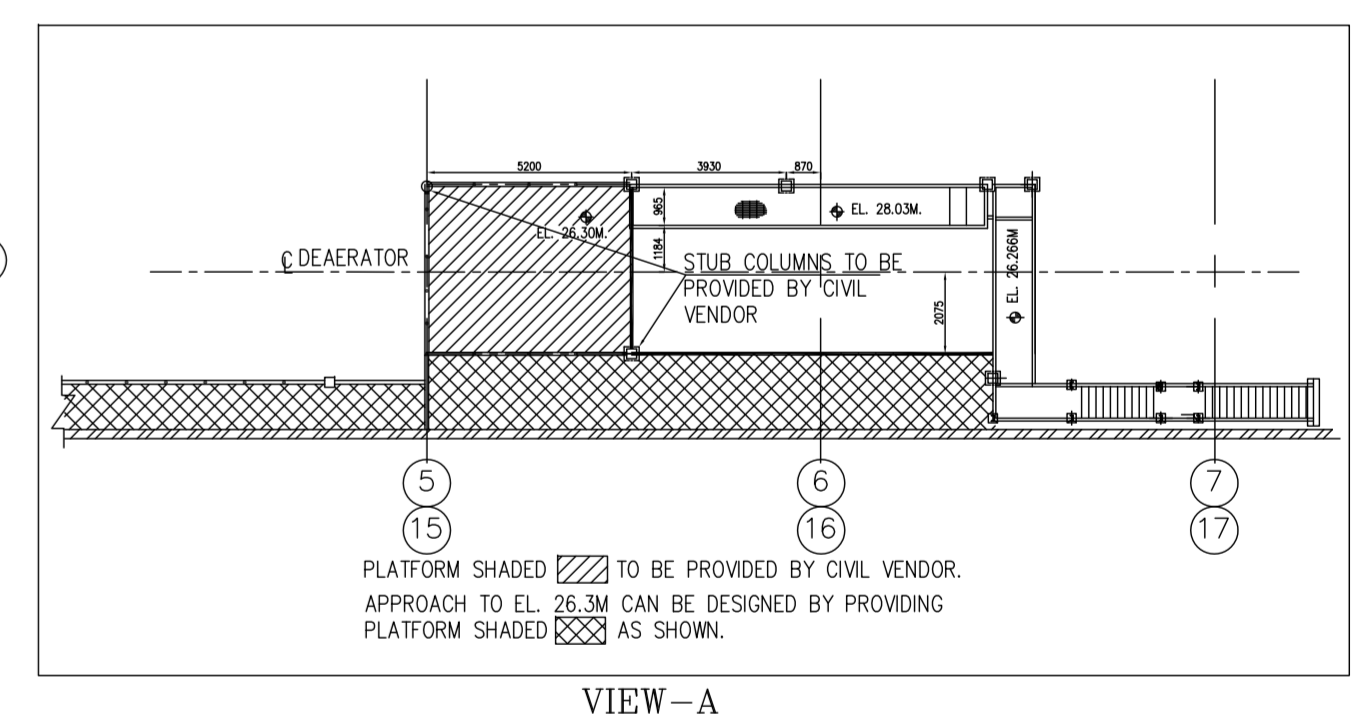
PLAN AT 21.0M

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

- NOTES:-**
- ALL DIMENSIONS ARE IN MM & ELEVATIONS IN METRES UNLESS STATED OTHERWISE.
 - ALL ELEVATIONS ARE WITH RESPECT TO TG HALL 0.0M WHICH CORRESPONDS TO 219.85M.
 - FOR TG COLS & FLOOR FRAMING REFER CIVIL DRGS SEPARATELY.
 - ALL CIVIL DETAILS SUCH AS DOORS/WALLS/CLADINGS/OOPENINGS/TOILETS/STAIRCASES ETC. ARE INDICATIVE ONLY & FOR EXACT DETAILS REFER CIVIL/ARCHITECTURE DRAWINGS.
 - DETAILS OF LAYOUT AS SHOWN FOR OTHER THAN BHEL SCOPE ARE SUGGESTIVE ONLY.
 - CIVIL TO PROVIDE 2Nos. EPS (TOS) 250MM WIDE X 1380MM LONG FOR HPH-5, 250MM WIDE X 1630MM LONG FOR HPH-6 FOR MOVEMENT OF HP-HEATERS AS PER LOCATION SHOWN IN THE DWG.



PLAN AT 15.5M

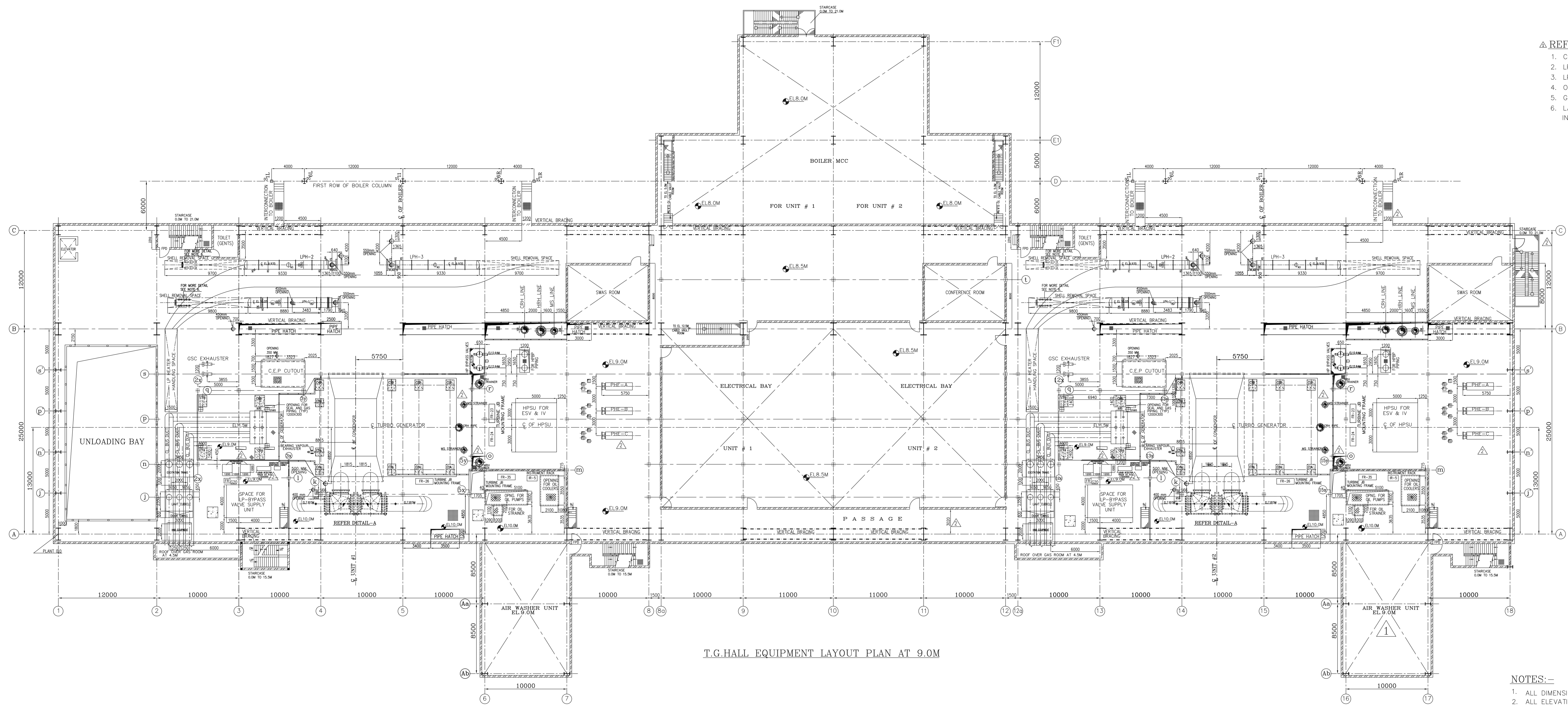


VIEW-A

CUSTOMER		gvlk		GVK POWER (GOINDWAL SAHIB) LTD.			
CUSTOMER'S CONSULTANT		TCE		TCE CONSULTING ENGINEERS LIMITED, BANGALORE			
JOB No.	304	STATUS		CONTRACT			
DISTRIBUTION		TO		DIST. TARN TARAN, PUNJAB			
NO. OF		DEPT		BHARAT HEAVY ELECTRICALS LTD			
REV		M		POWER SECTOR			
DATE		01.10.08		PROJECT ENGINEERING MANAGEMENT			
BY		BR/S4/AJ/S4		NEW DELHI			
DATE		01.10.08		TITLE			
REVISED AS PER MOM DTD 4/5-11-2009		REVISED AS MARKED		T.G.HALL EQUIPMENT LAYOUT PLAN AT			
AND COMMENTS STD.05.02.2010.		MARKED AS		15.5M & 21.0M FLOOR			
MPL	C	MSE	I	MAX	E	DEPT.	SCALE 1:200
SIGN		DATE		DRAWING No.		PE-DG-304-100-M005	
DATE		SHEET 1 OF 1		REV		02	

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COMPUTER FILE NAME: D04_100_M005.DWG

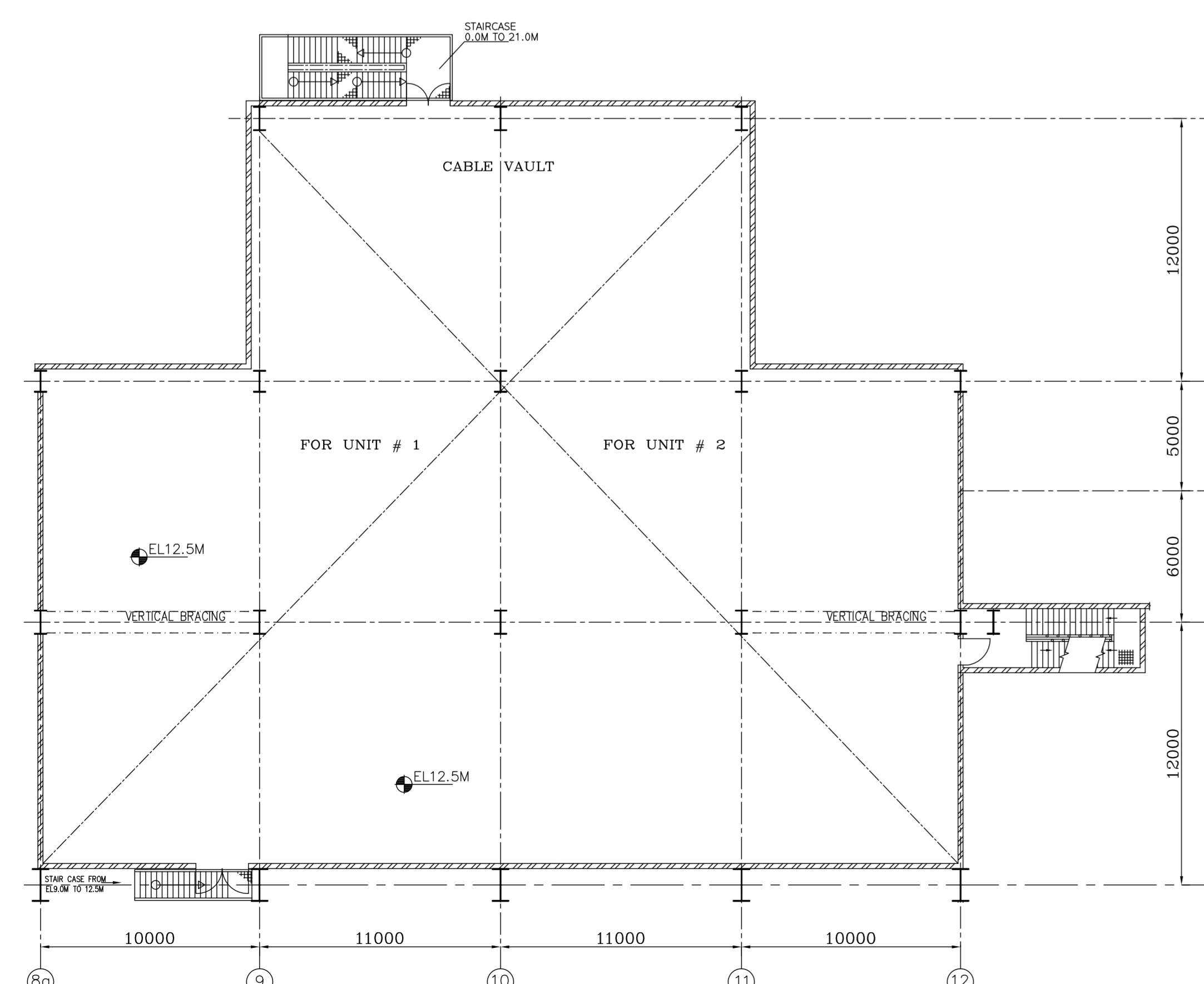


T.G.HALL EQUIPMENT LAYOUT PLAN AT 9.0M

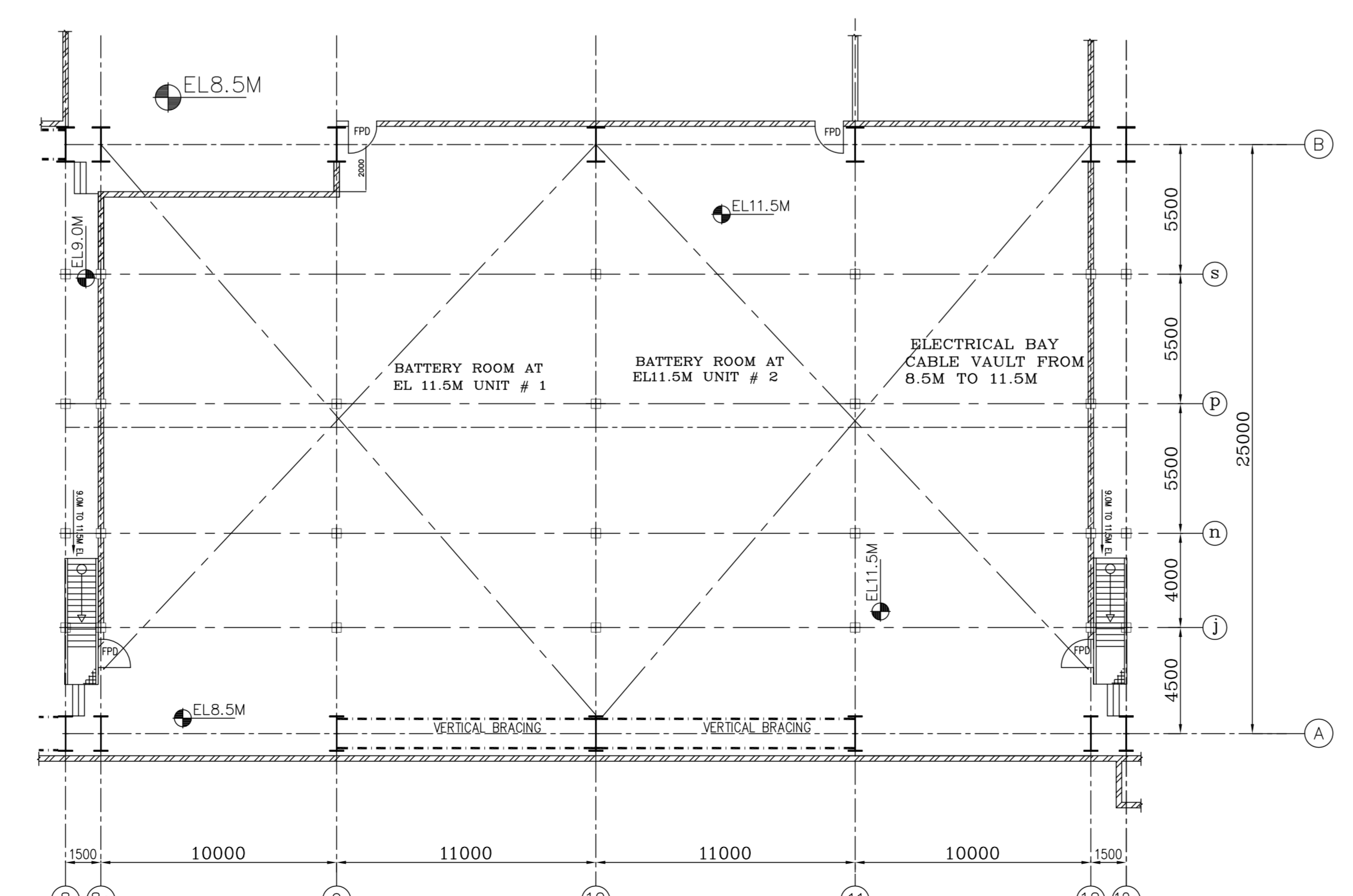
- △ REFERENCE DRGS:-
- | | |
|---|-----------------------------|
| 1. CONDENSER | 0-160-10-70055C149 (HWR) |
| 2. LP HEATER # 1 | 0-162-18-70086C149 (HWR) |
| 3. LP HEATER # 2 & 3 | 0-162-22-70064C149 (HWR) |
| 4. OIL ROOM ARRANGEMENT | 0-13100-B3004 (HWR) |
| 5. GA OF CEP | HY-DG-1-18100-56560 (HWT) |
| 6. LAYOUT OF ELECTRICAL EQUIPMENT IN POWER HOUSE BUILDING | PLL-GVK-PEE-299-F-001 (PLL) |

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

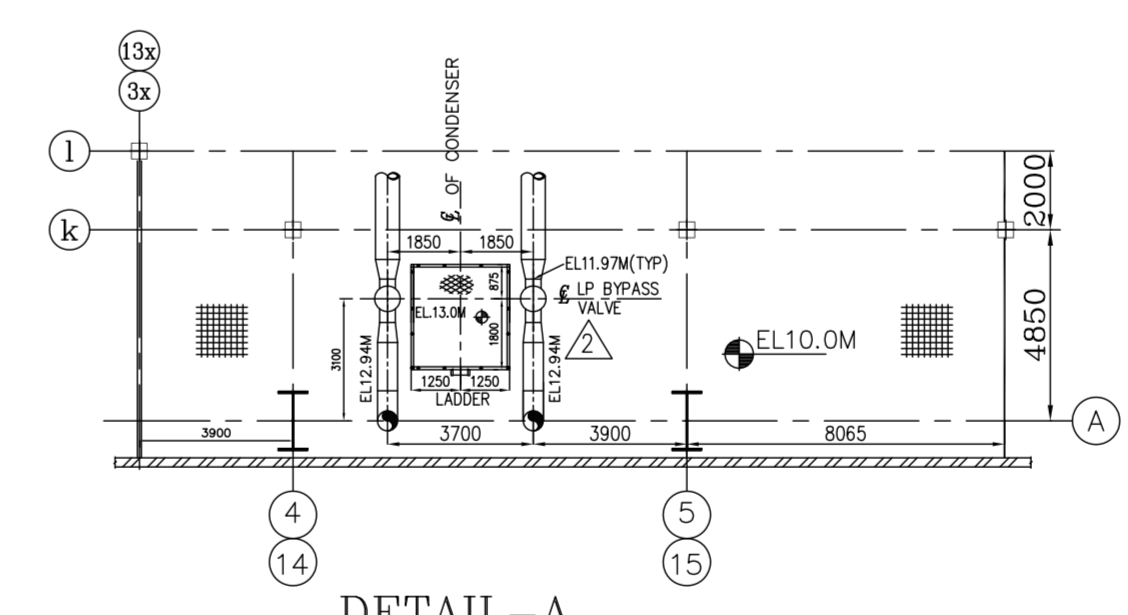
- NOTES:-
- ALL DIMENSIONS ARE IN MM & ELEVATIONS IN METERS UNLESS STATED OTHERWISE.
 - ALL ELEVATIONS ARE WITH RESPECT TO T.G HALL 0.0M WHICH CORRESPONDS TO RL 219.85M.
 - FOR TO COLS & FLOOR FRAMING REFER CIVIL DRGS SEPARATELY.
 - ALL CIVIL DETAILS SUCH AS DOORS/WALLS/CLADINGS/OPENINGS/TOILETS/STAIRCASES ETC. ARE INDICATIVE ONLY & FOR EXACT DETAILS REFER CIVIL/ARCHITECTURE DRAWINGS.
 - DETAILS OF LAYOUT AS SHOWN FOR OTHER THAN BHEL SCOPE ARE SUGGESTIVE ONLY.
 - CIVIL TO PROVIDE 2NoS.EPS(TOS 9.0M) PER HEATER 150MM WIDEx17900MM LONG FOR LPH-1, 150MM WIDEx17100MM LONG FOR LPH-2&3 FOR MOVEMENT OF LP-HEATERS AS PER LOCATION SHOWN IN THE DWG.



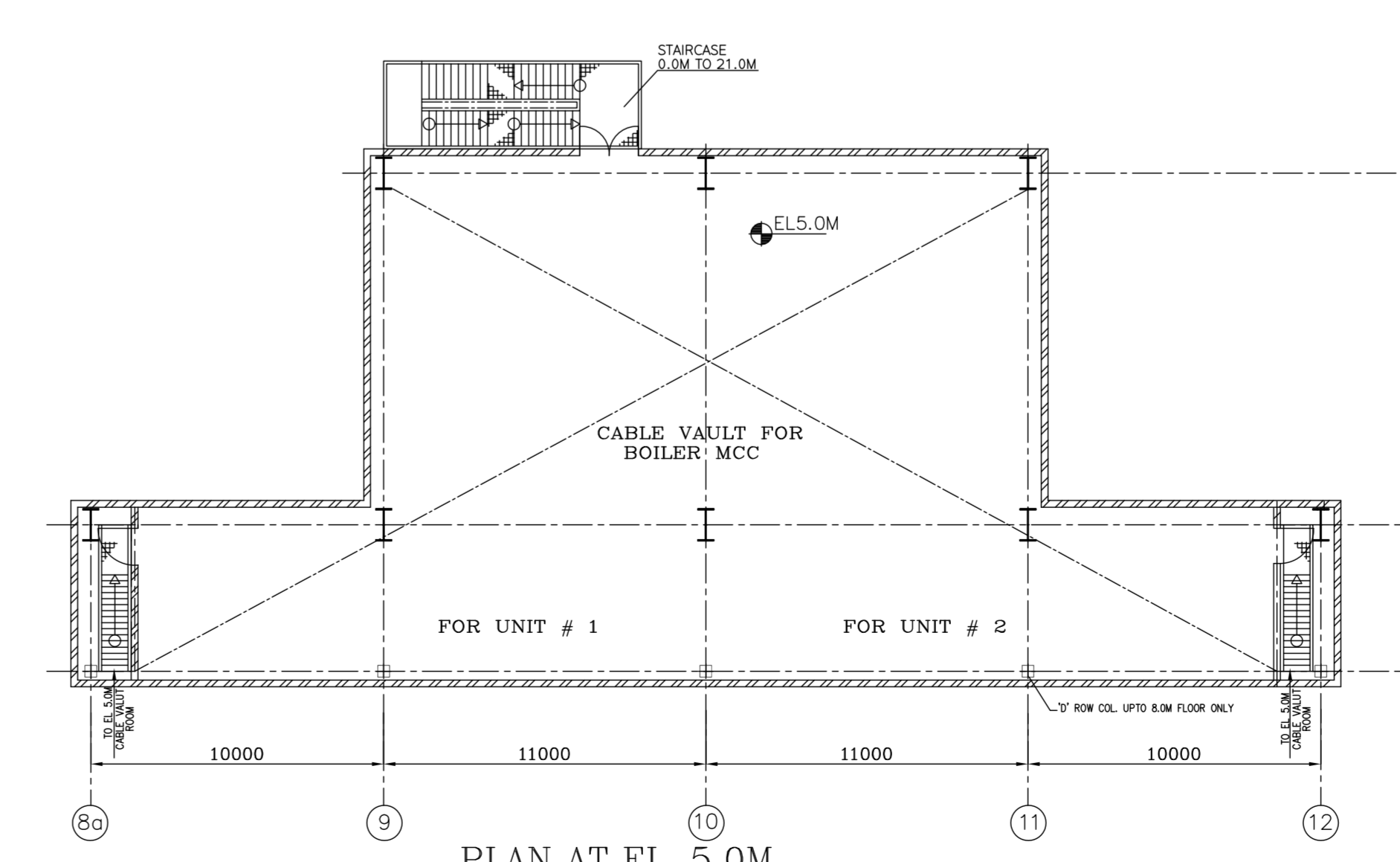
LAYOUT PLAN AT 12.5M



LAYOUT PLAN AT 11.5M



DETAIL-A



PLAN AT 5.0M

REV	DATE	ALD	CHD	APPD	REV	DATE	ALD	CHD	APPD
01	13.08.10	VJ	LKJ	AJ	01	01.10.08	VJ	BR/S4/	AJ/S4/
02					01				

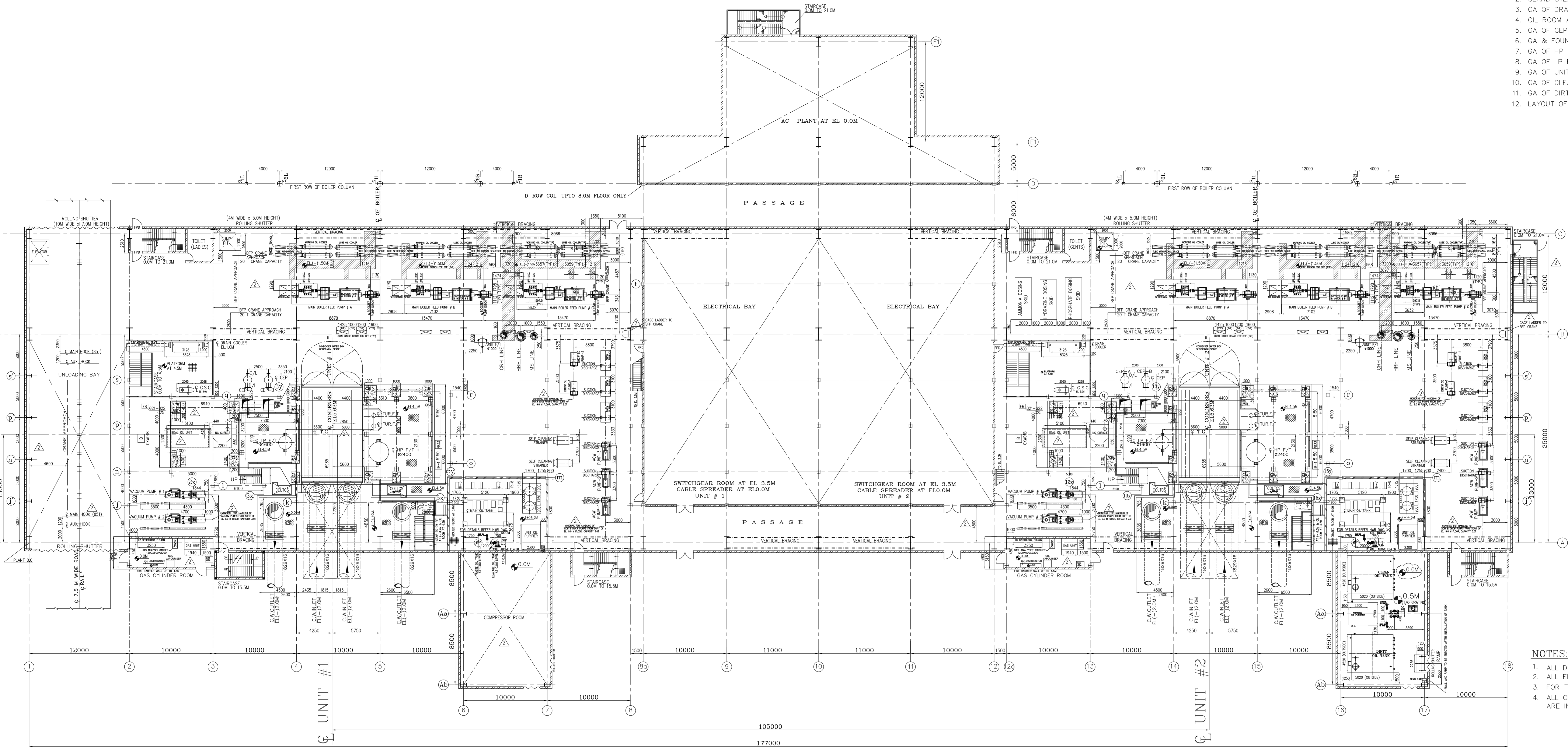
CUSTOMER		gvc [®] GVK POWER (GOINDWAL SAHIB) LTD.	
CUSTOMER'S CONSULTANT		TCE CONSULTING ENGINEERS LIMITED, BANGALORE	
JOB No.	304	2 X 270 MW GOINDWAL SAHIB TPS (UNIT 1 & 2)	
STATUS	CONTRACT	DIST. TARN TARAN, PUNJAB	
DISTRIBUTION		BHARAT HEAVY ELECTRICALS LTD	
		POWER SECTOR	
		PROJECT ENGINEERING MANAGEMENT	
		NEW DELHI	
TITLE			
T.G.HALL EQUIPMENT LAYOUT PLAN AT 9.0M FLOOR			
MPL	C	MSE	I
SCALE	1:200	DEPT.	SCALE
NO. OF SHEETS	1	NO. OF SHEETS	1
DRAWING No.	PE-DG-304-100-M004	DATE	02

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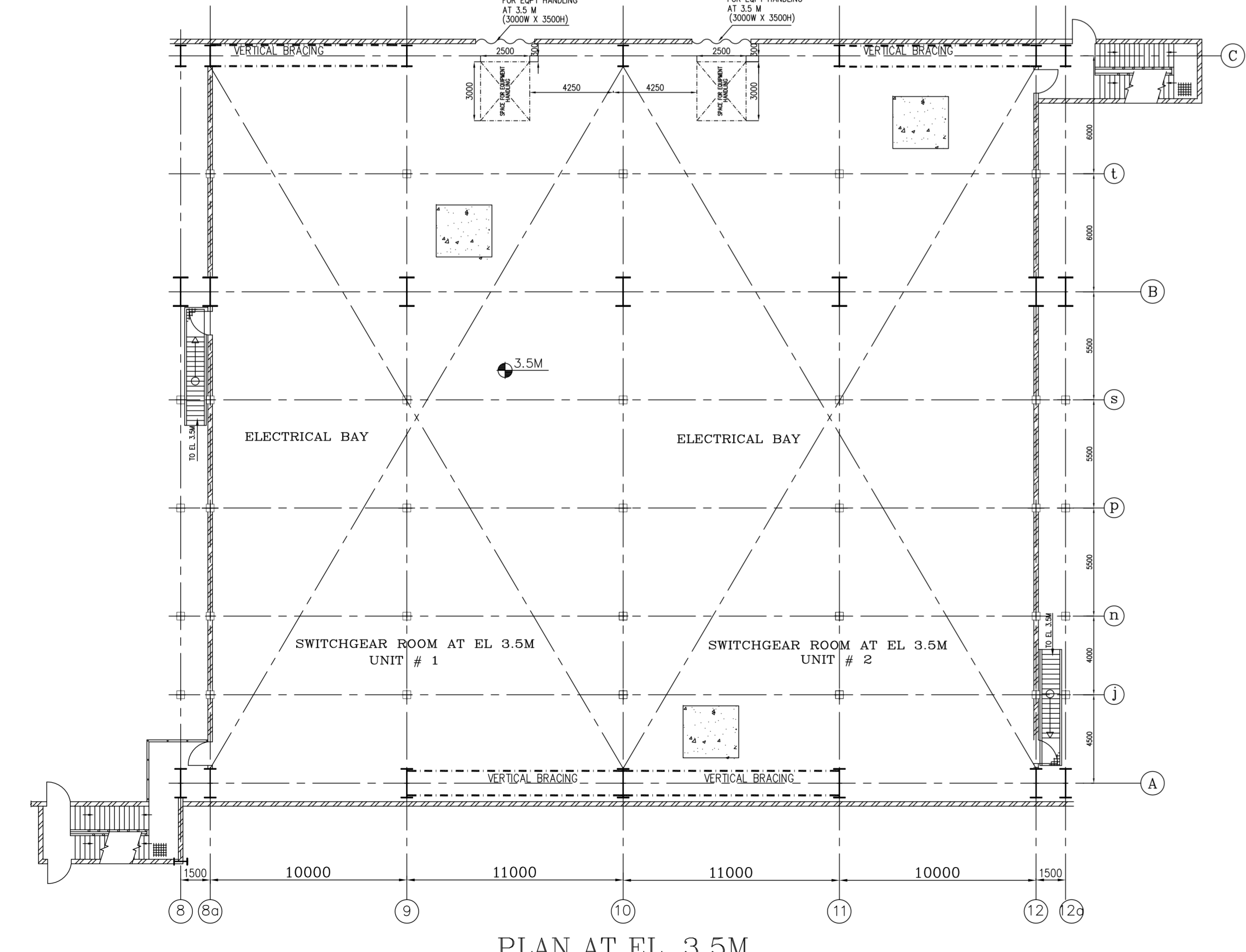
- △ REFERENCE DRGS:-**
- 1. CONDENSER 0-160-10-70055C149 (HWR)
 - 2. GLAND STEAM CONDENSER 0-162-05-7000B149 (HWR)
 - 3. GA OF DRAIN COOLER 1-162-01-7001C149 (HWR)
 - 4. OIL ROOM ARRANGEMENT 0-13100-B3004 (HWR)
 - 5. GA OF CEP HY-DG-1-18100-56560 (HYD)
 - 6. GA & FOUNDATION DETAILS OF BFP SET HY-DG-1-18000-56553(HYD)
 - 7. GA OF HP FLASH TANK -(BPL)
 - 8. GA OF LP FLASH TANK -(BPL)
 - 9. GA OF UNIT FLASH TANK -(BPL)
 - 10. GA OF CLEAN OIL TANK 1-17052-40260 (BPL)
 - 11. GA OF DIRTY OIL TANK 1-17052-40261 (BPL)
 - 12. LAYOUT OF ELECTRICAL EQUIPMENT IN POWER HOUSE BUILDING PLL-GVK-PEE-299-F-001 (PLL)



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

- NOTES:-**
1. ALL DIMENSIONS ARE IN MM & ELEVATIONS IN METRES UNLESS STATED OTHERWISE.
 2. ALL ELEVATIONS ARE WITH RESPECT TO TO HALL 0.0M WHICH CORRESPONDS TO RL 219.85M.
 3. FOR TG COLS & FLOOR FRAMING REFER CIVIL DRGS SEPARATELY.
 4. ALL CIVIL DETAILS SUCH AS DOORS/WALLS/GLAZINGS/OPENINGS/TOILETS/STAIRCASES ETC. ARE INDICATIVE ONLY & FOR EXACT DETAILS REFER CIVIL/ARCHITECTURE DRAWINGS.

PLAN AT EL. 0.0M



PLAN AT EL. 3.5M

CUSTOMER		gvek [®] GVK POWER (GOINDWAL SAHIB) LTD.								
CUSTOMER'S CONSULTANT		TCE CONSULTING ENGINEERS LIMITED, BANGALORE								
JOB No.	304	2 X 270 MW GOINDWAL SAHIB TPS (UNIT 1 & 2)								
STATUS	CONTRACT	DIST. TARN TARAN, PUNJAB								
DISTRIBUTION		BHARAT HEAVY ELECTRICALS LTD. POWER SECTOR PROJECT ENGINEERING MANAGEMENT NEW DELHI								
REV	DATE	ALTD	CHD	APPD	REV	DATE	ALTD	CHD	APPD	
01	13.08.10	VJ	LKJ	AJ	01	01.10.08	VJ	BR/S4/	AJ	S4/
1. REVISED AS PER MOM DTD 4/5-11-2008 AND COMMENTS DTD 05.02.2010.					1. REVISED AS MARKED △					
2. DRAWING REVISED AS PER HWR DWG.										
3. REVISED AS MARKED △										
TITLE										
T.G.HALL EQUIPMENT LAYOUT PLAN AT 0.0M FLOOR										
MPL	C	MSE	I	MAX	E	DEPT.	SCALE 1:200	DRAWING No.		
						PE-DG-304-100-M003				
						SHEET 1 OF 1		REV 02		

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