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

NO. BHE/PW/PUR/BELAT-STG/708

FOR

RECEIPT OF MATERIALS FROM BHEL / CUSTOMER STORES / STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION TO SITE OF WORK, ERECTION, TESTING, ASSISTANCES FOR COMMISSIONING & TRIAL OPERATION, FINAL PAINTING AND HANDING OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT FROM TRAILER, UNLOADING, HANDLING, LIFTING & PLACEMENT ON FOUNDATION), CONDENSER WITH R.E. JOINTS & BUTTERFLY VALVES, TG INTEGRAL PIPING, EXTERNAL/ REGENERATIVE PIPING INCLUDING, EQUIPMENTS / TANKS / VESSELS, HP & LP HEATERS, POWER CYCLE PUMPS WITH ASSOCIATED AUXILIARIES ETC. INCLUDING BOUGHT OUT ITEMS, PEM PACKAGES LIKE CENTRAL LUBE OIL SYSTEM, MISC. PUMPS, COLTS, PLATE HEAT EXCHANGER, MISC. HOISTS & CHAIN PULLEY BLOCKS, SELF-CLEANING STRAINERS ETC. **OF** 1X270 MW THERMAL POWER PLANT

AT

1X270 MW THERMAL POWER PLANT, BELA
IDEAL ENERGY PROJECTS LIMITED
DISTT- NAGPUR - MAHARASTRA

PART I

(TECHNICAL BID SPECIFICATION, NOTICE INVITING TENDER & GCC)

BHARAT HEAVY ELECTRICALS LIMITED
(A GOVERNMENT OF INDIA UNDERTAKING)
POWER SECTOR : WESTERN REGION
345-KINGSWAY, NAGPUR – 440 001

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LEGEND:

$: Included in Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled **"NIT+GCC-708".**

@: Issued as separate hard copy booklet 'Tender Specifications Part-II (Price Bid-708)'. Hosted in BHEL web page (www.bhel.com) as file titled **"PRICE BID-708"**

***** ENCLOSED AT THE END OF TENDER SPECIFICATION PART-I.

Note:
Rest of the tender documents are included in Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled "**TECH BID-708**

BHARAT HEAVY ELECTRICALS LIMITED

(A GOVERNMENT OF INDIA UNDERTAKING)
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345-KINGSWAY, NAGPUR 440 001

TENDER SPECIFICATION DOCUMENT ISSUE DETAILS

TENDER SPECIFICATION No. BHE / PW / PUR / BELAT-STG/708

JOB: RECEIPT OF MATERIALS FROM BHEL / CUSTOMER STORES / STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION TO SITE OF WORK, ERECTION, TESTING, ASSISTANCES FOR COMMISSIONING & TRIAL OPERATION, FINAL PAINTING AND HANDING OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT FROM TRAILER, UNLOADING, HANDLING, LIFTING & PLACEMENT ON FOUNDATION), CONDENSER WITH R.E. JOINTS & BUTTERFLY VALVES, TG INTEGRAL PIPING, EXTERNAL/ REGENERATIVE PIPING, EQUIPMENTS / TANKS / VESSELS, HP & LP HEATERS, POWER CYCLE PUMPS WITH ASSOCIATED AUXILIARIES ETC. INCLUDING BOUGHT OUT ITEMS, PEM PACKAGES LIKE CENTRAL LUBE OIL SYSTEM, MISC. PUMPS, COLTS, PLATE HEAT EXCHANGER, MISC. HOISTS & CHAIN PULLEY BLOCKS, SELF-CLEANING STRAINERS ETC. **OF** 1X270 MW THERMAL POWER PLANT

AT

1X270 MW THERMAL POWER PLANT, BELA
IDEAL ENERGY PROJECTS LIMITED
DISTT- NAGPUR - MAHARASTRA

EARNEST MONEY DEPOSIT: Please see Notice Inviting Tender.

LAST DATE FOR
TENDER SUBMISSION: Please see Notice Inviting Tender

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

M/s. ……

…….

(TENDER DOCUMENTS ARE NOT TRANSFERABLE)

For Bharat Heavy Electricals Limited

Sr DGM (Purchase)
Place: Nagpur
Date:

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
POWER SECTOR - WESTERN REGION
345-KINGSWAY, NAGPUR 440 001

PROCEDURE FOR SUBMISSION OF SEALED TENDERS

THE TENDERER MUST SUBMIT THEIR TENDERS AS REQUIRED IN TWO PARTS IN SEPARATE SEALED COVERS PROMINENTLY SUPERSCRIBED AS PART-I TECHNICAL BID AND PART-II PRICE BID AND ALSO INDICATING ON EACH OF THE COVERS THE **TENDER SPECIFICATION NUMBER AND DUE DATE AND TIME AS MENTIONED IN THE TENDER NOTICE.**

PART-I (TECHNICAL BID) COVER-I

EXCEPTING RATE SCHEDULE, ALL OTHER SCHEDULES, DATA SHEETS AND DETAILS CALLED FOR IN THE SPECIFICATION SHALL BE ENCLOSED IN PART-I "TECHNICAL BID" ONLY.

PART-II (PRICE BID) COVER-II

ALL INDICATIONS OF PRICE SHALL BE GIVEN IN THIS PART-II "PRICE BID". **EMD SHALL NOT BE INCLUDED IN THIS COVER.**

THESE TWO SEPARATE COVERS-I AND II (PART-I AND PART-II) SHALL TOGETHER BE ENCLOSED IN A THIRD ENVELOPE (COVER-III) ALONGWITH REQUISITE EMD AS INDICATED EARLIER AND THIS SEALED COVER SHALL BE SUPERSCRIBED AND SUBMITTED TO ADDL. GEN MANAGER (PURCHASE) AT THE ABOVE MENTIONED ADDRESS ON OR BEFORE THE DUE DATE AS INDICATED.

THE QUALIFIED TENDERER WILL BE INTIMATED SEPARATELY ABOUT THE STATUS OF THEIR OFFER.

TENDERER ARE REQUESTED TO MAKE SPECIFIC NOTE OF THE FOLLOWING CONDITIONS:

- CONTRACTOR SHOULD HAVE ADEQUATE RESOURCES INCLUDING MAJOR T&PS AT HIS DISPOSAL FOR THIS JOB.
- CONTRACTOR SHOULD HAVE SOUND FINANCIAL STABILITY.
- TENDERER SHOULD MEET QUALITY REQUIREMENT REGARDING WORKMANSHIP, DEPLOYMENT OF PERSONNEL, ERECTION TOOLS AND NECESSARY INSPECTION, MEASUREMENT & TESTING INSTRUMENTS.
- ALL INFORMATION AS CALLED FOR IN VARIOUS APPENDICES AND CLAUSES OF TENDER SPECIFICATION SHOULD BE FURNISHED IN COMPLETENESS. PLEASE REFER THE CHECKLIST.
- CLARIFICATION ON TENDER IF ANY, SHALL BE OBTAINED BY THE TENDERER BEFORE SUBMITTING THEIR OFFER.
- OFFERS MUST BE SUBMITTED WITHOUT ANY DEVIATION.
- OFFERS RECEIVED WITH ANY DEVIATION OR WITHOUT RELEVANT INFORMATION AS DESCRIBED ABOVE ARE LIABLE TO BE REJECTED. PRICE BIDS RECEIVED IN THE FORM OTHER THAN SPECIFIED IN PART-II (PRICE BID) ARE LIABLE TO BE REJECTED.
- In case customer approval is required for this package, bidder's offer will be accepted subject to approval of bidder by customer.

PROJECT INFORMATION

BACKGROUND

BHEL's Client M/s IDEAL ENERGY PROJECTS Ltd (IEPL) is installing Pulverized Coal based Power Plant at BELA Thermal Power Plant, Distt-Nagpur , Maharashtra. The said client has undertaken the installation of one power generation unit of 270 MW rating.

1. Owner M/s Ideal Energy Projects Limited
2. Owner's Consultant M/s DCPL
3. Project Title 1X270 MW TPP, BELA, Nagpur

LOCATION AND APPROACH :

1. Location : Village – Bela, Dist- Nagpur, around 51 kms from Nagpur town, State – Maharastra , India.
2. Address Details : **1x270 MW Thermal Power Plant**
   Ideal Energy Projects Limited, Bela
   Near Purty Sugar Factory
   P.O.-Bela, Dist.- Nagpur
   Pin Code- 441 115
   Maharahstra State, India"
3. GPS Co-ordinates : Latitude: 20º 18'16.42''N & Longitude : 79º03'17.05''E
4. Nearest Port : Mumbai
5. Nearest Air Port : Nagpur, at a distance of around 51 kms.
6. Approach Road : NH-7, at a distance of around 12 kms. from project site.
7. Railway Approach : Nearest Railway Station Borkeri ……

   (about 12 kms. From project site)

Meterological Data:

1. **Ambient Air Temperature**

a. Max. ambient temperature : 45Deg.C

b. Min. ambient temperature : 7 Deg.C

2. **Relative Humidity**
   a. Annual mean humidity 65%
3. **Rainfall**
   a. Annual Average – 1000 mm

b. Period :June to August

4. **Seismic data**

a. Zone - Zone II as per IS: 1893-2002

5. **Wind Data** :

a . Max wind velocity experienced : 169.2 kms/hr

b Wind Direction : South and South west

The Bidder shall visit site and get acquainted himself with the conditions prevailing at site before submission of the bid. The informations given here in under are for general guidance and shall not be contractually binding on BHEL/ Owner. All relevant site datas / informations as may be necessary shall have to be obtained /collected by the Bidder.

CHECK LIST

1	NAME OF THE TENDERER WITH ADDRESS		
2	NATURE OF THE FIRM	LIMITED / PARTNERSHIP / PROPRIETARY	
3	EMD DETAILS (Rs. 2.0 LACS BY DD ONLY OR ONE TIME EMD)		
4	VALIDITY OF OFFER (REQUIRED 6 MONTHS FROM TENDER OPENING DATE)		
5	MOBILIZATION TIME (NOT EXCEEDING 15 DAYS FROM FAX LOI)		
6	WHETHER NO DEVIATION CERTIFICATE FURNISHED	YES	NO
7	TENDERER HAS VISITED THE PROJECT SITE AND ACQUAINTED WITH THE SITE CONDITIONS	YES	NO
8	DETAILS OF CONCURRENT JOBS ARE FURNISHED (AS PER RELEVANT APPENDIX)	YES	NO
9	HEAD QUARTER'S ORGANISATION IS FURNISHED	YES	NO
10	PROPOSED SITE ORGANISATION IS FURNISHED	YES	NO
11	FINANCIAL STATUS OF THE COMPANY IS FURNISHED	YES	NO
12	PROFIT & LOSS ACCOUNT FOR PRECEDING THREE YEARS IS FURNISHED	YES	NO
13	LATEST SOLVENCY CERTIFICATE FROM THE BANKER IS FURNISHED	YES	NO
14	LATEST INCOME TAX CLEARANCE CERTIFICATE OR COPY OF PAN CARD ACCOMPANIED BY 'IT RETURN' COPY IS FURNISHED	YES	NO
15	MANPOWER DEPLOYMENT PLAN (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO
16	MONTHWISE DEPLOYMENT PLAN FOR MAJOR T&P (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO
17	ANALYSIS OF UNIT RATES QUOTED (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO
18	POWER OF ATTORNEY ENCLOSED IN FAVOUR OF PERSON MAKING OFFER.	YES	NO
19	DETAILS OF SIMILAR WORK DONE IN LAST SEVEN YEARS (AS PER RELEVANT APPENDIX) AND SUPPORTING DOUCMENTS FURNISHED.	YES	NO
20	PROGRAMME FOR THE SUBJECT WORK FURNISHED	YES	NO

21	BIDDER HAS FMILIARIZED HIMSELF WITH ALL RELEVANT LOCAL LAWS & CONDITIONS.	YES	NO
22	WHETHER ALL THE PAGES OF THE TENDER DOCUMENTS ARE READ, UNDERSTOOD AND SIGNED	YES	NO
23	WHETHER THE FOLLOWING DETAILS PERTAINING TO YOUR BANK ACCOUNT DULY ENDORSED BY THE BANK HAVE BEEN FURNISHED {TO ENABLE BHEL RELEASE PAYMENTS THROUGH ELECTRONIC FUND TRANSFER (EFT/RTGS) AS SPECIFIED IN SECTION 12 } 1. Name of the Company 2. Name of Bank 3. Name of Bank Branch 4. City/Place 5. Account Number 6. Account type 7. IFSC code of the Bank Branch 8. MICR Code of the Bank Branch NOTE: In case Bank endorsed certificate regarding above has already been submitted earlier, Kindly submit photocopy of the same	YES	NO
24	**WHETHER plan of Generator Stator lifting is furnished along with Technical Bid (Refer Clause 4.6.3)**	YES	NO

NOTE : STRIKE OFF YES OR NO, AS APPLICABLE

DATE : SIGNATURE OF TENDERER

DECLARATION BY BIDDER'S AUTHORIZED REPRESENTATIVE

I, HEREBY CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO THE TENDER SPECIFICATION NO**. BHE/PW/PUR/BELAT-STG/708** ARE TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE. I HAVE GONE THROUGH THE SPECIFICATIONS, CONDITIONS AND STIPULATIONS IN DETAIL AND AGREE TO COMPLY WITH THE REQUIREMENTS AND INTENT OF THE SPECIFICATION. I FURTHER CERTIFY THAT I AM DULY AUTHORIZED REPRESENTATIVE OF THE UNDER-MENTIONED TENDERER AND A VALID POWER OF ATTORNEY TO THIS EFFECT IS ALSO ENCLOSED.

AUTHORISED REPRESENTATIVE'S SIGNATURE WITH
NAME AND ADDRESS

DATE:

TENDERER'S NAME AND ADDRESS

CERTIFICATE OF NO DEVIATION

TENDER SPECIFICATION NO. BHE/PW/PUR/BELAT-STG/708

I/WE, M/s .....

HEREBY CERTIFY THAT NOTWITHSTANDING ANY CONTRARY INDICATIONS/ CONDITIONS ELSEWHERE IN OUR OFFER DOCUMENTS, I/WE HAVE NEITHER SET ANY TERMS AND CONDITIONS NOR THERE IS ANY DEVIATION TAKEN FROM THE CONDITIONS OF BHEL'S TENDER SPECIFICATIONS, EITHER TECHNICAL OR COMMERCIAL, AND I/WE AGREE TO ALL THE TERMS AND CONDITIONS MENTIONED IN BHEL'S TENDER SPECIFICATION WITH ASSOCIATED AMENDMENTS AND CLARIFICATIONS.

SIGNATURE OF BIDDER

DATE:

SECTION-3
OFFER OF THE BIDDER

To,
Sr DGM (PURCHASE)
BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345, KINGS WAY
NAGPUR 440 001

DEAR SIR,

Sub: Offer against Tender Specification No. **BHE/PW/PUR/BELAT-STG/708**

I/WE HEREBY OFFER TO CARRY OUT THE WORK DETAILED IN TENDER SPECIFICATION NO. **BHE/PW/PUR/BELAT-STG/708** OF THERMAL POWER PLANT, BELA, IDEAL ENERGY ROJECTS LIMITED, DISTT- NAGPUR (MAHARASTRA) ISSUED BY BHARAT HEAVY ELECTRICALS LIMITED, POWER SECTOR-WESTERN REGION, NAGPUR, IN ACCORDANCE WITH THE TERMS AND CONDITIONS THEREOF.

I/WE HAVE CAREFULLY PERUSED THE FOLLOWING DOCUMENTS CONNECTED WITH THE ABOVE WORK AND AGREE TO ABIDE BY THE SAME.

1. INSTRUCTIONS TO TENDERERS
2. GENERAL CONDITIONS OF CONTRACT
3. SPECIAL CONDITIONS OF CONTRACT
4. OTHER SECTIONS, APPENDICES, SCHEDULES AND DRAWINGS.

I/WE HAVE DEPOSITED / FORWARDED HEREWITH THE EARNEST MONEY DEPOSIT AS SPECIFIED IN THE TENDER SPECIFICATION. DETAILS OF EMD PAYMENT ARE FURNISHED IN THE CHECK LIST.

EMD SHALL BE REFUNDED SHOULD OUR OFFER NOT BE ACCEPTED / EMD **NEED NOT BE REFUNDED AND THE AMOUNT MAY BE TREATED AS "ONE TIME EMD" FOR ERECTION AND COMMISSIONING TENDERS OF BHEL-PSWR, NAGPUR**. SHOULD OUR OFFER BE ACCEPTED, I/WE FURTHER AGREE TO DEPOSIT SECURITY DEPOSIT FOR THE WORK AS PROVIDED FOR IN THE TENDER SPECIFICATION WITHIN THE STIPULATED TIME AS MAY SBE INDICATED BY BHEL, POWER SECTOR-WESTERN REGION, NAGPUR.
OR,
WE HAVE ALREADY DEPOSITED ONE TIME EMD OF Rs. 2,00,000/- (RUPEES TWO LACS ONLY), DETAILS OF WHICH ARE FURNISHED IN THE CHECK LIST.

I/WE FURTHER AGREE TO EXECUTE ALL THE WORKS REFERRED TO IN THE SAID DOCUMENTS UPON THE TERMS AND CONDITIONS CONTAINED OR REFERRED TO THEREIN AND AS DETAILED IN THE APPENDICES ANNEXED THERETO.

PLACE: SIGNATURE OF TENDERER:
DATE: ADDRESS:

WITNESSES WITH THEIR ADDRESS

SIGNATURE	NAME	ADDRESS
1.		
2.		

SECTION- 4

SPECIAL CONDITIONS OF CONTRACT

4.0 SCOPE OF WORK

The scope of work under the specification covers receipt of materials from BHEL / Customer stores / Storage Yard, Handling at Stores / Storage Yard, Site of work, Transportation to site of work, Erection, Testing, Assistance for Commissioning & Trial operation, Final Painting, and Handing over of Steam Turbine, Turbo-Generator (Including its receipt from Trailer, Unloading, Handling, Lifting & Placement on foundation), Condenser with R.E. Joints & Butterfly valves, TG Integral Piping, External/ Regenerative Piping, Equipments/ Tanks/ Vessels, HP & LP Haters, Power Cycle Pumps with Associated Auxiliaries etc. including Bought Out Items, PEM Packages like Central Lube Oil System, Misc. Pumps, COLTS, Plate Heat Exchangers, Misc. Hoists & Chain Pulley Blocks, Self cleaning Strainers etc. of 1X270 MW Thermal Power Plant, Ideal Energy Projects Limited, Bela, Nagpur (Maharashtra) project

4.0.1
The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship for fabrication, engineering and construction management. The Bidder should ensure timely completion of work. The Bidder must have adequate quantity of tools, construction aids, equipments etc, in his possession. He must also have on his rolls adequate, trained, qualified and experienced supervisory staff and skilled personnel.

4.0.2
The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Bidder and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

4.0.3
All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the Bidder.

4.0.4
The Bidder shall at his cost perform any services, tests etc, although not specified but nevertheless required for the completion of work.

4.0.5
Contractor shall erect all the equipments as per sequence prescribed by BHEL at site. The sequence of erection, methodology will be decided by the BHEL engineers depending upon the availability of material, work fronts etc. No claims for extra payment from the Contractor will be entertained on the grounds of deviation from the methods and sequence of erection adopted in erection of similar TG sets or for any reasons whatsoever.

4.0.6
All the necessary certificates and licenses required to carryout this work are to be arranged by the Contractor expeditiously at his cost.

4.0.7
The work to be carried out under the scope of these specifications covers the complete work of loading at stores/storage yard, handling, transporting, unloading at erection site, pre-assembly, erection, alignment, hot alignment, bolting, fastening, welding, radiography, levelling, cold pulling, adjusting, Non-destructive testing, Post weld heat treatment, hydraulic test, chemical

cleaning, passivation, steam blowing, oil flushing, water flushing, air flushing, pre-commissioning tests, trial running of Equipments, Auxiliaries, Piping and other systems as per scope covered under these specifications, commissioning and all other activities till handing over of the unit. The work shall conform to dimensions and tolerances specified in the various drawings, documents etc. that will be provided during the course of installation. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost failing which the work will be got done by BHEL at the cost and risk of the contractor.

4.0.8
The terminal points as decided by BHEL shall be final and binding on the Contractor.

4.0.9
The indicative schedules of weight of major equipments given in relevant appendices are meant for providing a general idea to the Contractor about the magnitude of the work involved.

4.0.10
During the course of execution of this work, certain rework/ modification/ rectification/ repairs/ fabrication etc. will be necessary on account of feed back from various thermal power stations on units already commissioned and/or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework/ modification/rectification/ fabrication/ repairs etc., promptly and expeditiously. Daily log sheets indicating the details of work carried out, man-hours, consumables used etc, shall be maintained by the Contractor and got signed by BHEL engineer every day. Claims of contractor, if any, for such works will be dealt as per clauses of Section-13, Special Conditions of Contract.

4.0.11
All tools and tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables etc. required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause.

4.0.12
The contractor shall make adequate security arrangements including employment of security personnel and ensure protection from theft, fire, pilferage, damage and loss of materials/equipments issued to him for the work. Special care will have to be taken to guard against pilferage / theft of copper tubing, brass fittings, brass valves and other costly materials.

4.0.13
All equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc, shall be used for handling of the equipments without the specific permission of the engineer.

4.0.14
Contractor shall ensure proper housekeeping and remove all scrap materials periodically from various work area covered in the scope and deposit the same at the place earmarked for this purpose. In case of contractor's failure to do the same, BHEL reserves the right to remove scrap at contractor's cost and risk.

4.0.15
Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.

4.0.16
Contractor shall mobilise sufficient quantity of Concrete/Wooden Sleepers for stacking of materials in his custody.

4.0.17
The Contractor's scope of work is further described in the following clauses:

4.1 COLLECTION AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES

4.1.1
Contractor shall take delivery of the components, equipments, lubricants, chemicals, special consumables, steel etc from the storage yard/stores/sheds of BHEL/ client. The Contractor should note that the transport of equipments to erection site, assembly yards etc should be done by the prescribed route, without disturbing the other works and contractors and in the most professional manner. Special equipments such as laboratory equipments, measuring and controls equipments, special electrodes, valves, shims, packing materials for joints and seals, lubricants, actuators etc, shall be stored, when taken over by the Contractor, in appropriate manner as per BHEL's instructions.

4.1.2
The contractor shall return all parts, materials, consumables etc. remaining extra over the normal requirement with proper identification tags to BHEL stores. In case of any misuse or use over actual requirement, BHEL reserves the right to recover the cost of parts/materials used in excess or misused, with departmental charges.

4.1.3
Transportation of lube oil, Chemicals, Gas cylinders etc. from stores, is included in the scope of this contract. The contractor shall have to return all the empty and excess drums to the customer/BHEL stores. Similarly, transport of chemicals for various pre-commissioning activities/ processes mentioned in clauses herein from BHEL/customer's stores and charging of chemicals into the system for carrying out various pre-commissioning activities and processes mentioned herein and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of contractor. After completion of oil flushing operation, the used oil shall be filled in empty drums and which in turn shall be returned to BHEL/customer's stores.

4.2 PREPARATION OF FOUNDATION

4.2.1
Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by the customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations up to around 25 mm for achieving proper levels will be within the scope of work/specification.

4.2.2
All minor foundations and anchor points required for installing erection equipments like winches, anchors etc. are to be cast by the contractor.

4.2.3
The complete work of Secondary Grouting of equipments is included in the scope of work/ specification. Contractor shall arrange all manpower; T&P, formwork and shuttering materials, all grouting materials such as Ordinary Portland Cement, Sand, Stone Chips etc & Quick-

setting-Non-shrink-Free-flow special grout mix of required specification (like Conbextra-GP-2 or equivalent).

4.2.3.1
The Quick-setting-Non-shrink-Free-flow special grout mix shall be purchased only from the BHEL approved vendors; names of some such current vendors are as under. Contractor shall obtain updated list from BHEL before procurement action.

1. M/s Fosroc Chemicals (India) Pvt Ltd;
2. M/s Sika India Pvt Ltd;
3. M/s Pagel Concrete Technologies Pvt Ltd;
4. M/s Pidilite Industries Ltd.

In order to ensure the quality, the major grouting of equipments using any of above grout mixes shall essential be done as per the recommendations of supplier with regard to grout mix preparation and use of machinery etc under the supervision of the respective supplier. BHEL has arrangement with above suppliers for supervision services and the supervision charges for the same will be borne by BHEL. However, the contractor shall ensure readiness of equipment for grouting in all respect before such a service is requisitioned and the duration is not prolonged unduly. Any overstay required due to contractor shall be charged to the contractor with BHEL's departmental charges. Contract shall consult BHEL engineer before deciding upon the vendor for the above.

4.2.3.2
Cleaning of the foundation surfaces, pocket holes, anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods will be within the scope of this work.

4.2.4
BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional packer plates and shims if required will have to be prepared by the contractor out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

4.2.5
The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipments under scope wherever required. The support and sole plates matching and concrete surface bedding is also covered in the scope of work. The fine dressing of concrete shall be with Prussian blue-match checks.

4.2.6
Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

4.3 EQUIPMENTS INSTALLATION – COMMON REQUIREMENTS

4.3.1
Filling of lubricants for steam turbine, turbo-generator and other rotating auxiliaries for purpose of oil flushing, initial fill up and subsequent topping up during various stages of work.

4.3.2
All works such as cleaning, levelling, aligning, hot alignment, trial assembly, dismantling of certain equipments/components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, grinding, straightening, chamfering, filling, machining, chipping, drilling, reaming, scraping, lapping, shaping, fitting-up, drilling of holes, making dowel pins, minor rectification of foundation bolts etc. are incidental to the erection/commissioning and any other work/activity which is necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

4.3.3
Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, ESV & IV, control valves, LP bypass valves, Cold Re-heat Non Return Valves with power cylinders and other valves, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/packing/lubricants for replacement will be provided by BHEL free of cost.

4.3.4
All equipment shall be preserved and protected periodically before and after erection as per advice of BHEL engineer. The journals of steam turbine rotors, generator rotor, HT motors and other rotating machines shall be thoroughly cleaned, greased/painted with preservative agents periodically as instructed by BHEL engineer.

4.3.5
Trial run of all motors including checking direction of rotation in uncoupled condition, check alignment and re-couple the motor to driven equipment.

4.3.6
After initial trial of rotating equipments, control and power cabling for motors and other equipments/instrumentation may have to be disconnected for checking alignment and resetting/realignment/hot alignment. Contractor will have to provide services for disconnection and reconnection of control and power cables.

4.3.7
All racks or assembled units like Governing Rack, LP Bypass Rack, High Pressure LP Bypass Governing System, Cold Re-heat Non Return Valve, Seal Oil Unit, Gas Unit, Seal Oil Valve Rack, Gas Cylinder Racks etc supplied from manufacturing units will be tested in BHEL/ Customer stores or at site. This may require transportation, filling of oil, water etc in these racks for carrying out testing of these racks. Defects noticed during testing of these racks will have to be rectified by the contractor free of charges. Further, any pipeline / flanges / fittings not found assembled properly, the same have to be rectified / corrected by the contractor free of charges.

4.4 PIPING INSTALLATION

4.4.1
The scope of work in piping system (air, Gas, Water, Oil, Steam, Governing oil/Control oil, Jacking Oil etc.) will include cutting to required length, edge preparation, laying, fixing and welding of the elbows/fittings/valves etc., fixing supports/hangers/shock absorbers/ guides and restraints etc. and carrying out all other activities/works to complete the erection and also carrying out all pre-commissioning/ commissioning operations mentioned in these specifications as per engineer's instructions and/or as per approved drawings. **Weld joints and NDT requirement for all TG Integral piping, External/ Regenerating System and other pipings as applicable under tender specification shall be as per drawings/schemes and suiting to site requirement. The necessary drawings/documents for these weld**

joints will be provided at site during execution of work. Indicative list of schemes of piping and their approximate weights are provided relevant **Appendix.**

4.4.2
Carrying out of piping work as per the specifications between equipments constituting terminal points, whether the terminal equipments fall within the scope of the work/specification or not, is within the scope of the work/ specification. The contractor shall complete terminal joints at either ends, with due NDE & PWHT if applicable, for all the piping schemes covered in the scope of work.

4.4.3
The erection of equipments like Condenser R.E. Joints, Condenser Butterfly Valves, Misc. Pumps, Plate Heat Exchangers, Condenser On Load Cleaning System and Self-cleaning Strainers etc which are including under the scope of these specifications shall also be required as reference point for erection of piping etc. to other agencies/customer at site. Contractor shall carry out erection/installation of these systems on priority as per instruction of BHEL Engineer at site. The welding with NDE & PWHT etc of terminal joints / counter flanges either joint connected to these equipments shall be carried by contractor under these specifications under instruction of BHEL Engineer. The decision of BHEL Engineer shall be final and binding on contractor.

The Erection, Welding, NDE, Supporting, Hydraulic Test etc. work of Supply, Return and other related lines of Condenser Cooling water piping (Main Circulation Water Piping/CW piping and ACW System Cooling water piping interconnecting the customer terminal points (from "A" Row of TG Building) to above equipments/ systems is specifically included under these tender specifications. The contractor under these specifications shall carryout the erection, welding, NDE, Hydro Test etc. at site on priority as decided by BHEL Engineer-In-charge at site. Contractor shall carryout the Hydraulic Test including providing the Dummies/ Blanks with materials as scope of work. The necessary design of Dummies/Blanks will be furnished by BHEL at site. All the piping systems weighing about 120 MT are covered under PGMA No. 80-468 (**Main Circulation Water Piping)** of "EXTERNAL PIPING/RE-GENERATIVE PIPING WITH ASSOCIATED VALVES, COMPONENTS/ITEMS, FITTINGS AND SUPPORTS ETC." described in the scope of work. In order to facilitate to understand the contractor, the nature of work, it is clarified that the majority of size-wise of CW & ACW water pipings involved are 50 NB, 150NB, 500NB, 600NB, 1800 NB etc. Contractor shall carry out the entire piping work as stated above including the TG Aux. cooling water piping under PGMA No. 80-463, payments for which will be made by BHEL as per accepted piping item rate under Sl. No. 02 of Schedule of Rates & Quantities (Price Bid) for actual quantity of work executed."

4.4.4
Fit up and welding/bolting/fastening of piping to the terminal points (such as stubs, valves, flanges on terminal points/equipments, stubs on headers, battery limits etc) forming part of the scope of work/specification and stress relieving and radiography of joints so made are also within the scope of work. Permanent fasteners and gaskets will be supplied by BHEL.

4.4.5
Interconnection/Hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work has to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

4.4.6
All drains / vents / relief / escapes / safety valve piping to various tanks/ sewage / drain canal / flash box / condenser / sump / atmosphere etc. from the stubs on the piping and equipments erected by contractor is completely covered in the scope of this tender specification.

4.4.7
The following items of work shall be incidental and forming part of piping fabrication and erection:

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

4.4.8
Pipelines will be field routed as per schemes/ suggestive layout or as per the instructions of BHEL engineer. Pipes & tubes will be supplied in random lengths and running lengths. The contractor shall have to lay the piping after carrying out the necessary fabrication, edge preparation, routing etc to suit site requirement in best professional manner.

4.4.9
As far as possible pre-assembly shall be done. The pipe laying shall be carried out from the available terminal point/points or any other area between the terminal points. The erection can be carried out on temporary supports to obtain proper alignment and welding. After fixing the permanent supports, all the temporary supports shall be removed. The alignment, distances and loading of the supports shall be checked and the required settings to be ensured as per requirement.

4.5 CONDENSER INSTALLATION

4.5.1
The condenser will be despatched in loose parts mainly comprising of bottom plates, dome valves, front and rear water chamber, front and rear water boxes, side walls, hot well, spring elements, support plates, air extraction pipes, baffles, stiffening rods and pipes etc. The condenser is to be assembled at site in position by welding the different parts. Condenser tubing and tube expansion (roller expansion) is to be done at site by the contractor, after taking due care to clean all the tube holes. After final alignment and levelling of turbine exhaust

and condenser, the same has to be welded to the exhaust position of LP exhaust as per the sequential welding procedure.

The Condenser Tubes are Welded Austenitic Stainless Steel Tubes Grade-304 material having Dia. 28.575xThk-0.889 and Dia. 28.575 x Thk-0.71 mm. All the works of tube insertion, expansion / flaring etc. as per drawing requirement shall be carried out contractor as scope of work.

4.5.2
Before insertion of tubes, the contractor shall clean the holes in the tube plates and tube support plates to remove paint, corrosion spots, oxide scales etc. Usage of suitable cleaning agent may also be required which has to be supplied by the contractor.

4.5.3
The tubes shall be expanded using an Automatic Electronic Torque Controlled Tube Expanding unit/Pneumatic Tube Expander and as per drawing requirement procedure/ instruction of BHEL Engineer at site. Tube expansion shall be checked with dial bore gauge. The total set up including tube expanders and tube cutting tools etc. for carrying out the complete condenser tube expansion works shall be provided by the contractor.

4.5.4
The contractor shall carry out the condenser neck welding with LP cylinder exhaust hood only after final installation of LP casing. Neck welding shall be subjected to specified non-destructive testing.

4.5.5
The hydrostatic testing of steam space and hydraulic testing of water space up to the terminal point after assembly of water boxes are also included in the scope.

4.5.6
Work of painting of condenser surfaces in various area and at various stages of work are specified elsewhere in these specifications.

4.6 GENERATOR STATOR LIFTING & PLACEMENT

4.6.1
The Generator Stator, weighing 228 Metric Tonnes (approx.), will be despatched to site by Road on trailer. The customer's EOT (capacity 100/25 Tonnes) in TG hall shall not be suitable for lifting of Generator Stator and this Generator Stator shall be lifted by Strand and Jacks / Lift & Shift arrangement method. The Scope of contractor shall take complete responsibility and carry out the liaisoning and follow up with transporters, filling of ditches/levelling etc. for marching of trailer to unload at suitable location/point of lifting near the TG building, Shifting/dragging of Generator Stator by providing required arrangements like rails/plates/sleepers etc. (as per requirement), arranging the Strand And Jacks/Lift & Shift arrangements & their assembly /installation with expert supervision till lifting & placement of Generator, making resting Foundations/Footings to suit the installation of his Strand and Jack arrangements (as required) and Lifting & Placement of Generator Stator to required/designed foundation/elevation.

4.6.2
Contractor shall plan all his activities / operations so as to avoid the delay in unloading and releasing the transporters Carrier/trailer. For any demurrage Charges by Transporter / Customer on account of delay in Handling, Unloading from Trailer after arrival at site shall be the responsibility of Contractor. The all above complete works of receipt from trailer, unloading,

shifting, Lifting & placement to required foundation /elevation of Generator Stator is the part of scope of work under this contract.

4.6.3

The Generator Stator will have to be lifted from space out side the "A" row of TG building and between A-3 & A-4 columns. Lifting and placement of Generator Stator from this side may require to hold casting of certain civil foundations of some Auxiliaries like CW Pit, TG hall column structural bracings etc., Contractor shall visit site and discuss his plan with Customer & BHEL Engineer at site and submit his plan of Generator Stator lifting along with Technical Bid. Contractor shall deploy his above Generator Stator lifting **Strand and Jack arrangements** & other resources well in time to suit the site requirement so as to lift & place it on required foundation in minimum possible time. **Contractor is advised to visit the site and plan the arrangements required to be deployed at site for this work.**

Some of the renowned agencies who can provide strand and jack lifting arrangement are :–

1 M/s Fagioli PSC India Pvt Ltd (203, Krishna Bhavan, Govandi Station Road, Deonar, Mumbai 400 088, Telephone No 022 – 25564388, Fax No 022 – 25562565)

2 M/s Freight Wings (P) Ltd, (309, Rex Chambers, Walchand Hirachand Marg, Ballard Estate, Mumbai 400 001, Telephone No 022 – 22631714, 22632261, 22639988)

3 M/s Dorman Long Technology Ltd, (233 Bharat Industrial Estate, Lal Bahadur Shastri Marg, Bhandup (West), Mumbai 400 078, Telephone No 022 – 25961960, Mo 09820192807)

4 M/S Basu and Basu Engineers Pvt Limited, Kolkata, Telephone No 033 – 24642967, 24664069, Fax 033 – 24664621)

5 M/S Lift and Shift India Private Limited (96 Chembur, Mankhurd Link Road, Mumbai 400 043, Telephone 022 – 25484180, 25560101, Fax 022 – 25563573, E-Mail – projects@liftandshift.co.in)

Contractor may engage **any of the above-named agencies or any other competent agency** known to contractor for this lifting activity. Generator Stator shall be required to be lifted and put on foundation within one week time after availability of material and other essential inputs, and clear the holds for further civil & structural works. All above shall be the part of scope of work and progressive payment for same shall be made per **clause 12.1.1** as per section-12 of tender specification.

Lifting of Generator Stator by <u>Jack and Sleeper/sand bag or such other methods is not permitted</u>.

4.6.4

The Generator shall have to be placed on designed foundation at an elevation of about 15.8 Meters between "A" & "B" row of TG building and have to be lifted from about Zero meter level out side the TG hall other than shifting/dragging of Stator from point of unloading to point of lifting (if necessary and this is also the scope of work, refer clause 4.6.1). To facilitate the contractor to understand the lifting Trunion arrangement,

dimension of stator and fixing of lifting slings etc, **the drawing No.0-139-00-01341 (Generator Outline) and drawing No. PE-DG-328-100-M005 (T.G. Hall Equipment layout Plan at 9.0 M) and drawing No. PE-DG-328-100-M006 (Cross Section of T.G. hall) are attached with Tender Specification**.

4.6.5
Immediately after completion of Generator Stator lifting work, Contractor shall dismantle his Strand and Jack arrangements and vacate the holds within a week time to enable customer to proceed with further works of civil foundations and structural works kept under hold for Generator Stator lifting.

4.7 HANDLING OF HEAVIER EQUIPMENTS

Heavy and voluminous Equipments/consignments like HP Turbine module, IP Turbine module), LP Rotor, LP turbine (Inner-Outer & Inner-Inner) Lower half casing, LP turbine (Inner outer) Upper half casing, Generator rotor, Brushless Exciter, HP & LP Heaters etc. along with other Equipments shall be handled carefully. Contractor shall have to arrange his own Tools & Tackles, Trailer of suitable capacity including additional suitable capacity lifting Crane and any other arrangement required to handle right from collection of materials from BHEL/Customer store yards/stores, transportation to site of works and erection & their placement on respective elevation/foundation. BHEL shall not provide any T&P other than those specified for the specific work as relevant Appendix and other relevant clauses of tender specification.

4.8 INSTALLATION OF HP & LP HEATERS ETC.

4.8.1
Erection of Permanent approach platform and ladders etc for De-aerator and FST is in the scope of work. The structural steel and other members will be supplied in random length/size & will have to be cut to required size and profile as incidental to work.

4.8.2
HP Heaters (Horizontal Type), LP Heaters (Horizontal Type) are to be located in B-C Bay of TG Building at their designed foundations which are at elevations of 15.8 m & 09.30 m respectively. The customer's EOT crane 100/25T is located in A-B Bay of TG Building and as such this EOT crane will not have direct accessibility /approachability to handle and place these equipments to their foundations. Contractor may make use of this EOT crane subject to its feasibility, approachability, readiness with as per prior approval of BHEL/Customer engineer to carry out lifting and placement of these equipments to nearest location by using additional platform etc. along with dragging arrangements, wherever required. Contractor shall make his own arrangement of such requirements for shifting/dragging/making additional platforms etc. to place and assembled/ install these equipments to their respective designed foundations & elevations as part of scope of work. BHEL/Customer shall not provide any other additional arrangements/infrastructure for this purpose.

4.8.3
Boiler feed pumps with Auxiliaries are to be installed/erection between B-C Bay of TG Building at an elevation about 00.30M. EOT crane in TG hall which is located in A-B row will not be accessible for erection and handling of these BFPs. Contractor shall make his own arrangement for placement and installation of these equipments as part of scope of work so that the progress of work is not affected.

4.9 HYDROSTATIC TESTING, PRESERVATION AND OTHER TESTS

4.9.1
Contractor shall carry out the following tests required to complete the erection and commissioning of the TG Set:

(1) Hydraulic testing of individual equipments like condenser, coolers, heaters, other auxiliaries, equipments and piping systems. Required capacity Hydraulic test pump/Fill pump and other necessary arrangement shall be provided by contractor to carry out hydraulic testing, Chemical cleaning/Flushing etc. of the equipments and piping as part of scope of work under this tender specification.

(2) Ultrasonic test

(3) Dye-Penetrant test

(4) Magnetic Particle Test.

All above facilities (Men, Materials, Equipments, Consumables etc.) with operating engineer/experienced person and proper approach wherever required shall be provided by the contractor for satisfactory completion of the above tests.

4.9.2
Contractor shall lay all necessary temporary piping, welding, fabricate chemical mixing tank, supports, install pumps, valves, pressure gauges, electric cables and switches etc, required for the Hydro test, Air leak test, Chemical cleaning, Steam blowing etc.. After the test is over, all the temporary piping, pumps, etc will be removed. It may also specifically be noted that servicing, erection and dismantling of piping and equipments for conducting above tests will be done by the contractor. No separate payment shall be made for this temporary piping work for above purpose. BHEL will provide only temporary piping and valve materials. Contractor shall provide Chemical cleaning/flushing/circulation pumps, Hydraulic test pumps of required capacity along with all other required arrangements of control panel, Motor Starters, cables, switches etc. as scope of work.

4.9.3
All the above tests shall be repeated till all the equipments, piping and systems satisfy the technical and statutory requirements. All related works form part of the scope.

4.9.4
Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration/ venting /drain points with valves as per BHEL engineer's instruction, for performing hydro test of piping is within the scope of work**.** Required valves, fasteners, blank flanges, blanks or steel for blank flanges will be provided by contractor. After completion of hydraulic test, welded blanks shall be cut and removed, weld burrs ground finished and cavities/scars to be repaired by weld deposit and finished ground as per BHEL engineers' instruction.

4.9.5
Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

4.9.6
While conducting hydraulic test of steam lines, water lines, oil lines either individually or grouping a few lines or in portions. Blanks/spools may have to be put up at terminal points,

strainers, walls, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored. Also interconnecting piping between boiler and turbine, the hydraulic test may have to be done section wise and some–times piping of other agencies may have to be combined. Contractor shall carry out all such incidental work to satisfactorily conduct the hydro test. Wherever work is involved in the terminal points, Contractor shall carryout the same as per instruction of BHEL engineer. The decision of BHEL engineer is final and the same is binding on the contractor.

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

4.10 PRE-COMMISSIONING TESTS, COMMISSIONING AND POST COMMISSIONING

4.10.1
Commissioning of the TG equipments with associated Aux. and other Equipments with auxiliaries shall involve the following tests and activities of the equipments erected:

(a) Trial run of Boiler Feed Pumps, C.E.P., Booster Pumps, Vacuum Pumps, Misc. Pumps, Central Lube oil system pumps etc. and other equipments like Misc. Hoists & Chain Pulley Blocks etc. and other various rotating machineries / pumps as per tender specification.

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

(c) Hydraulic Test, Chemical Cleaning/Flushing, Oil flushing of lube oil system, Governing oil system/Control oil system, Seal oil System, Air cleaning/blowing of pipelines, closed systems, Tanks and Vessels.

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

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

(f) Manual/mechanical cleaning of Oil tanks, Suction Strainers / Filter elements of CEP, BFP, Booster Pump, Misc. Pumps, Flash Tanks, Misc. Tanks etc., Plate Heat Exchangers, LP Bypass Governing/control oil System tanks and other various equipments & tanks /vessels erected by the contractor. This may have to be repeated several times during the commissioning process.

(g) Chemical cleaning of piping systems, Misc. tanks, Flash Tanks etc. as per requirement. Contractor shall carry out disassembly and reassembly of vulnerable components like gauges, instruments etc. as instructed by BHEL during this process.

(h) Putting Turbine on barring gear.

(i) Trial run/trial operation and Load test of Misc. Hoists and Chain Pulley Blocks etc.

(j) Rolling and synchronisation.

(k) Full load operation.

(l) Trial operation

The above activities/tests/trial runs may have to be repeated till satisfactory results are obtained and also to meet the technical and statutory requirements. Contractor shall provide assistance to BHEL for carrying out these activities.

4.10.2
Contractor shall lay temporary pipelines with fittings and accessories etc. as instructed by BHEL engineer for the purpose of pre-commissioning and commissioning activities like Hydraulic testing, chemical cleaning, oil flushing, steam blowing etc. of piping and other equipments as part of the scope of work. Temporary installations shall be dismantled by contractor and returned to BHEL stores as specified elsewhere in this T.S.

4.10.3
The contractor shall provide necessary assistance to facilitate/enable electrical and instrumentation testing and commissioning of equipments under this scope of work, to BHEL and their Testing & Commissioning agency.

4.10.4
The contractor shall carry out any other test as desired by BHEL engineer on erected equipments covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or parts of work performed by the contractor.

4.10.5
In case any malfunctioning and / or defect is found during tests / trial runs such as loose components, undue noise or vibrations, strain on connected equipments etc. The contractor shall immediately attend to these defects/ malfunctioning and take necessary corrective measures. If any readjustment and realignments are necessary, the same shall be done as per BHEL engineer's instructions, free of cost.

4.10.6
The cleaning of Lube oil tank etc. is in general by wire brush / abrasive paper etc. In case of tenacious rusting spots found if any, the same shall be cleaned thoroughly mechanically by buffing wheel etc. If manual / mechanical cleaning is not proper, the cleaning by sand blasting as per instructions of BHEL engineer before and after oil flushing is responsibility of contractor.

4.10.7
The contractor shall associate for initial and subsequent fillings of gas in generator gas system as and when required till unit is handed over to Customer.

4.10.8
The contractor shall carry out air tightness test on generator gas cooling system to the satisfaction of BHEL engineer.

4.10.9
Replacing/changing mechanical/other seals of equipment, pumps etc. during commissioning stage is within the scope of work.

4.10.10
During the stages of commissioning, and till Unit is handed over, if any part of TG and auxiliaries need repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim if any, for such repair/rectification/rework/ replacement etc. for reasons not attributable to the contractor, will be governed by relevant clauses of General Conditions of Contract of the specification. The parts to be replaced shall however, be provided by BHEL free of cost.

4.10.11
During this period, though BHEL's and customer's engineers will also be associated in the work, the contractor's responsibility will be to make available resources in his scope till such time the commissioned units are taken over by the customer.

4.10.12
In case any malfunctioning and/or defects are found during tests, trial run such as loose component, undue noise or vibration, strain on connected equipment etc., The contractor shall immediately attend to these defects/ malfunctions and take necessary corrective measures. If any readjustment or realignment is necessary, same shall be done as per BHEL engineer's instruction.

4.10.13
The pre-commissioning activities will start prior to Lube oil, Governing/ Control oil flushing, Seal Oil of the TG and various trials, commissioning operations shall continue till the TG is handed over to customer. Simultaneous commissioning checks, activities will be in progress in various areas like trial run of various equipment, checking of equipment erected, making ready for trial runs, filling up of lubricants, chemicals etc. All these works need specialised gangs including electricians, Instrument Technicians, Fitters, in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted. The mobilisation of these commissioning gangs shall be sufficient so that planned commissioning activities are taken up in time and also completed as per schedule and the work is to be undertaken round the clock if required.

4.10.14
Contractor shall cut open works if needed as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over, without any extra payment.

4.10.15
After the start of commercial operation of machine, commissioning activities will continue. It shall be the responsibility of contractor to provide following manpower along with supervisor as part of commissioning assistance for a period of three months.

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

4.10.16
The above figures shows only minimum required over and above labour required for completing pending erection and commissioning works and clearing of punch lists. Contractor has to provide number of personnel and other resources as per work demand.

4.10.17
It shall be specifically noted that above employees of the contractor may have to work round the clock along with BHEL commissioning engineers.

4.10.18

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

4.10.19
It is the responsibility of the contractor to provide for necessary resources till the completion of work under these specifications, even in case erection, testing and commissioning of the TG and other equipments are delayed due to reasons not attributable to the contractor.

4.11 WELDING AND HEAT TREATMENT

4.11.1
Removal of welding slag and burrs by hand files, with brushes and/or flexible grinders will be carried out simultaneously.

4.11.2
On all steam, oil, instrument, gas, air (Instrument air/services air) piping, DM water piping etc. both TIG welding and subsequent arc welding or total TIG welding process is to be adopted as instructed by BHEL engineer.

4.11.3
All weld joints on piping shall be ground / filed / dressed on completion of welding and before NDE as per instructions BHEL engineer.

4.11.4
The Contractor shall procure all electrodes and filler wires of approved quality / brand as per the standards and specifications of BHEL and instruction of BHEL Engineer.

4.11.5
Contractor should purchase the electrodes as per the recommendations of BHEL engineer, welding manual, welding schedule and other relevant documents. The electrodes shall be purchased only from BHEL approved manufacturers.

4.11.6
The purchase of electrodes shall be accompanied by proper test certificate and these certificates should be submitted regularly for the scrutiny of BHEL engineer.

4.11.7
All electrodes shall be stored in a clean dry area. The storage room shall be of permanent nature and damp proof, and the room shall be exclusively meant for storage of welding electrodes and filler wires. Excepting for a vent in the top, it is not preferred to have any other opening like windows or ventilators. The temperature inside the room has to be kept in the range of 8-10^0 c above atmospheric temperature and humidity should be less than 50. This is to be accomplished by using electric heaters or infrared lamps. The storage room must be provided with hygrometer and thermometer. Temperature and humidity are to be monitored regularly. 15-20 holders, welding cables, connecting cables to equipments and other welding accessories including temporary electrical connection from construction power point to individual equipment like winches, hoisting equipment, welding generators, transformers, heat treatment equipment and other construction equipment shall be arranged by contractor.

4.11.8
All racks and other items used for storage of electrodes shall be of steel and not of wood.

4.11.9
All electrodes soon after purchase shall be offered for inspection to the BHEL engineer. Contractor shall be strictly prohibited from using electrodes not inspected/approved by BHEL engineer.

4.11.10
All welding consumables shall be issued to the welders only by authorised person who is controlled by contractor's welding engineer. The necessary baking requirements are to be ensured by Contractor's welding engineer.

4.11.11
All welders shall be tested and approved by BHEL engineer/customer before they are actually engaged on work though they may possess the requisite certificate. BHEL reserves the right to reject any welder without assigning any reasons. Statutory requirements like IBR approval for welders are to be complied with before starting of the work. If required, the welders may have to undergo Procedure Qualification test also. The decision of BHEL Engineer will be final in this regard.

4.11.12
All charges for testing of contractor's welders including destructive and non-destructive tests conducted by BHEL at site shall have to be borne by the contractor. However for initial testing of welders the test will be provided by BHEL. However, If deployed welders fails in initial testing due to lack of experience OR frequent testing of new welders, due to non-availability/non-deployment of earlier qualified/tested welders, it shall be the responsibility of Contractor to provide necessary test plates at his cost for above testing.

4.11.13
BHEL engineer is entitled to stop any welder from his work if his work is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by him, which, in the opinion of BHEL engineers, will adversely affect the quality of welding though the welder has earlier passed the tests prescribed. The fact that the welders have passed the test does not relieve the contractor from his contractual obligations to check the performance of the welders. Contractor shall submit a monthly performance record of all welders.

4.11.14
All welded joints shall be subject to acceptance by BHEL engineer whose decision will be final and binding.

4.11.15
Pre-heating and stress relieving before and after welding are part of erection work and shall be performed by the contractor in accordance with instructions of BHEL engineer. Contractor has to arrange for the recorders along with accessories and suitable technicians for heat treatment purpose. The temperature recorders and thermocouples shall be duly calibrated. During preheat and stress relieving operations the temperature shall be measured as per the instructions of BHEL engineers by thermocouples and recorded graphs for the heat treatment works carried out shall be the property of BHEL.

4.11.16
For the purpose of stress relieving, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations are as per the standards of BHEL. Thermocouples have to be attached using battery operated portable thermocouple attachment unit and not by manual arc welding. Contractor shall arrange sufficient number of thermocouple attachment units.

4.11.17
Wherever necessary, contractor should provide temperature indicator/temperature recorder as required by BHEL engineer for measuring preheat temperature for welding or for controlling temperature of metal for hot correction etc. Decision of BHEL engineer on method and of checking preheat temperature or controlling temperature for hot correction and welding shall be final and binding on contractor.

4.11.18
Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The contractor shall make all necessary arrangements including labour required for the same as per directions of BHEL.

4.11.19
Heat treatment requirements shall be as per the Welding Schedules of BHEL

4.11.20
For weld joints of heavy structural items like beams, I-sections, if heat treatment is required, the same shall be carried out as part of the work.

4.11.21
Checking effectiveness of stress relieving by hardness tests (either by Poldi Hardness Tester or other approved test methods as per BHEL engineer's instruction) including necessary testing equipments is within the scope of the work/specification.

4.11.22
TIG welding process is to be used for all root pass welds in pipes. Subsequent welding after root pass can be carried out by manual metal arc welding with basic coated electrodes. For the pipe of thickness less than 6mm, the entire welding has to be carried out by TIG welding. However, BHEL site engineer will have the option of changing the method adopted. Manual arc welding shall be done following weaving technique and the width of weaving shall not exceed 1.5 time of the diameter of the electrodes.

4.11.23
Two pieces to be joined shall be individually checked for the weld edge preparation and profile dimensions and with respect to the template. Dye penetrant check shall be carried out on edge prepared surfaces at random. The percentage shall depend on piping system as specified by BHEL engineer.

4.11.24
Joint fit up will be a stage for inspection.

4.11.25
All joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

4.12 RADIOGRAPHY

4.12.1
Radiographic inspection of welds shall be arranged by the contractor including all consumables like isotope camera, x-ray film, chemicals etc. Scaffolding and approaches for taking radiographs.

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

4.12.2
Contractor shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. The defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance/rejection of the joints will be final and binding on the contractor.

4.12.3
Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if defect persists after first repair, as per radiograph, carrying out repairs and radiography shall be repeated till joint is made acceptable in case, the joint is not repairable, the same shall have to be cut and repaired at contractor's cost. Decision of BHEL engineer in all these matters is final and binding on the contractor.

4.12.4
100% radiography of weld joints of certain piping has to be carried out as per BHEL standards/drawings/specification.

4.12.5
It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. Necessary trained personnel shall be deployed for this purpose.

4.13 ACID CLEANING / ALKALI FLUSHING / STEAM BLOWING / OIL FLUSHING ETC.

4.13.1
Contractor shall lay temporary pipelines with fittings and accessories and also erect/commission pumps after servicing as per requirements, tanks and other installations, as a system as instructed by BHEL for the purpose of chemical cleaning, steam blowing, steam washing, steam flushing, water flushing, water washing, oil flushing etc. of piping and other equipments including **providing the Chemical Cleaning/ flushing Pumps/ equipments etc. (refer clause 5.2.13 of T.S.)** which are within the scope of work and also systems in which equipments and piping erected by contractor form a part of the scope of work. The required DM water and Steam will be provided by BHEL free of cost.

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

4.13.2

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

4.13.3
Preservation of the cleaned surfaces will be the responsibility of contractor under the guidance of BHEL engineer.

4.13.4
Hydraulic test of temporary piping is to be carried out as per the instructions of BHEL Engineer. Carrying out repairs, if any, is in the scope of work/specification.

4.13.5
For chemical cleaning of the piping system, contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected is in the scope of contractor or not. Decision of BHEL Engineer in this regard will be final and binding on the contractor.

4.13.6
During the initial stages of work, trenches for draining water may not be available after alkali flushing or mass flushing for discharging and emptying. Necessary low point drains and temporary piping for this will have to be provided by contractor from materials provided by BHEL.

4.13.7
Laying effluent discharge line from mixing tank (for acid cleaning or any other chemical cleaning process) as per the instructions of BHEL engineer and dismantling, servicing for preservation and handing over the same to BHEL stores after completion of the job is within the scope of work/specification.

4.13.8
Radiographic examination of weld joints on temporary pipes as required by the Engineer In-charge should be carried out.

4.13.9
Contractor shall also carry out the repairs or attend leaks etc., in the temporary piping and equipments for the above operations/activities while carrying out the above activities/ operations.

4.13.10
For chemical cleaning of system which consist of equipment/piping erected by the contractor and also equipment/piping erected by other contractors of BHEL/customer's contractor has to arrange for workers and supervisory staff as required supplementing/complimenting the labour and supervisory staff mobilised by other agencies for chemical cleaning of the portion of equipment erected by them in the system. Decisions on the strength of gangs and supervisory staff for deployment of labour and allocation of work for them at site, by BHEL engineer is final and binding on the contractor.

4.13.11
Contractors quoted rate shall be inclusive of fabrication, cost of consumables, erection, dismantling of temporary piping and servicing of the equipments and valves and handing over to BHEL. No separate payment on this account shall be entertained.

4.13.12

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

4.13.13
For full welding of structures, tanks and piping etc., only welding generators shall be used. The use of welding transformers will be subject to the approval of BHEL Engineer.

4.13.14
Erection and commissioning of connecting piping – permanent & temporary for oil purification equipments and all operations for cleaning, oil flushing, dismantling of temporary piping during pre and post-commissioning of equipment up to full load shall be the responsibility of contractor as part of scope of work.

4.14 ELECTRICAL AND INSTRUMENTATION

4.14.1
Contractor shall mount all flow indicators, centrifugal/speed switches of motors, accumulators, pressure regulators etc. which are received loose and which are to be erected/mounted at site on air lines, water lines, oil lines, LP Bypass system, steam lines, auxiliaries and firemen floor and other operating floors on boiler/power house and other equipments. These are to be mounted during erection for finalising routing/position etc. They are to be dismantled after completion of erection work and handed over to BHEL for calibration. After calibration, these instruments shall be remounted by the contractor in their respective positions just before commissioning.

4.14.2
Certain instrumentation like, pressure gauges, power cylinders, flow meters, valve actuators, flow indicators, etc are received in assembled condition as integral part of equipments. Contractor shall dismantle such equipment at an appropriate stage under the instruction of BHEL and hand them over to BHEL for calibration and storage. Contractor shall re-erect them in position just before commissioning of the equipment.

4.14.3
Seal welding of Thermo-wells, RT plugs before Hydro test of equipments and piping systems is also within the scope of this work/specification. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld Thermowells after Hydro test/steam blowing of lines.

4.14.4
Providing necessary engineer/supervisors/technicians/electricians as required by BHEL engineer for drying out the LT/HT motors is within the scope of the work. Job includes testing the motor for finding out PI & IR values and making necessary cabling connection for heating for dry out from the nearest source of supply and maintaining and controlling the temperature till the IR and PI values are achieved as per standards. However, BHEL will provide necessary motorised insulation testers for this purpose. The contractor shall provide necessary power cables and other tools and consumables for the above works free of charges. Before undertaking dry out/trial run of HT motors, the end shields and covers shall be opened on both the ends of the motor for inspection, cleaning and greasing of bearings.

4.14.5

Welding of all Thermo-wells, draft, pressure and temperature instrumentation points and all other instrumentation points on piping, and auxiliaries is within the scope of this work.

4.14.6
All the HT Motors shall be preserved with space heaters on and provided with proper cover till the commissioning of the motors.

4.14.7
Mounting of instrumentation on turbine, generator and exciter and auxiliaries which are the integral part and supplied with main equipments shall be the part of scope of work and contractor shall render necessary services for their commissioning.

4.15 GENERAL

4.15.1
During the course of erection, platforms and floor grills are to be cut at certain places to route steam, oil, water and air piping, cable trays, etc or for accommodating erection, rigging etc, the cutting of platforms and grills should be minimum and as approved by BHEL engineer. After completion of work, the platform/grills cut shall be made good neatly as instructed by BHEL engineer.

4.15.2
Welding/threading of GI instrument air / Service air piping as specified in drawing / documents and instruction of BHEL engineer shall be carried out as part of scope of work.

4.15.3
No temporary supports should be welded on to the piping.

4.15.4
Contractor shall carry out preservation painting on all items taken from stores. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. The contractor shall provide this facility till the commissioning and handing over of the equipment to the customer. The contractor shall also carry out preservative and touch up painting on equipments covered under this specification stored at stores/storage yard.

4.15.5
Adjustment of spring hangers for piping shall be done by the contractor during initial erection. After initial commissioning trials, it is possible that the spring hangers have to be adjusted repeatedly till the correct spring compression is achieved. Contractor shall do the same to the satisfaction of BHEL engineer. The marking of cold and hot positions on the hangers shall be done by the contractor.

4.15.6
The contractor shall return to BHEL the excess materials left over after completion of work, materials issued for temporary pipelines for HT, chemical cleaning, flushing, blowing etc. and materials issued on returnable basis in neatly dressed condition. Necessary grinding, edge cutting (square facing), edge preparation (VEE), painting etc. to the condition similar to the one at the time of issue shall be in scope of work.

4.15.7

All suitable access/approach platforms for valves/ isolating/throttling devices/equipments at suitable location/elevations shall be carried by contractor as per instruction of BHEL Engineer as part of scope of work.

4.16 PG TEST TAPPING POINTS

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

4.16.1
All packing and forwarding material shall be returned as soon as the material is unpacked. The location for storage of such materials shall be as indicated by BHEL Engineer.

4.16.2
All Measuring and Monitoring Devices (MMD) used for the work in scope of this tender speciication shall be calibrated by the accredited agencies that are approved by BHEL or calibration tractability is established up to National Physical Laboratory.

4.16.3
Contractor shall furnish the consumption details of chemicals, lubricants, TIG welding filler wire, welding electrodes and other consumables on monthly basis.

4.17 SPECIFIC INCLUSIONS

4.17.1
All terminal connections for equipment & piping covered in this specification.

4.17.2
Impulse/pneumatic piping between customer's battery limit and equipments.

4.17.3
Servicing and assembly of control valves/regulating valves, fixing of filter elements/strainers & steam blowing & blanking devices in LP bypass, M.S. Strainer, HRH Strainer and blanking of LP bypass, ESV & IV System, for hydro test, steam blowing etc is the part of scope of work.

4.17.4
Erection, commissioning and testing of LP Bypass system valves and Cold Re-heat Non-return valve with respective oil system and accessories are included under the scope of tender specification. Erection LP Bypass valves and CRH NRV shall involve installation of valves on temporary supports to provide reference/connection of LP Bypass and CRH Critical piping which will be erected by other agency, dismantle the valves/ remove valve internals & fix steam blowing devices (as advised by BHEL Engineer at site) to make Steam blowing connection and install the valves permanently/re-fix the internals on permanent supports for final connection. Oil system shall require erection of tanks, Motors, Power Cylinder, oil piping, oil flushing of system etc. till final commissioning and handing of system. All above are under the scope of contractor. BHEL shall provide oil for flushing and initial fill, topping up free of charges. Contractor shall collect the oil barrels from BHEL stores/storage yard and return the empty container/left over oil barrels (flushed oil / fresh oil) to BHEL stores after completion of work.

4.17.5

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

4.17.6
Complete control fluid systems of LP Bypass and Governing System are included in this specification. Associated assistance for commissioning like lube oil flushing, filling and topping up of lube oil etc shall be part of the work.

4.17.7
Assembly and Installation of Strainer Elements of MS and HRH system is within the scope of work. Cleaning of these strainer elements during trial operation of machine is also covered under this scope.

4.17.8
Erection and welding of Impulse piping from various equipments & pipings tapping point to root valve.

4.17.9
Chipping of foundation, placement, erection, alignment, commissioning, grouting, mounting of equipment mount instruments and other fittings of BHEL (PEM bought out items) supplied Packages like Misc. Hoists & Chain Pulley Blocks, Misc. Pumps, Plate Heat Exchangers and other Tanks & Vessels etc. & other packages are in scope of the work. **Erection and commissioning of these Equipments/Pumps & Packages will be required to complete to meet the commissioning schedule/ milestone activities of other areas like Boiler, CW Systems, DM water treatment plant, Ash Handling Plant requirement, fuel oil handling plant etc. Contractor shall plan and complete erection & commissioning of these equipments on priority as per decision of BHEL Engineer/Customer requirement. Details of such systems are furnished in relevant Appendix.**

4.17.10
Misc. Hoists & chain pulley blocks etc.- lifting equipments along with associated items / fittings are under the scope of this tender specification. These equipments have to be installed at different locations and elevations. The scope of works in this regard shall include the following:-

- Handling at stores & storage yard & taking over delivery from BHEL of components of the cranes & other lifting equipments and test load etc.
- Transportation to site of work including via pre-assembly yard, if needed.
- Pre-erection checks, pre-assembly if needed.
- Erection, alignment, welding, bolting, fastening of all components of the cranes/lifting equipments including electric bus bards/trailing cables, pendants etc.
- Dry run test at no load.
- Load tests at different loads as advised by BHEL at site.
- Over load test at designated load as required.
- Return of surplus components, test loads etc to BHEL stores with due reconciliation.

Priority of erection & commissioning of these equipments shall be as per instruction and priority of BHEL at site and decision of BHEL site In-charge at site shall be final and binding on contractor.

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

1) All protective paints for the protection of site weld joint fit-ups, application of primers on finished weld joints with providing all the consumables, paint brush, brush cleaner, labour & necessary tools and plants are in the scope of contractor.

2) The water boxes shall be sandblasted to remove all traces of primer applied at the works. After tubing & before hydraulic testing of condenser, the interior surface of Condenser Water Boxes and Water side Surfaces of Water Chambers and Tube plates shall be painted with two coats of Black Coal tar Epoxide finish Paint as per drawing requirement to achieve the total DFT of 250 microns. The Black Coal Tar Epoxide finish paint shall be from any BHEL/Customer approved manufacturer. Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL/Customer approved laboratory for the primers and paints. Prior approval of BHEL for each and every batch of the primer & paints shall be mandatory. In order to achieve a desired minimum paint dry film thickness (DFT) as specified in BHEL drawing, number of coats may be applied and method of application shall be as recommended by the paint manufacturer. **Contractor shall arrange required paints & primers and other consumables for above works as part of scope of work.**

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

4) Preservation of all components/equipments during various stages of erection, commissioning till handing over is in the contractor's scope. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor. **Contractor has to arrange all consumables like wire brush, painting brush, labour with T&P etc. as required for this work as scope of work. However BHEL will provide the Primer & Paints free of charges.**

4.18 FINAL PAINTING

4.18.1
Equipments and Components of the TG & Auxiliaries will in general be supplied by BHEL with one coat of Primer and two coats of finish paint applied at the manufacturing shop; contractor shall apply one coat of finish paint on all such components (which are not insulated) after erection at site unless and otherwise the shop coating is damaged in the meanwhile. The tentative types of paints involved for final painting are Synthetic Enamel, Epoxy, Heat Resistant Aluminium, Chlorinated rubber paints etc..However, the final type of paints and thickness of coats shall be as per drawings & customer requirements at site.

4.18.2
In addition to components/equipment as above, there could be limited few without any prior protective coating. Such components shall first be thoroughly cleaned of all dirt, rust, scale, grease, oil and other surface deposits by wire brushing, scraping, washing,

wiping with solvent or any appropriate method and the same being inspected and approved by BHEL followed by application of one coat of primer. Afterwards, the above parts shall be over-coated with two layers of specified paint as per application procedure prescribed by the paint manufacturer.

4.18.3 Touch-up painting on damaged areas -

a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer.

4.18.4
Painting of site-welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc has been carried out by the bidder.

(a) Clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.

(b) Painting procedure to be followed as mentioned above for touch-up painting on damaged areas.

4.18.5
The scope of work includes painting of colour bands, legends, lettering, marking the signs and direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/ customer engineer at site for the equipments/components covered in these specifications.

4.18.6
In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

4.18.7
Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The contractor at his own cost shall provide all the consumables and application implements.

4.18.8
During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, contractor shall repair the same free of cost to BHEL. BHEL will make available only the primer and paints free of any charge to contractor.

4.18.9
Specified drying time shall be permitted from one to another coat.

4.18.10

This work requires working at higher altitudes from ground level. The work spread is also substantial involving substantial run of structures, piping and equipments. Contractor shall take sufficient precautions to ensure safe and hazard-free working condition. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of appropriate quality for safe and smooth execution of work.

4.18.11
Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by contractor, BHEL shall have the right to recover the cost of such damages from the contractor.

4.18.12
Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the contractor without any extra charges.

4.18.13
In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipment inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the contractor. For the purpose of spray painting, service air at one point will be made available by BHEL free of cost. Laying of air pipeline, hose and any other line required shall be done by contractor at his cost. The contractor shall provide spray equipment set.

4.18.14
The contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

4.18.15
Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

4.19 **Preservation & Protection of Components**

4.19.1
BHEL will issue majority of the plant equipment/components duly applied with primer and one coat of finish paint at shop. Components /equipment that will finally remain exposed to atmosphere will be coated with specified paints; During the course of activities at site, the shop coat of paint may get peeled off/burnt. Contractor at all stages of work, shall ensure appropriate preservation of all such equipment/ component that are in his custody including those erected by him by way of applying touch up paint coating. Such preservation shall conform to preservation procedure of BHEL (if any), else according to the instructions of BHEL engineer. BHEL will provide the necessary primer and paint free of charges; while contractor shall arrange for the preservation materials for all other types of surfaces including machined surfaces in his cost.

4.19.2
The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

4.19.3
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of contractor in compliance of this requirement, BHEL will make suitable arrangement at contractor's risk and cost.

4.19.4
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc shall be returned to BHEL stores by the contractor.

4.19.5
The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilisation of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.

4.19.6
For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.

4.20 Computer Based System

BHEL is operating web based computerized site operation management system (SOMS) that includes, inter-alia, issue of materials, daily progress reporting, contractor's running monthly billing and material reconciliation through a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work. In the event the computerized SOMS is inoperative for any reasons, the contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the SOMS as and when the SOMS is re-activated/normalized.

4.21
SECURITY, HOUSE KEEPIN & OTHER RESPONSIBILITY OF THE CONTRACTOR

4.21.1
The contractor shall have total responsibility for all equipment and materials in his custody at contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

4.22 EXLUSIONS

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

A) All cable connections except those specified as scope of work.

B) Measuring instruments, monitoring, relaying, protection and signalling equipments other than those supplied with the equipments by / on behalf of BHEL and which have been indicated as scope of work.

C) Erection, testing and commissioning of electrical panels and starting resistors for DC JOP, DC EOP pumps, Seal oil system

D) Electrical testing of motors. However erection these will be under the scope of this tender specification.

E) Impulse piping and fittings from the tapping points of various equipment root valves other than those specified as scope of work.

F) Copper tubing work.

G) Civil works to the extent not specifically provided for in this tender.

H) Thermal insulation of Turbine, ESV, IV, CRHNRV, LP Bypass valves, integral piping and external piping/regenerating piping system.

I) Supply of materials for temporary piping (pipe, valve, structural steel etc.) required for hydraulic test, chemical cleaning, flushing or steam/air blowing of the pipelines.

J) Supply of chemicals and lube oil for pre-commissioning and commissioning activities.

SECTION-5

SPECIAL CONDITIONS OF CONTRACT

5.0 OBLIGATIONS OF THE CONTRACTOR (TOOLS, TACKLES, CONSUMABLES ETC.)

5.1 ACCOMMODATION, DRINKING WATER & LOCAL TRSNPORTATION FOR LABOUR / OTHER EMPLOYEES

BHEL/client is **not** providing any accommodation for contractor's labour / staff. However customer will provide open space for contractor's labour colony as available near by the project area. Contractor shall make his own arrangements for construction of accommodation for his workmen and the staff with necessary facilities etc with necessary hygienic facilities including drinking water, Sanitation, Transport, Lighting, FIRST AID & Emergency. Also, the contractor has to make his own arrangement for transportation of his workmen and other employees. BHEL/client shall not provide any facility in this regard.

5.2 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES:

5.2.1
The contractor shall provide all (in addition to those in BHEL scope) required tools and plants, monitoring and measuring devices (MMD) and handling & transportation of equipments for the scope of work covered under these specifications. Contractor shall deploy suitable Crane (s) for handling of materials issued to him at BHEL/client's stores/storage yard and erection of equipments.

5.2.2
All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification. Indicative list of major T&P to be arranged by the contractor has been furnished in the relevant Appendix. Contractor shall also mobilize all other T&P necessary for timely and satisfactory completion of the work in scope.

5.2.3
Contractor has to provide spanners of all sizes, Bolt stretching devices etc. as required for satisfactorily carrying out the complete erection / commissioning works. No spanners will be provided by BHEL to the contractor.

5.2.4
Contractor has to arrange slings of all sizes for completing the works covered under these specifications including the special slings for Generator Stator Lifting/Handling.

5.2.5
Contractor's responsibilities with regard to operator, fuel, lubricants and daily upkeep of T&P provided by BHEL are further detailed in Section-7.

5.2.6
Timely deployment of adequate quantity of T&P is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned programme and to achieve the milestones.

5.2.7

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

5.2.8
In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make the alternative arrangement at the risk and cost of the contractor.

5.2.9
The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. The movements of cranes and other equipment should be such that no damage / breakage occur to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility. The necessary test certificates for equipments to be submitted.

5.2.10
Use of welding generators/rectifiers for welding only shall be permitted. Use of welding transformers will be subject to specific approval of BHEL engineer.

5.2.11
The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of Measuring & Monitoring Devices (MMD). Test / Calibration certificates shall be furnished to BHEL. MMD shall be calibrated only at NABL accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL. All calibration shall be traceable to national or international standards.

5.2.12
BHEL T&P will be issued in basic assembled or knocked down condition; contractor shall transport them to & fro between BHEL stores and site. Additional loose components / sub-assemblies / attachments as and when necessary, will be issued by BHEL, to & fro between BHEL stores and site of such items shall also be done by the contractor. Assembly of such additional loose components/sub-assemblies/ attachments is in contractor's scope. Any boom reduction/ extension of BHEL cranes for contractor's use and restoration to previous state or as directed by BHEL shall be the contractor's responsibility. Contractor shall provide all enabling services with tools and tackles for assembly/dismantling and boom extension/reduction as above.

5.2.13
BHEL shall not provide any Chemical Cleaning /Flushing pumps / equipments as required for Chemical cleaning/flushing of piping and related equipments / systems. These Chemical pumps of suitable capacity along with motor starters, cables etc. shall have to be provided by the contractor as part of scope of work. Contractor shall arrange / provide all Chemical cleaning arrangements as per requirement and instructions of BHEL engineer without any delay/time lapse.

5.2.14
Strand and Jack/Lift & Shift arrangement for lifting and placement of Generator Stator:

Contractor shall arrange complete set up of Strand and Jacks/Lift & Shift arrangements and all Tools & Tackles as required for lifting and placement of Generator Stator to its designed elevation & foundation including the services of expert execution and supervision. BHEL/Client shall not provide any Crane / Lifting

Arrangements for Generator Stator handling & erection. Method for Handling of Generator Stator and lifting & placement to required elevation and foundation is the scope of responsibility. Generator Stator shall have to be lifted & placed on designated foundation with Strand and Jacks/Lift & Shift method (refer clause 4.6).

Sleepers & Jack or Sand Bag & Jack or any methods/arrangement other than the one specified above for Lifting & Placement of Generator Stator will not be accepted.

5.2.15
Complete set of hydraulic jacks of 50 tonnes and 100 tonnes capacity shall be arranged by the contractor for use during erection and commissioning of Turbine. Also, hydraulic jacks of 100 tonnes and 63 tonnes capacity along with long high pressure hoses of suitable length for Generator erection and alignment shall be arranged by the contractor. These jacks shall of internationally reputed make, highly reliable and maintained in excellent working condition. They shall be tested for safe working before deploying in actual work. These jacks shall not be permitted for use anywhere other than Steam Turbine / Generator area.

5.2.16
All jack bolts that are required during erection for carrying out roll-check etc. will have to be arranged by the contractor. No jack bolts will be provided by BHEL.

5.3 CONSUMABLES

5.3.1
The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those which are specifically indicated as BHEL scope.

TG Special Consumables like Hylomar / Golden Hermetite / Stag-B / Molykote/ Anabond compounds / Rubber fixing compounds etc. will have to be arranged by the contractor.

5.3.2
All consumables to be used for the work shall have prior approval of BHEL engineer with regard to brand and quality specifications. Test reports / certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

5.3.3 PRIMERS & PAINTS

All primers and paints are in the contractor's scope unless provided otherwise in BHEL scope as free issue.

5.3.4
Consumables for BHEL supplied equipments (Cranes, T&P etc.)

Refer relevant clause of SECTION –7 SPECIAL CONDITIONS OF CONTRACT in this regard.

5.4 WELDING ELECTRODES, TIG WELDING FILLER WIRES AND GASES

5.4.1

All the required welding electrodes, except those indicated as BHEL scope elsewhere in these specifications, as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to

inspection and approval by BHEL regarding type of electrodes, batch number, date of expiry etc. Batch test certificates shall be made available for verification & record before the actual use of the welding consumables.

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

5.4.2
Gases like Argon, Oxygen and Acetylene etc. that are required for erection related activities shall be arranged by the contractor at his cost.

5.4.3
Nitrogen gas, if required for preservation during chemical cleaning process of piping system, will be arranged by BHEL free of charges. Contractor shall arrange necessary connector, Nipple, Regulator, Header and piping for usage of such Gas from Cylinders.

5.5 FIELD OFFICE

5.5.1
The contractor shall make his own arrangements for field office and stores for accommodating necessary equipments, tools room for execution of the work. Only open space will be provided by BHEL / customer, free of charges as per the availability of space. Further, contractor shall obtain concerned local administrative authority's approval for construction of his filed office and pay the fees and chares as may be applicable.

5.5.2
On completion of work, all the temporary buildings, structures, pipelines, cables, etc shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, BHEL will arrange to remove and expenditure thereof including overhead expenses (presently @30%) will be recovered from the contractor. The decision of BHEL engineer in this regard shall be final. However, the scope of dismantling and leveling the area is limited only to the contractor's site office, yard and other spaces occupied by the contractor.

5.5.3.
BHEL is installing a computerized site management system at site to cover areas of material management, erection & commissioning, quality control, billing, MIR, etc. This system can be accessed through normal telephone lines and through LAN installed at site.

Contractor shall ensure that all operations in their scope that has interface with BHEL system is done only through this computerized system. Contractor shall make all arrangements for connectivity, computing equipment, personnel, software, etc to operate and interact with BHEL system. No manual system other then what is not covered by computerized system will be acceptable to BHEL.

5.6 AREA LIGHTING

5.6.1

Contractor shall arrange adequate floodlights, hand lamps and area lighting at all the areas of works at site. All temporary wiring must comply with regulations and will be subjected to engineer's inspection before connecting to supply point. Contractor shall use his own materials like cables, fuses, switch-boards etc. BHEL/client will not provide anything in this regard.

5.7 CONSTRUCTION POWER & WATER

5.7.1
BHEL/customer will provide construction power (three phase, 415v / 440v) free of charges at one point near the erection site. The construction power for construction purpose will be free of charges, however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor. The further distribution / drawal of construction power for contractor's requirement by providing all required necessary installation arrangements shall be made by contractor. As part of measurement & effective utilisation of construction power to avoid the wastages, ccontractor shall provide energy meter (duly calibrated) in his works. All cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices E.G. ELCG etc. and any other installation as specified by statutory authority/act. shall be arranged by contractor. Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc towards the clearance of such installations, prior to use.

5.7.2
It shall be the responsibility of the contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced Electrician.

5.7.3
The contractor shall install necessary Capacitor Bank etc. with appropriate control mechanism to maintain the Power Factor as per the guidelines in vogue from time to time in this regard. Any levy imposed by the customer / authority for any deviation in power factor shall be passed on to the contractor.

5.7.4
Contractor shall be equipped with back-up power supply arrangement like DG set and diesel operated welding machine etc. to tackle situations arising due to failure of customer supplied power, so as to ensure continuity and completion of critical process that are underway at the time of power failure or important activities planned in immediate future.

5.7.5 Client will provide at one point each the Construction Water and Drinking water free of charges in project premise. Contractor shall make his own arrangement for further distribution as may be required.

5.7.6
BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply. Contractor shall take suitable insurance policy for such accidental loss/ damages.

5.7.7
While BHEL will make reasonable efforts to ensure continuous electric power supply, interruptions cannot be ruled out. Contractor shall be well equipped with back-up power supply arrangement like DG set and diesel operated welding machine etc to tackle situations arising due to failure of customer supplied power, so as to ensure continuity and completion of critical processes that are underway at the time of power failure or important activities planned in immediate future.

5.8. CONSTRUCTION WATER

5.8.1
Water for construction purpose will be provided by customer free of charges at available single point inside the plant area. Contractor has to arrange his own distribution system/pumping arrangements etc. for further distribution of construction water. The necessary taxes, duties and levies as imposed by customer have to be borne by contractor and the coated rates deemed to have included all this things.

Contrcator shall make his own arrangement of drinking water.

5.8.2
It shall be the responsibility of the contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.

5.9 RESPONSIBILITIES WITH REGARD TO LABOUR EMPLOYMENT ETC.

Refer 'General Conditions of Contract'

5.9.1
Contractor shall also comply with the requirements of local authorities/ project authorities calling for police verification of antecedents of the workmen, staff etc.

5.9.2
BHEL / customer may insist for witnessing the regular payment to the labour. They may also like to verify the relevant records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL / customer.

5.9.3
It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc for entering the project premises. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer / BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permits for working beyond normal working hours.

5.9.4
Contractor shall provide at different elevation suitable arrangement for urinal and drinking water facility with necessary plumbing & disposal arrangements including construction of septic tank. These installations shall be maintained in hygienic condition at all times.

5.9.5
If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability/shortfall in provision of resources from the contractor's side BHEL will make suitable alternate arrangements at the risk and cost of contractor. The expenditure incurred with overheads thereby shall be recovered from the contractor.

5.9.6
The contractor in the event of engaging 10 or more workmen will obtain Independent licence under the contract labour (regulation and abolition) act 1970 from the concerned authorities based on the certificate (form-V) issued by the principal employer/customer. In order to issue

the certificate (form-V) by customer, contractor shall fulfill all statutory requirements like Insurance Policy, PF code/PF account number etc. as per requirement of BHEL/Customer

5.9.7
Contractor will deduct the necessary amount from his employees towards provident fund and contribute the equal amount as per government of india labour laws. This amount will be deposited regularly to the provident fund commissioner and get the account code. Contractor shall submit the above account code duly certified by PF commissioner to BHEL project incharge.

5.9.8
It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with IEPL/BHEL officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by IEPL/BHEL for making gate passes.

5.9.9
Contractor shall also comply with the provisions of ESI act in vogue and submit evidence thereof to BHEL site incharge. Also all other employees benefits to be borne by the contractor as per the labour laws. Contractor shall produce necessary certificates towards their compliance with such statutes and payment of all statutory dues.

5.9.10
Contractor shall also comply with the requirements of local authorities / project authorities calling for police verification of antecedents of the workmen, staff etc.

5.9.11
Where permitted, by Customer /BHEL, to work beyond normal working hours, the contractor shall arrange necessary gate passes.

5.10.0 TAXES, DUTIES, LEVIES

5.10.1

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

5.102 Service Tax & Cess on Service Tax

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

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,

I. **The name, address and the registration number of the contractor,**
II. **The name and address of the party receiving taxable service,**
III. **Description, classification and value of taxable service provided and,**

IV. The service tax payable thereon.

All the four conditions shall be fulfilled in the invoice before release of service tax payment.

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

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

5.10.3 VAT (Sales Tax /WCT)

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

5.10.4 Modalities of Tax Incidence on BHEL

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

5.10.5 New Taxes/Levies

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

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

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

5.11 SUBMISSION OF PERIODICAL REPORTS

Contractor shall submit periodical reports in respect of following aspects of operation:

1) Consumption of consumables like welding electrodes, gases and paints
2) Consumption of construction power
3) Availability and utilization of BHEL's Tools & Plants
4) Availability and utilization of contractor's Tools & Plants
5) Daily manpower reports
6) Daily progress reports of activities & incidents
7) Calibration reports
8) Records of wages payment
9) Any other report/record as may be specified by BHEL/client.

BHEL at site will suggest formats for these reports.

5.12

It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer/ BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permit for working beyond normal working hours.

SECTION-6
SPECIAL CONDITIONS OF CONTRACT

6.0 CONTRACTOR'S OBLIGATION IN REGARD TO EMPLOYMENT OF SUPERVISORY STAFF AND WORKMEN

6.1

The contractor shall deploy all the skilled/semiskilled/ unskilled labour including highly skilled workmen etc. These workmen should have previous experience on similar job. They shall hold valid certificates wherever necessary. BHEL reserves the right to insist on removal of any employee of the contractor at any time if he is found to be unsuitable and the contractor shall forthwith remove him. Contractor should furnish a tentative deployment plan of his manpower as required vide relevant Appendix. Also the actual deployment will be so as to satisfy the erection and commissioning targets set by BHEL.

6.2

It is the responsibility of the contractor to engage his workmen in shifts and or on overtime basis for achieving the targets set by BHEL. This target may be set to suit BHEL's commitments to its customer or to advance date of completion of events or due to other reasons. The decision of BHEL in regard to setting the erection and commissioning targets will be final and binding on the contractor.

6.3

Contractor shall deploy only qualified and experienced engineers/ supervisors. They shall have professional approach in executing the work.

6.4

The contractor's supervisory staff shall execute the work in the most professional manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. They shall be responsible to ensure that the assembly and workmanship conform to dimensions and tolerances given in the drawings/instructions given by BHEL engineer from time to time.

6.5

The supervisory staff employed by the contractor shall ensure proper outturn of work and discipline on the part of the labour put on the job by the contractor. Also, in general they should see that the works are carried out in a safe and proper manner and in coordination with other labour and staff employed directly by BHEL or other contractors of BHEL or BHEL's client.

6.6

If at any time, it is found that the contractor is not in a position to deploy the required engineers/supervisors/workmen due to any reason; BHEL shall have the option to make alternate arrangements at the contractor's risk and cost.

6.7 WATCH AND WARD

Contractor shall arrange and provide watch and ward round the clock for the materials/equipments issued to him.

6.8

Contractor shall implement local labour laws, maintain necessary records and co-ordinate with the local labour authorities on all matters of labour and industrial relations.

6.9

The contractor shall comply with the applicable law, rules and regulation etc; with regard to employment of labour. He shall obtain labour license.

The scope includes getting the licenses and approvals from the statutory authorities, arranging for inspection of electrical inspector periodically as per BHEL engineer's instructions, submitting documents etc. and following up the matter with them as and when necessary for the work involved in this scope. All expenses, fees, levies etc have to be borne by the contractor.

6.10 SITE ORGANISATION

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

- Overall Planning, Monitoring & Control
- Materials Management
- Condenser & Auxiliaries.
- Turbine & Auxiliaries.
- Generator & Auxiliaries.
- Pumps & Auxiliaries.
- Piping.
- Misc. Equipments
- Quality Control and Quality Assurance
- Safety, Fire & Security
- Industrial Relations and fulfillment of Labour Laws and other statutory obligations.

Contractor shall furnish an organisation chart indication the staffing pattern for the above functions. Contractor shall provide the names and details of Engineers/supervisor at the time of mobilisation to BHEL as per the proposed organisation chart.

SECTION-7

SPECIAL CONDITIONS OF CONTRACT

7.0 OBLIGATIONS OF BHEL

7.1 FACILITIES TO BE PROVIDED BY BHEL

7.1.1 Space for site office / stores

Refer section-5 in this regard.

7.1.2 Construction Power & Water

Refer Section-5 in this regard.

7.1.3 Other materials and consumables:

BHEL shall not provide any material / consumables except those specifically mentioned in this tender specification.

7.1.4 TEST MATERIALS (PLATES & PIPES)

BHEL will provide suitable plates and pipes free of cost only for site test of welders including IBR welders before their deployment. . Contractor shall prepare the required test pieces from such raw materials and shall arrange all destructive and non-destructive examinations of test blanks / pieces as scope of work. Responsibilities with regard to deployment of IBR welders and meeting the stipulations shall be the responsibility of contractor.

7.2 FILLER WIRE FOR TIG WELDING

BHEL will not provide any filler wire/TIG wires etc. and all these shall be arranged by contractor at his cost.

7.3 EQUIPMENTS – TOOLS & PLANTS

BHEL will make available only those T&P that are listed in relevant **Appendix** free of charge. All other required T&P shall be arranged by the contractor.

7.3.1 CRANES TO BE PROVIDED BY BHEL

Services of one No. E.O.T. crane of 100/25 T capacity for erection of TG equipments within the TG hall will be utilised by contractor on sharing basis. It shall be the responsibility of the contractor to operate and carry out the day-to0day operation / maintain, general cleanliness, applying cadmium compound, holding / supporting of supply cables etc. of E.O.T. crane during the execution of the contract by providing qualified operator, electrician and crew members as per requirement.

It shall also be the responsibility of contractor to keep the crane in good working condition. The contractor shall note that the E.O.T. crane along with the operator shall also be made available for the erection of equipment by other agencies. Contractor has to plan his activities well in advance and inform BHEL engineer in charge/ Construction Manager the date of actual use.

The E.O.T. crane after completion of erection shall be handed over to Customer in good working condition.

7.3.2

BHEL will make available the cranes (as per relevant **Appendix** free of charge to the contractor on sharing basis mainly for the purposes enumerated vide notes in the relevant Appendix. BHEL cranes have to be shared with other agencies / contractors of BHEL. The allocation of cranes shall be the discretion of BHEL engineer, which shall be binding on the contractor.

7.3.3
Contractor shall lay necessary sleeper beds, backfilling of approaches wherever necessary for safe movement of the cranes as directed by BHEL. Contractor shall transport the equipments and components/sub assemblies/ attachments of BHEL equipments to & fro between BHEL stores and site.

7.3.4
Cranes, including the crane hired by BHEL, will be initially issued in basic assembled condition. Any alteration/addition like boom reduction / extension, assembly of components/sub-assemblies needed for modulating the capacity/ reach/other features of cranes and restoration to the state as directed by BHEL shall be the contractor's responsibility.

7.3.5
The cranes provided by BHEL will be withdrawn for regular and capital maintenance as per the respective schedule of maintenance. As far as possible such schedules will be intimated to the contractor in advance and may be adjusted depending on the work requirements at site. However no claim whatsoever will be entertained on account of non-availability of cranes.

7.3.6
Contractor shall provide the fuel for all the cranes for his scope of work.

7.3.7
Where the services of the cranes provided by BHEL are to be shared by other agencies/ contractors of BHEL, the contractor's responsibilities defined above will also be apportioned accordingly to the beneficiary agency. Working arrangements in this regard will be done at site by BHEL engineer and in any case his decision shall be final and binding.

7.4 OTHER T&P

7.4.1
The responsibilities of contractor defined above for BHEL cranes shall also be applicable, mutates-mutandis, in respect of other tool & plants provided by BHEL.

7.4.2
Special tools which are supplied by BHEL as part of maintenance tools to be handed over to customer under regular Packages / DU / DESS Numbers in various product groups may be issued to the contractor free of charges for specific activities only, at the discretion of BHEL. Contractor shall return them in good working condition as acceptable to Customer/BHEL after the completion of the specific activity for which the tools were spared.

7.4.3
BHEL engineer will inspect all the tools and plants issued to contractor periodically. In case contractor fails to make good, the damages caused, BHEL will do the same at contractor's cost. The tools and tackles will be issued only to persons nominated by the contractor.

7.4.4
Required temporary structural steel, pipes & fittings, valves for conducting hydraulic test, chemical cleaning / steam blowing / oil flushing / acid cleaning etc shall be provided by BHEL on returnable basis.

7.5 CHEMICALS, GASES AND LUBRICANTS FOR PRE-COMMISSIONING AND COMMISSIONING

7.5.1

All lubricants/Lube oil and chemicals required for testing, chemical cleaning, acid cleaning, oil/chemical/gas flushing required for testing, pre-commissioning & commissioning up to trial operation of equipments/unit will be provided by BHEL free of cost. Flushed/fresh oil for flushing of lube oil/governing/control oil system and filling with day-to-day topping up, Carbon-dioxide & Hydrogen gas for purging and filling in Turbo-generator will also be supplied by BHEL free of cost. Contractor shall arrange for taking delivery and loading of all such consumables from BHEL/Customer Stores, transportation to site of work and unloading thereon, filling in the system and return the used lube oil, balance quantity of consumables, empty containers etc to BHEL stores duly reconciled for quantity.

In case of any wastage or excess consumption attributable to the contractor in respect of the aforesaid consumables, the cost thereof including BHEL's overhead charges shall be recovered from the contractor.

7.6 PRIMER AND PAINTS FOR FINAL PAINTING

All primer, paints and thinner required for Final painting / Finish Painting and Preservation Painting shall be supplied by BHEL free of charges. However for preservation of site welding joints Paints & Primers and Black Coal Tar Epoxide Paints for finish paints / Final Painitng of Condenser Water Chambers and Water Boxes shall be provided by Contractor as scope of work..

The contractor, however, shall keep and furnish account of all the items issued to him and return the primer, paints etc remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores.

SECTION-8 (Rev 01, 24/01/2009)
SPECIAL CONDITIONS OF CONTRACT

8.0 Inspection/Quality Assurance/Quality Control/ Statutory Inspection

8.1 Various inspection/quality control/quality assurance procedures/methods at various stages of erection and commissioning will be as per BHEL/customer quality control procedure/codes and other statutory provisions and as per BHEL engineer's instructions.

8.2 Preparation of quality assurance log sheets and protocols with customer/ consultants/statutory authority, welding logs, NDE records, testing & calibration records and other quality control and quality assurance documentation as per BHEL engineer's instructions, is within the scope of work/specification. These records shall be submitted to BHEL/customer for approval from time to time.

The protocols between contractor and customer/ BHEL shall be made prior to installation for correctness of foundations, materials, procedures, at each stage of installation, generally as per the requirement of customer/ BHEL. This is necessary to ensure elimination of errors or keeping them within tolerable limits and to avoid accumulation and multiplication of errors.

8.3 A daily log book should be maintained by every supervisor/engineer of contractor on the job in duplicate (one for BHEL and one for contractor) for detailing and incorporating alignment/clearance / centering / leveling readings and inspection details of various equipments etc.

High pressure welding details like serial number of weld joints, welders name, date of welding, details of repair, heat treatment etc. will be documented in welding log as per BHEL Engineer's instructions.

Record of radiography containing details like serial number of weld joints, date of radiography, repairs, if any, re-shots etc shall also be maintained as per BHEL Engineer's instructions.

Record of heat treatments performed shall be maintained as prescribed by BHEL.

8.4 The performance of welders will be reviewed from time to time as per the BHEL standards. Welders' performance record shall be furnished periodically furnished for scrutiny of BHEL's Engineer. Corrective action as informed by BHEL shall be taken in respect of those welders not conforming to these standards. This may include removal/ discontinuance of concerned welder(s). Contractor shall arrange for the alternate welders immediately.

8.5 All the welders shall carry identity cards as per the proforma prescribed by BHEL/Customer/Consultant. Only welders duly authorized by BHEL/customer/consultant shall be engaged on the work.

8.6 Contractor shall provide all the measuring monitoring devices (MMDs) required for completion of the work satisfactorily. These MMDs shall be of brand, quality and accuracy specified by BHEL Engineer and should have necessary calibration and other certificates as per the requirement of BHEL Engineer. Decision of BHEL Engineer regarding acceptance or otherwise of the measuring instruments/gauges/tools for the work under this specification, is final and binding on the contractor. The indicative list of MMDs required for this work and to be made available by the contractor is given in relevant appendix. The list will be reviewed by BHEL and the contractor shall meet any augmentation needed wherever required.

8.7 It is the responsibility of the contractor to prove the accuracy of the testing/measuring/calibrating equipments brought by him based on the periodicity of calibration as called for in the BHEL's quality assurance standards/BHEL Engineer's instructions.

8.8

Any re-laying or re-termination of cables/re-erection of instruments/ recalibration of instruments etc. required due to contractor's mistake or design requirement and found at any stage inspection, shall be carried out by the contractor at no extra cost.

8.9 BHEL, Power Sector – Western Region (PSWR) has already been accredited with ISO 9002 certification and as such this work is subject to various audits to meet ISO 9002 requirements. One particular aspect which needs special mention is about arrangement of calibration of instruments by the contractor. Contractor shall ensure deployment of reliable and calibrated MMDs (Instrument Measuring and Test Equipment). The MMDS shall have test / calibration certificates from authorised / Government approved / Accredited agencies traceable to National / International Standards. Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MMDs so that work does not suffer when the particular equipment / instrument is sent for calibration. Also if any MMDs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall ie repeat the readings taken by that instrument, failing which BHEL may deploy MMD and retake the readings at Contractor's cost.

8.10 Re-work necessitated on account of use of invalid MMDs shall be entirely to the contractor's account. He shall be responsible to take all corrective actions, including resource augmentation if any, as specified by BHEL to make-up for the loss of time.

8.11 In the courses of erection, it may become necessary to carry repeated checks of the work with instruments recently calibrated, re-calibrated. BHEL may counter/ finally check the measurements with their own MMDs. Contractor shall render all assistance in conduct of such counter/final measurements.

8.12 Vibration indicators / vibration recorders / vibration analysers will be provided by BHEL for checking and analysing vibration levels of rotating equipments with necessary operators. Contractor shall provide necessary labour for carrying out such tests.

8.13 Total Quality is the watchword of the work and Contractor shall strive to achieve the Quality Standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and Quality Standards. Contractor shall provide the services of Quality Assurance Engineer.

8.14 Stage Inspection By FES/QA Engineers

Apart from day-to-day inspection by BHEL Engineers stationed at Site and Customer's Engineers, stage inspection of equipments under erection and commissioning at various stages shall also be conducted by teams of Engineers from Field Engineering Services of BHEL's Manufacturing Units, Quality Assurance teams from field Quality Assurance, Unit/Factory Quality Assurance and Commissioning Engineers from Technical Services etc. Contractor shall arrange all labour, tools and tackles etc for such stage inspections free of cost.

8.15 Any modifications suggested by BHEL FES and QA Engineers' team shall be carried out. Claims of contractor, if any, shall be dealt as per Section 13, and provided such modifications have not arisen for reasons attributable to the contractor.

Statutory Inspection of Work

8.16 The work to be executed under these specifications has to be offered for inspection, at appropriate stages of work completion, to various statutory authorities for compliance with applicable regulations.

The work related statutory inspections, though not limited to, are as under:

1) Inspectorate of steam boilers and smoke nuisance
2) Factory Inspector, Labour Commissioner, Electrical Inspector PF Commissioner and other authoritiy connected to this project work

The scope includes getting the approvals from the statutory authorities, which includes arranging for inspection visits of statutory authority periodically as per BHELl Engineer's instructions, arranging materials for ground inspection, taking rub outs for the pressure parts to be offered for inspection, submitting co-related inspection reports, documents, radiographs etc and

following up the matter with them. Contractor shall also make all arrangements for offering the Products / Systems for inspection at location, as applicable, to the concerned authority.

8.17 Contractor should be qualified to execute pressure parts & piping work coming under the purview of IBR, for which he should register himself with CIB of state concerned. contractor also should be aware of the latest IBR regulations and Electricity Act, including the amendments thereof.

8.18 All fees connected with the contractors for testing his welders / men / workers and testing, inspection, calibrating of his instruments and equipments, shall be paid by the contractor. It shall be contractor's responsibility to obtain approval of Statutory Authorities, wherever applicable, for the conducting of any work which comes under the purview of these authorities.

8.19 Other fees like fees for periodic visits, hydraulic test fees, light up inspection fees etc. shall be borne by the contractor.

8.20 Payment of Registration fees for Boiler is excluded from the scope.

8.21 BHEL shall pay the ground inspection fees of Boiler Inspectorate. All other arrangements for site visits periodically by Boiler Inspector to site, for obtaining Inspection certificate etc, will have to be made by contractor.

8.22 The quality management system of BHEL, Power Sector – Western Region (PSWR) has already been certified and accredited under ISO 9002 standards in this regard. The basic philosophy of the quality management system is to define the organizational responsibility, work as per documented procedures, verify the output with respect to acceptance norms, identify the non-conforming product/ procedure and take corrective action for removal of non-conformance specifying the steps for avoiding recurrence of such non-conformities, & maintain the relevant quality records. The non-conformities are to be identified through the conduct of periodical audit of implementation of quality systems at various locations/stages of work. Suppliers/vendors of various products/services contributing in the work are also considered as part of the quality management system. .as such the contractor is expected not only to conform to the quality management system of BHEL but also it is desirable that they themselves are accredited under any quality management system standard.

Field Quality Assurance

8.23 Contractor shall carry out all activities conforming to the approved Field Quality Plan (FQP) as revised from time to time. Total quality shall be the watchword of the work and contractor shall strive to achieve the quality standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and quality standards. Contractor shall provide the services of quality assurance engineer as per the relevant clauses.

SECTION-9
SPECIAL CONDITIONS OF CONTRACT

Safety, Occupational Health and Environmental Management

BHEL PSWR has been certified for Environmental Management under ISO 14001:1996 standard and Occupational Health & Safety under OHSAS 18001 by DNV. In order to comply with the above standards, it shall be the endeavour of BHEL and all its subcontractors to meet and implement the requirements by following the guidelines issued under Environmental, Occupational Health and Safety Management (EHS) manual a copy of which will be available with the BHEL Site-in-charge.

Contractor shall also enter into a "Memorandum of Understanding" as given in clause 9.9 in case of award of contract.

9.0 Responsibility of the Contractor in Respect of Safety of Men, Equipment, Material and Environment.

9.1 The Contractor shall:

9.1.1

Abide by the Safety Regulations applicable for the Site/Project and in particular as mentioned in the booklet "Safe Work Practices" issued by BHEL. Contractors are also to ensure that their employees and workmen use safety equipments as stipulated in the Factories Act (Latest Revision) during the execution of the work. Failure to use safety equipment as required by BHEL Engineer will be a sufficient reason for issuance of memo, which shall become part of Safety evaluation of the contractor at the end of the Project. Also all site work may be suspended if it is found that the workmen are employing unsafe working practice and all the costs/losses incurred due to suspension of work shall be borne by contractor. A comprehensive list of National Standards from which the contractor can draw references for complying with various requirements under this section is given under 9.10

9.1.2

Hold BHEL harmless and indemnified from and against all claims, cost and charges under Workmen's Compensation Act 1923 and 1933 and any amendment thereof and the contractor shall be solely responsible for the same.

9.1.3

Abide by the Procedure governing entry/exit of the contractor's personnel within the Customer/Client premises. All the contractors employees shall be permitted to enter only on displaying of authorized Photo passes or any other documents as authorized by the Customer/Client.

9.1.4

Be fully responsible for the identity, conduct and integrity of the personnel/workers engaged by them for carrying out the contract work and ensure that none of them are ever engaged in any anti national activity

9.1.5

Prepare a signboard giving the following information and display it near work site:

i) Name of Contractor
ii) Name of Contractor Site-in-charge & Telephone number
iii) Job Description in short
iv) Date of start of job
v) Date of expected completion
vi) Name of BHEL Site-in-charge.

9.1.6
Abide by the rules and regulations existing during the contract period as applicable for the contractors at the Project premises.

9.1.7
Observe the timings of work as advised by BHEL Engineer-in-charge for carrying out the contract work.

9.2 SPECIAL CONDITIONS

9.2.1 Safety

9.2.1.1 Safety Plan

Before commencing the work, contractor shall submit a "safety plan" to the authorized BHEL official. The safety plan shall indicate in detail the measures that would be taken by the contractor to ensure safety to men, equipment, material and environment during execution of the work. The plan shall take care to satisfy all requirements specified hereunder.

The contractor shall submit "safety plan" before start of work. During negotiations, before placing of work order and during execution of the contract, BHEL shall have right to review and suggest modifications in the safety plan. Contractor shall abide by BHEL's decision in this respect.

9.2.1.2
The contractor shall take all necessary safety precautions and arrange for appropriate appliances and/or as per direction of BHEL or it's authorized person to prevent loss of human lives, injuries to men engaged and damage to property and environment.

9.2.1.3
The contractor shall provide to his work force and also ensure the use of Personnel Protection Equipment (PPE) as found necessary and/or as directed and advised by BHEL officials without which permission is liable to be denied.

- Safety helmets conforming to IS 2925/1984 (1990)
- Safety belts conforming to IS 3521/1989
- Safety shoes conforming to IS 1989 part-II /1986(1992)
- Eye and face protection devices conforming to IS 2573/1986(1991), IS 6994 (1973), part-I (1991), IS 8807/1978 (1991), IS 8519/1977(1991).
- Other job specific PPEs of standard ISI make as may be prescribed

9.2.1.4
All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, cages, safety nets, ladders, equipment, etc used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorized BHEL official who shall have the right to ban the use of any item found to be unsafe.

9.2.1.5
All electrical equipment, connections and wiring for construction power, its distribution and use shall conform to the requirements of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carryout all types of electrical works. All electrical appliances including portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed.

9.2.1.6

The contractor shall not use any hand lamp energized by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

9.2.1.7
The contractor shall adopt all fire safety measures as per relevant Indian Standards

9.2.1.8
Where it becomes necessary to provide and/or store petroleum products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provisions and/or storage in accordance with the rules and regulations laid down by the relevant government acts, such as petroleum act, explosives act, petroleum and carbides of calcium manual of the chief controller of explosives, Government of India etc. The contractor in all such matters shall also take prior approval of the authorized BHEL official at the site.

9.2.1.9
Proper means of access must be used e.g. ladders, scaffolds, platforms etc. No makeshift access such as oil drums or pallets shall be used. Design of these will be in accordance with relevant standards and certified by competent persons before use.

9.2.1.10
Temporary arrangements made at Site for lifting , platforms, approach access etc should be properly designed and approved before being put to use.

9.2.1.11
All excavations and openings must be securely and adequately fenced/barricaded and warning signs erected when considered necessary as per relevant code of practice.

9.2.1.12
No persons shall remove guardrails, covers or protective devices unless authorized by a responsible supervisor and alternative precautions have been taken

9.2.1.13
Access ways, means of escape and fire exits shall be clearly marked, kept clear and unobstructed at all times

9.2.1.14
Only authorized persons holding relevant license will drive and operate site plant and equipments e.g. cranes, dumpers, excavators, transport vehicles etc

9.2.1.15
Only authorized personnel are allowed to repair, commission electrical equipments.

9.2.1.16
Gas Cylinders shall be handled and stored as per Gas Cylinders Rules and relevant safe working practices

9.2.1.17
All wastes generated at Site shall be segregated and collected in a designated place so as to prevent spillage/contamination/scattering at Site, until the waste is lifted for disposal to designated disposal area as advised by BHEL official.

9.2.1.18
The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working when natural day light is not adequate for clear visibility.

9.2.1.19
The contractor shall train adequate number of workers/supervisors for administering “FIRST AID”. List of competent first aid administers should be prominently displayed.

9.2.1.20
The contractor shall display at strategic places and in adequate numbers the following in fluorescent markings

- Emergency telephone numbers
- Exit, Walkways
- Safe working load charts for wire ropes, slings, D shackles etc
- Warning signs

9.2.1.21
The contractor shall be held responsible for any violation of statutory regulations (local, state or central) and BHEL instructions that may endanger safety of men, equipment, material and environment in his scope of work or other contractors or agencies. Cost of damage, if any, to life and property arising out of such violation of statutory regulations and BHEL instructions shall be borne by the contractor.

9.2.1.22
In case of a fatal or disabling injury/accident to any person at construction sites due to lapses by the contractor, the victim and/or his/her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and/or his/her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.

9.2.1.23
In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover cost of such damages from payments due to the contractor after holding an appropriate enquiry.

9.2.1.24
In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from payments due to the contractor after notifying the contractor suitably and giving him opportunity to present his case.

9.2.1.25
If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given a reasonable opportunity to do so, and/or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorized BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

9.2.1.26 **Emergency Response**

BHEL will have an Emergency Response Plan for each Project Site in consultation with the Owner as the case may be, detailing the procedure for mobilization of personnel and equipment, and defining the responsibilities of the personnel indicated, in order to prepare for any emergency that may arise in order to ensure the priorities of

- Safeguard of life

- Protect assets under construction or neighbouring
- Protect environment
- Resumption of normal operations as soon as the emergency condition is called off

All Contractors shall also be part of the Emergency response Plan and the personnel so nominated shall be aware of their duties and responsibilities in an emergency response situation.

9.2.1.27
At least 5% Contractors supervisors and workmen shall undergo training in administering 'First Aid'. The trained persons should represent for all categories of work and for all areas of work. Adequate number of trained persons should be available for each shift. These first aides shall be included in the emergency response team. Contractor employees and workmen are encouraged to participate in first aid training programmes whenever organized by BHEL.

9.2.2 OCCUPATIONAL HEALTH

9.2.2.1
Specific occupational health hazards will be identified through the hazard evaluation processes in consultation with BHEL engineers and the necessary prevention/reduction/elimination methods implemented.

9.2.2.2
All personnel working in an activity with a potential risk to health shall be made aware of all those risks and the actions they must take to reduce/control/eliminate the risk

9.2.2.3
Safety coordinator shall conduct periodic checks to ensure that every group of workers engaged in similar activities are aware of potential risks to health and the actions required to be taken to mitigate the risk

9.2.2.4
In order to protect personnel from associated health hazards, the following main areas will be focused

- Issue of approved Personnel Protective Equipment
- Verification that the PPE are adequate/maintained and worn by all staff involved in operations that are potentially hazardous to their health
- Ensure that the personnel deployed are physically fit for the operation/work concerned
- Provide hygienic and sanitary working conditions

9.2.2.5
Contractor workers employees engaged in noise risk areas shall be issued with hearing protection aids and the use of the same will be enforced. Further, these workers will be educated on the hazards of noise

9.2.2.6
Contractor workers engaged in dust environment shall be issued with necessary dust protection aids and the use of the same shall be enforced

9.2.2.7
Workers engaged in exposure to bright light/rays as in welding or radiation shall be issued with eye protection devices and the use of the same shall be enforced

9.2.2.8

Adequate arrangements shall be made to provide safe drinking water

9.2.2.9
Health monitoring records on at least sample basis for contractor employees & workmen shall be maintained for persons engaged in specified categories of work. These shall include

- Noise induced hearing loss
- Lung Function test
- Ergonomic Test
- Eye Test for Welders, Grinders, Drivers etc

9.2.3.0 HYGIENE and HOUSEKEEPING

9.2.3.1
Good house keeping and proper hygiene is one of the key requirements of Occupational Health Safety and Environment management. Towards this the contractor shall encourage his workers and supervisors to maintain cleanliness in their area of work.

9.2.3.2
The Contractor shall arrange to place waste bins/chutes at convenient locations for the collection of scrap and other wastes. The bins shall be clearly marked and segregated for metal, non-metal, hazardous and non hazardous wastes.

9.2.3.3
BHEL may take up appropriate remedial measures at the cost of the contractors if the contractors fail in good house keeping and if there is an imminent risk of pollution

9.2.4 ENVIRONMENT MANAGEMENT

9.2.4.1
BHEL has a sound environmental management system, which is to be maintained and implemented by all the contractors. The system allows for project specific objectives to be set and developed sensitive to client requirements, applicable environmental legislation and BHEL's own objectives and policy. BHEL engineers will assess and monitor the environmental impact of their work and lay out objectives for their minimization. The contractors shall implement the objectives for continual improvement of environmental performance. BHEL shall regularly audit environmental impacts and their improvements.

9.2.4.2 WASTE MANAGEMENT

9.2.4.3.1
The objective of waste management is to ensure the safe and responsible disposal of waste, ensuring that it is correctly disposed of and being able to audit the process to ensure compliance.

9.2.4.3.2
Chemical wastes if any shall be collected separately and disposed of to BHEL designated refuse yard as per BHEL advice.

9.2.4.3.3
No dangerous chemicals, noxious waste products or materials will be disposed off on or off site without approval obtained through BHEL.

9.2.4.3.4
All disposal of wastes generated during construction shall be in accordance with all relevant legislation.

9.2.4.3.5
Acid and alkali cleaning wastes shall be neutralized to acceptable norms before disposal to the designated area.

9.2.4.3.6
All necessary measures shall be taken to ensure safe collection and disposal of waste oils. In particular to ensure the prevention of their discharge into surface waters, ground waters, coastal waters or drainages

9.3 **SUPERVISION**
9.3.1

Contractor must provide at least one full time on site safety coordinator when the manpower engaged is in excess of 50 for the contract activities in the premises. If the manpower is less than 50, the on site safety coordination responsibilities shall be assumed by any one of the contractor's other supervisory staff; however in both the cases, the contractor must specify in writing the name of such persons to the BHEL Engineer in Charge.

9.3.2

Contractor's safety coordinator or his supervisor responsible for safety as the case may be shall conduct at his work site, and document formal safety inspection and audits at least once in a week. Such documents are to be submitted to BHEL Engineer in Charge for his review and record.

Contractor, supervisor must attend all schedule safety meetings as would be intimated to him by the BHEL Engineer in Charge.

9.3.3

Before starting work under any contract, the contractor must ensure that a job specific safety procedures/field practices as required over and above the safety permit conditions are prepared and followed .He should also ensure that all supervisors and workers involved understand and follow this procedures /field practices.

9.3.4
Contractor must ensure that in his work site appropriate display boards are put displaying signs for site safety, potential hazards and precautions required.

9.4.0 **TRAINING & AWARENESS**

9.4.1

Contractor shall deploy experienced supervisors and other manpower who are well conversant with the safety and environment regulations of the Project. The electricians to be deployed on the job should have wireman license.

9.4.2
All Supervisors & Workmen of the Contractor shall undergo Fire safety training/ demonstration whenever arranged by BHEL with the help of either Customer's Fire and Safety department or outside faculty so as to acquire knowledge of fire prevention and also to be able to make use of appropriate fire extinguishers.

9.4.3
Contractor must familiarize himself from BHEL Engineer in Charge about all known potential fire, explosion or toxic release hazards related to the contract. He in turn will ensure that same information has been passed to the supervisors and workmen

9.4.4
Contractor must ensure that all his supervisors are properly trained and each employee has received and understood from his supervisor necessary training and briefing about the safety requirement. Necessary document as a means to verify that employees have understood the training is to be maintained.

9.4.5
The contractor supervisors shall also give a small safety briefing to all the workmen under his charge before undertaking any new work and specially understand the safety requirements that are mandatory

9.5.0 **REPORTING**

9.5.1
The contractor shall submit report of all accidents, fires and property damage, dangerous occurrences to the authorized BHEL official immediately after such occurrence but in any case not later than twelve hours of the occurrence. Such report shall be furnished in the manner prescribed by BHEL and also to meet statutory requirement.

9.5.2
Any injury sustained by any of the contractor's employees within the Project premises must be reported to BHEL supervisor and FIRST AID should be immediately administered. The Contractor shall be responsible for keeping and maintaining proper records of Accidents to his personnel.

9.5.3
Contractor must arrange to immediately investigate, properly document and report any injury, accident or near miss involving any of his employees and take appropriate follow up action. He must furnish within 12 hours of the incident a written report to BHEL Engineer in charge and the Safety Section.

9.5.4
According to the Factory Act and the Employees state Insurance Act & regulation, any person sustaining any injury within the project premises and absenting himself from work for more than 46 hours, his accident report has to be sent to the respective Government Authorities. Therefore contractor shall inform the owner's representative such matter immediately for their needful action.

9.5.5
In addition, contractor shall submit periodic reports on safety to the authorised BHEL official from time to time as prescribed.

9.5.6
Before commencing the work, the contractor shall appoint/nominate a responsible officer to supervise implementation of all safety measures and liaison with his counterpart of BHEL.

9.6 **AUDIT REVIEW AND INSPECTION**

9.6.1
BHEL shall conduct audit on the contractor performance and compliance with the project specific requirements of the Environment and Occupational Health & Safety Management systems. The programme of audit shall cover all activities under the contract but will focus particularly on high-risk activities. The Construction Manager shall decide the schedule of audit. The audit findings shall be communicated to the contractors and necessary remedial action as advised by BHEL Engineers shall be under taken within the stipulated time.

9.6.2
Inspections shall be carried out regularly by the contractors and by BHEL Engineers on activities, facilities, equipment, documentation, to cover the following aspects.

- Compliance with procedures and systems
- Availability, condition and use of PPE
- Condition of maintenance tools, equipments, facilities
- Availability of fire fighting equipments and its condition
- Use of fire fighting equipments and first aid kit
- Awareness of occupational health hazard
- Awareness of safe working practices
- Presence of quality supervision
- Housekeeping

The Safety coordinator shall visit and inspect work sites daily. All unsafe acts, unsafe conditions that have imminent potential for causing harm/injury/damage will be immediately corrected. He shall maintain a daily logbook giving details of unsafe acts or conditions observed and the corrective action taken and recommendations for preventing recurrence. Adequacy of corrective actions will be verified

The contractor shall take remedial measures as per the findings of each inspection
Besides the above, the contractor shall be required to carry out the following inspections

Sl no	**Equipment**	**Scope of inspection**	**Inspection by**	**Schedule**
1	Hand tools	To identify unsafe/defective tool	User	Daily
2	Power tools	To identify unsafe/defective tool	User	Daily
3	Fire Extinguishers	To check pressure and any defect	User / Safety Coordinator	Daily Every month
4	Lifting equipment/tackles	To check for defects and efficacy of brakes	User Third party	Daily Every Year
5	PPE	To check for defects	User	Daily

9.7 **NON COMPLIANCE**:-

9.7.1
NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND THE BHEL HAS RIGHT TO IMPOSE FINES ON THE CONTRACTOR AS UNDER **for every instance of violation noticed**:

Sl. No	**Instance of Violation**	**Fine (in Rs)**
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slinging property	200/-
07.	Using Damaged Sling	200/-
08.	Lifting Cylinders Without Cage	500/-
09.	Not Using Proper Welding Cable With Lot of Joints And	200/-

Sl. No	Instance of Violation	Fine (in Rs)
	Not Insulated Property.	
10.	Not Removing Small Scrap From Platforms	200/-
11.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	200/-
12.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
13.	Improper Earthing Of Electrical T&P	500/-
	Major Accident or Accidents causing partial loss of earning to the victim	50,000/- per victim
14	Fatal Accident or Accidents causing permanent loss of earning to the victim	1,00,000/- per victim

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected above will be utilised for giving award to the employees who could avoid accident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

9.8

CITATION:-If safety record of the contractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the contractor may be considered by BHEL after completion of the job

9.9 Memorandum of Understanding

After Award Of Work, Contractors Are Required To Enter Into A Memorandum Of Understanding As Given Below:

Memorandum of Understanding

BHEL, PSWR is committed to Health, Safety and Environment Policy (EHS Policy) as given in the booklet titled " Safe Working Practices" issued to all contractors.

M/s _____ do hereby also commit to the same EHS Policy while executing the Contract Number _____

M/s _____ shall ensure that safe work practices not limited to the above booklet are followed by all construction workers and supervisors. Spirit and content therein shall be reached to all workers and supervisors for compliance.

BHEL will be carrying out EHS audits twice a year and M/s _____ shall ensure to close any non-conformity observed/reported within fifteen days.

Signed by authorized representative of M/s----------

Name :

Place & Date:

9.10

Comprehensive list of National Standards for reference and use wherever applicable in the execution of Civil, Erection and Commissioning Contracts.

IS No	YEAR	Amd upto	DESCRIPTION
IS 10204	1982		PORTABLE FIRE EXTINGUISHERS MECHANICAL FOAM TYPE
IS 10245	1994		SPECIFICATION FOR BREATHING APPARATUS
IS 10291	1982		SAFETY CODE FOR DRESS DRIVERS IN CIVIL ENGINEERING WORKS
IS 10658	1983		HIGHER CAPACITY DRY POWDER FIRE EXTINGUISHERS (TROLLEY MOUNTED)
IS 10662	1992		COLOUR TELEVISION
IS 10667	1983		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF FOOT AND LEG
IS 11037	1984		ELECTRONIC FAN REGULATORS
IS 11057	1984		INDUSTRIAL SAFETY NETS
IS 11451	1998		RECOMMENDATION FOR SAFETY AND HEALTH REQUIREMENT RELATING TO OCCUPATION EXPOSURE TO ASBESTOS
IS 1169	1967		PEDESTAL FANS
IS 1179	1967		SPECIFICATION FOR EQUIPMENT FOR EYE AND FACE PROTECTION DURING WELDING
IS 11833	1986		DRY POWDER FIRE EXTINGUISHERS FOR METAL FIRES
IS 11972	1987		CODE OF PRACTICE FOR SAFETY PRECAUTION TO BE TAKEN WHEN ENTERING A SEWARAGE SYSTEM
IS 1287	1986		ELECTRIC TOASTER
IS 13063	1991		STRUCTURAL SAFETY OF BUILDINGS ON SHALLOW FOUNDATIONS ON ROCKS
IS 13385	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE WHEEL MOUNTED WATER TYPE (GAS CARTRIDGES)
IS 13386	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE MECHANICAL FOAM TYPE
IS 13415	1992		CODE OF SAFETY FOR PROTECTIVE BARRIERS IN AND AROUND BUILDINGS
IS 13416	1992		RECOMMENDATIONS FOR PREVENTIVE MEASURES AGAINST HAZARDS AT WORKING PLACE PART 1 TO PART 5
IS 13430	1992		CODE OF PRACTICE FOR SAFETY DURING ADDITIONAL CONSTRUCTION AND ALTERATION TO EXISTING BUILDINGS
IS 13849	1993		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CONSTANT PRESSURE)
IS 1446	1985		CLASSIFICATION OF DANGEROUS GOODS (FIRST REVISION)
IS 1476	1979		REFRIGERATORS
IS 1641	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): GENERAL PRINCIPLES OF FIRE GRADING AND CLASSIFICATION
IS 1642	1989		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS-DETAILS OF CONSTRUCTION
IS 1643	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): EXPOSURE HAZARD
IS 1646	1997		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): ELECTRICAL INSTALLATIONS
IS 1904	1986		CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF FOUNDATIONS IN SOIL
IS 1905	1987		STRUCTURAL SAFETY OF BUILDINGS MASONARY WALLS
IS 2082	1985		ELECTRICAL GEYSERS
IS 2171	1985		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CARTRIDGE)

IS No	YEAR	Amd upto	DESCRIPTION
IS 2309	1989		PRACTICE FOR THE PROTECTION OF BUILDINGS AND ALLIED BUILDINGS AGAINST LIGHTENING
IS 2312	1967		EXHAUST FANS
IS 2361	1994		SPECIFICATION FOR BUILDING GRIPS - FIRST REVISION
IS 2418	1977		TUBULAR FLUORSCENT LAMPS IS 2418 (FT-1)
IS 2750	1964		STEEL SCAFFOLDINGS
IS 2762	1964		SAFE WORKING LOADS IN KGS FOR WIRE ROPE SLINGS
IS 2878	1986		FIRE EXTINGUISHERS CARBON DIOXIDE TYPE (PORTABLE AND TROLLEY MOUNTED)
IS 2925	1984		SPECIFICATION FOR INDUSTRIAL SAFETY HELMETS
IS 3016	1982		CODE OF PRACTICE FOR FIRE PRECAUTIONS IN WELDING AND CUTTING OPERATIONS- FIRST REVISION
IS 3315	1974		DESERT COOLERS
IS 3521	1989		INDUSTRIAL SAFETY BELTS AND HARNESS
IS 368	1983		IMMERSION WATER HEATERS
IS 3696	1991		SAFETY CODE OF SCAFFOLDS AND LADDERS PART 1 TO 2
IS 3737	1996		LEATHER SAFETY BOOTS FOR WORKERS IN HEAVY METAL INDUSTRIES
IS 374	1979		CEILING FANS INCLUDING REGULATORS
IS 3764	1992		EXCAVATION WORK - CODE OF SAFETY
IS 3786	1983		METHOD FOR COMPUTATION OF FREQUENCY AND SEVERITY RATES FOR INDUSTRIAL INJURIES AND CLASSIFICATION OF INDUSTRIAL ACCIDENTS
IS 3935	1966		CODE OF PRACTICE FOR COMPOSITE CONSTRUCTION
IS 4014	1967		CODE OF PRACTICE FOR STEEL TUBULAR SCAFFOLDING
IS 4081	1986		SAFETY CODE FOR BLASTING AND RELATED DRILLING OPERATIONS
IS 4082	1977	1996	STACKING AND STORAGE OF CONSTRUCTION MATERIALS AND COMPONENTS AT SITE
IS 4130	1991		DEMOLITION OF BUILDINGS - CODE OF SAFETY PART 1 TO 2
IS 4138	1977		SAFETY CODE FOR WORKING IN COMPRESSED AIR (FIRST REVISION)
IS 4155	1966		GLOSSARY OF TERMS RELATING TO CHEMICAL AND RADIATION HAZARDS AND HAZARDOUS CHEMICALS
IS 4209	1967		CODE OF SAFETY FOR CHEMICAL LABORATORY
IS 4250	1980		FOOD MIXERS
IS 4262	1967		CODE OF SAFETY FOR SULFURIC ACID
IS 4756	1978		SAFETY CODE FOR TUNNELING WORK
IS 4912	1978		SAFETY REQUIREMENTS FOR FLOOR AND WALL OPENINGS, RAILINGS AND TOE BOARDS
IS 5121	1969		SAFETY CODE FOR PILING AND OTHER DEEP FOUNDATIONS
IS 5182	1969	1982	METHODS FOR MEASUREMENT OF AIR POLLUTION
IS 5184	1969		CODE OF SAFETY FOR HYDROFLUORIC ACID
IS 5216	1982	2000	RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICE IN ELECTRICAL WORK PART I AND II
IS 555	1979		TABLE FANS
IS 5557	1995		INDUSTRIAL AND SAFETY LINED RUBBER BOOTS (SECOND REVISION)
IS 5916	1970		SAFETY CODE FOR CONSTRUCTION INVOLVING USE OF HOR BITUMINOUS MATERIALS

IS No	YEAR	Amd upto	DESCRIPTION
IS 5983	1980		SPECIFICATION FOR EYE PROTECTORS - FIRST REVISION
IS 6234	1986		PORTABLE FIRE EXTINGUISHERS WATER TYPE (STORED PRESSURE)
IS 692	1994		CRITERIA FOR SAFETY AND DESIGN OF STRUCTURES SUBJECTED TO UNDERGROUND BLASTS
IS 6994	1973		SPECIFICATION FOR SAFETY GLOVES
IS 7155	1986		CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8)
IS 7205	1974		SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK
IS 7293	1974		SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY
IS 7323	1994		GUIDELINES FOR OPERATIONS OF RESERVOIRS
IS 7812	1975		CODE OF SAFETY FOR MERCURY
IS 7969	1975		SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS
IS 8089	1976		CODE OF SAFE PRACTICE FOR LAYOUT OF OUTSIDE FACILITIES IN AN INDUSTRIAL PLANT
IS 8091	1976		CODE OF PRACTICE FOR INDUSTRIAL PLANT LAYOUT
IS 8095	1976		ACCIDENTS PREVENTION TAGS
IS 818	1968	1997	CODE OF PRACTICE FOR SAFETY AND HEALTH REQUIREMENTS IN ELECTRIC AND GAS WELDING, AND CUTTING OPERATIONS
IS 8448	1989		AUTOMATIC LINE VOLTAGE CORRECTOR (STABILISER)
IS 8519	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR BODY PROTECTION
IS 8520	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR EYE, FACE AND EAR PROTECTION
IS 875	1987		STRUCTURAL SAFETY OF BUILDING: LOADING STANDARD PART 1 TO 5
IS 8807	1978		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF ARMS AND HANDS
IS 8978	1985		INSTANTANEOUS WATER HEATERS
IS 8989	1978		SAFETY CODE FOR ERECTION OF CONCRETE FRAMED STRUCTURES
IS 940	1989		PORTABLE FIRE EXTINGUISHERS WATER TYPE (GAS CARTRIDGE)
IS 9457	1980		SAFETY COLOURS AND SIGNS
IS 9679	1980		CODE OF SAFETY FOR WORK ENVIRONMENTAL MONITORING
IS 9706	1997		CODE OF PRACTICE FOR THE CONSTRUCTION OF AERIAL RPEWAYS FOR THE TRANSPORTATION OF MATERIAL
IS 9759	1981		GUIDELINES FOR DEWATERING DURING CONSTRUCTION
IS 9815	1989		SERVO MOTOR OPERATED LINE VOLTAGE CORRECTOR (SERVO STABILISER)
IS 9944	1992		RECOMMENDATIONS ON SAFE WORKING LOAD FOR NATURAL AND MAN-MADE FIBRE ROPE SLINGS
IS 996	1979		SINGLE PHASE ELECTRIC MOTORS
ISO 3873	1977		SAFETY HELMET

SECTION-10

SPECIAL CONDITIONS OF CONTRACT

10.0 DRAWINGS AND DOCUMENTS

10.1
The detailed drawings, specifications available with BHEL engineers will also form part of this tender specification. Revision of drawings/documents may take place due to various considerations as is normal in such large project. Work will have to be carried out as per revised drawings/ documents. These documents will be made available to the contractor during execution of work at site.

10.2
One set of necessary drawings/documents to carry out the erection work will be furnished to the contractor by BHEL on loan that shall be returned to BHEL after completion of the work. Contractor's personnel shall take care of these documents given to them.

10.3
The data furnished in various sections and appendices and the drawings enclosed with this tender specification describe the equipment to be installed, tested and commissioned under this specification, briefly. However, the changes in the design and in the quantity may be expected to occur as is usual in any such large scale of works.

10.4
If any error or ambiguity is discovered in the specification/information contained in the documents/drawings and tender, the contractor shall forthwith bring the same to the notice of BHEL before submission of offer.

10.5
In case an ambiguity is detected after award of work, the same must be brought to the notice of BHEL before commencement of the work/activity. BHEL's interpretation in such cases will be final and binding on the contractor.

SECTION-11

SPECIAL CONDITIONS OF CONTRACT

TIME SCHEDULE, MOBILIZATION, PROGRESS MONITORING, OVERRUN, CONTRACT VARIATION, ADVANCE PAYMENT ETC.

11.1 TIME SCHEDULE & MOBILIZATION

11.1.1 INITIAL MOBILIZATION AND TENTATIVE SCHEDULE

Contractor shall reach site, make his site establishment and be ready to commence the work within **two weeks** from the date of fax Letter of Intent or as per directions of construction manager of BHEL.

The contractor has to subsequently augment his resources in such a manner that the entire work is completed to achieve the following **tentative** schedule:

ACTIVITY	**TENTATIVE SCHEDULE OF COMPLETION #**
Turbine Box up	10^{th} month
Completion of Oil Flushing completion	12^{th} month
Barring Gear	14^{th} month
Rolling & Synchronisation	15^{h} month
Completion of Trial Operation	17^{th} month
Completion of commercial operation	18^{th} month
Completion of all facilities	20^{th} month

 # -Indicates the No. of months from the start of contract period.

11.1.2

In order to meet above schedule and other intermediate targets/activities as set by BHEL Engineer In charge at site, to meet customer requirements/project schedule, contractor shall arrange all necessary resources and work force in consultation with BHEL engineer at site to undertake works simultaneously in all possible work fronts as made available to contractor. Contractor shall discuss for initial mobilisation to commence the Erection & Commissioning work at site with BEHL Engineer & mobilise the resources accordingly including augmenting the resources as per direction of BHEL Engineer to achieve the intermittent milestone date. Mutually agreed programme shall be drawn by the contractor primarily to achieve the schedule as aforesaid, taking into account available and anticipated materials inflow and other inputs. This may have to be further tuned with shorter duration programmes as per requirement to suit the project schedule and commitments to customer.

11.1.3

Contractor shall specifically note that there may likely to be some delay in supplies of materials / release of work fronts / other reasons. Contractor may have to work round the clock on such critical activities as a part of catch up programme to meet the project requirement to the extent possible and Contractor shall have to provide required resources as part of scope of work for same.

11.1.4 Start of Contract Period and Duration

The total contract period for completion of entire work shall be 20 **(Twenty) months** from the start of erection. Erection of the first major equipment, as identified by BHEL site-in-charge, on its permanent location/ foundation shall be reckoned as the start of contract period. Small components like packer plates, insert plates, etc. will not be considered for this purpose.

However the contractor shall have to mobilize his resources earlier than the start of contract period for preparatory work like taking over and chipping of foundations, blue matching and grouting of packer plates etc.

The contractor shall complete all the work in the scope of this contract within the contract period.

11.1.5 Grace Period

Not Applicable

11.2 Progress Monitoring, Contract Extension and Overrun

11.2.1 Progress Monitoring

Refer 'General Conditions of Contract'

11.3 Contract Extension

Refer 'General Conditions of Contract'

11.4 Overrun Compensation

Refer 'General Conditions of Contract'

11.5 PRICE VARIATION

Refer 'General Conditions of Contract'

11.6 Contract Variations

11.6.1 Variation in Weight/Quantity

Weights of various equipments/systems and/or quantities of various items of work indicated under this Tender Specification are tentative and are likely to vary while executing the actual work. In case of such variations, the following shall be applicable.

The lump sum rate accepted for **Item SN 01 of Rate Schedule** shall remain unchanged and will be applicable irrespective of any variation.

For any upward or downward variation in the quantities of **Item SN 02 and 03 of Rate Schedule**, the rates accepted shall remain applicable without any variation; payments will be made for the actually executed quantity of respective item.

In case a new item of work (not indicated in the Tender Specification) becomes necessary for completion of the work, it shall be carried out by the contractor. For the purpose of payment, item rate shall be adopted/ deduced from comparable rate of similar item already existing in the present contract if any; else it will be mutually discussed and agreed upon.

11.7 Interest Bearing Recoverable Advance

Refer 'General Conditions of Contract'

11.8 Definition of Work Completion

The contractor's scope of work under these specifications will deem to have been completed in all respect, only when all the activities are completed satisfactorily and so certified by BHEL site in charge. The decision of BHEL in this regard shall be final and binding on the contractor.

SECTION-12

SPECIAL CONDITIONS OF CONTRACT

12.0 TERMS OF PAYMENT

12.0.1
The contractor shall submit his monthly RA account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar month. However, first RA Bill shall be released only after signing of Contract Agreement.

12.0.2
Clause 2.6 of general conditions of contract shall be referred to as regards mode of payment, and measurement of the work completed.

12.0.3
Release of payment in each running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter.
Refer 'General Conditions of Contract' for Retention amount

12.0.4
The payment for running bills will normally be released within around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

12.0.5
BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, the following details are to be furnished by the Contractor pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker:

1. Name of the Company
2. Name of Bank
3. Name of Bank Branch
4. City/Place
5. Account Number
6. Account type
7. IFSC code of the Bank Branch
8. MICR Code of the Bank Branch

BHEL may also choose to release payment by other alternative modes as suitable.

12.1 STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

The progressive payment for erection, testing and commissioning on accepted price of contract value/item rates will be released as per the break up given hereinafter under the clause 12.1.1)

12.1.1
TG with TG Auxiliaries and associated equipments, Integral piping, pumps with aux. tanks, vessels etc. (scope as per**"AA**"), External piping/Re-generative piping with associated valves, components/items, fitting, supports etc. (scope as per "**BB**") and Equipments/systems, Central

Lube Oil System, Misc. pumps, Condenser On Load Tube Cleaning System (COLTS), Plate Heat Exchangers, Misc. Hoists & Chain Pulley Blocks, LP Dosing system etc. (scope as per **"CC"**) of Appendix-I &II

(A) FOR Sl. No. 01 OF RATE SCHEDULE: – TG with TG Aux. and associated Equipments, Integral Piping, Pumps with Aux., Tanks, Vessels.

SN	Description	%
1.0	**CONDENSER (15%)**	
1.1	Preparation of foundation.	1.0
1.2	Placement, alignment, assembly and welding of bottom plate segments, hot well, NDT and spring elements placement	1.0
1.3	Assembly and positioning of water chamber, water boxes, side plates, bottom plates, welding and NDT	1.5
1.4	Assembly, alignment and welding & NDT of tube support plates and internals like baffle plates, air evacuation pipes etc.	3.0
1.5	Assembly, welding & NDT of dome walls and dome stiffeners, extraction piping and steam throw device etc.	2.5
1.6	Insertion, expansion, end milling of condenser tubes	3.0
1.7	Hydro test of steam and water side	1.0
1.8	Welding of condenser neck joint and NDT& completion of balance works	1.0
1.9	Assy. and Erection of Condenser R.E. Joints and Butterfly Valves	1.0
	Total of 1.0	**15%**
2.0	**TURBINE (16 %)**	
2.1	Placement, alignment and grouting of base plates of LPC and bearing pedestals	1.0
2.2	Placement and alignment of LP outer casing bottom portion and centre guide keys	1.0
2.3	Placement of LP rotor and alignment with inner casing and checking of blade clearance	1.0
2.4	Assembly, alignment & welding of LP Outer Casing upper half.	1.5
2.5	Placement of IP Turbine, lowering of IP Rotor on bearings and checking of clearances, coupling etc.	1.5
2.6	Placement of HP Turbine, lowering of HP Rotor on bearings and checking of clearances, coupling etc.	1.0
2.7	Boxing up of LP inner-inner & inner- outer and roll check	1.0

SN	Description	%
2.9	Alignment of all Rotors including reaming, honing and fixing of coupling bolts	1.0
2.10	Assembly of regulation system	1.0
2.11	Installation of ESV, IV, LPBP Valves, CRH NRV, MS Strainers (internals), HRH strainers (internals)	2.0
2.12	Erection, alignment and welding of cross around piping	1.0
2.13	Final box-up of LP turbine	1.0
2.14	Completion of Turbo-visory works	1.0
2.15	Final boxing up of Pedestals after Oil Flushing completion	1.0
	Total of 2.0	**16%**
3.0	**TURBO GENERATOR (24%)**	
3.1	Preparation of foundation, levelling, matching and grouting of foundation plates	1.0
3.2	Unloading of stator from Trailer and shifting to point of Lifting	1.0
3.3	Readiness of Generator Stator lifting arrangement at site	3.5
3.4	Lifting of Generator Stator to required elevation	3.5
3.5	Placement, Levelling and Centring of Generator Stator on foundation	4.0
3.6	Testing of Hydrogen Coolers and insertion	1.0
3.7	Rotor Insertion and lowering on bearings.	1.0
3.8	Erection of Brushless Exciter with accessories and covers etc.	1.0
3.9	Checking the run out, alignment of Generator Rotor, LP Turbine Rotor, Brushless Exciter rotor and grouting of foundation frames/plates.	2.5
3.10	Reaming, Honing of coupling holes and fixing of coupling bolts of LP-Gen. and Generator Brushless Exciter Rotors.	1.5
3.11	Boxing up of Generator and assembly of Hydrogen Seals	1.0
3.12	Final gas tightness test of Stator with complete system	2.0
3.13	Completion of balance works.	1.0
	Total of 3.0	**24%**
4.0	**PUMPS AND AUXILIARIES (20 %)**	

SN	Description	%
4.1	**Erection/Testing of Boiler Feed Pumps.** **Erection / Testing of Motor Driven BFP- 3Nos.** (A) Foundation chipping, blue matching of foundation and levelling, centring of grillage/foundation frame and bolt grouting. (B) Placement of feed pump, booster pump, motor, hydraulic coupling and preliminary alignment. (C) Grouting of grillage/ foundation and final alignment of BFP, BP, Motor and HC (D) Erection of lube Oil piping, working oil coolers & other balance piping like mechanical seal water coolers with piping etc, Erection of panel/racks and oil flushing of oil piping.	6.0
4.2	Erection & Testing of Condensate Extraction Pumps- 2 sets	2.0
4.3	Erection and Testing of Lube oil pumps, oil centrifuge, Main oil tank, Coolers, Duplex Filter and other related equipments / Items including with fittings etc.	2.0
4.4	Erection and testing of Vacuum Pumps	1.0
4.5	Erection and Testing of Seal oil, Gas System units/Refrigeration Driers / racks / equipments, Brushless Exciter air system.	1.5
4.6	Erection of HP & LP heaters with standpipes and fittings.	2.5
4.7	Erection of Gland Steam Condenser, Drain cooler with fittings.	0.5
4.8	Erection of Tanks & Vessels like HP & LP Flash Tanks, Unit Flash Tank/Vessel with fittings.	1.0
4.9	Erection of DMCW Tank, Clean oil Tank, Dirty Oil Tank and Oil unloading Tank with fittings.	2.5
4.10	Erection of Misc. / other Auxiliaries	1.0
	Total of 4.0	**20%**
5.0	**INTEGRAL PIPING (10 %)**	
5.1	Lube. Oil and Jacking Oil Piping	2.0
5.2	Control oil / Governing oil Piping for ESV's, IV's, CRHNRV's and LP Bypass Governing oil system etc.	1.0
5.3	Seal Steam Piping	1.0
5.4	Turbine Drainage Piping	1.0
5.5	Condensate Spray Piping	1.5

SN	Description	%
5.6	Generator Seal Oil Piping	1.0
5.7	Generator Gas Piping	1.0
5.8	Miscellaneous and Other Piping	1.5
	Total of 5.0	**10%**
6.0	**ASSISTANCE FOR COMMISSIONING (10%)**	
6.1	Oil Flushing of lube. Oil, Jacking oil system, seal oil and Governing oil system	1.5
6.2	Charging of CW piping and DMCW system	1.0
6.3	Commissioning of BFPs and CEPs	1.0
6.4	Barring Gear operation	1.0
6.5	TG system Vacuum pulling operation	1.0
6.6	Synchronisation	1.5
6.7	Completion of Trial Operation and related works of PG test	1.5
6.8	Completion of all facilities	1.5
	Total of 6.0	**10%**
7.0	**Final Painting / Finish Painting, legending & colour banding etc. (5%)**	
7.1	TG and TG Auxiliaries etc.	1.0
7.2	Heat Exchangers with related Auxiliaries etc.	1.0
7.3	Pumps with Aux., Tanks & Vessels with Aux. etc.	1.0
7.4	Integral Piping with supports, fittings etc.	1.0
7.5	Misc. equipments / auxiliaries	1.0
	Total of 7.0	**5%**
	Grand Total of (1)+(2)+(3)+(4)+(5)+(6)+(7)	**100%**

(B) FOR Sl. No. 02 OF RATE SCHEDULE: External/Re-generating piping (Carbon Steel & Alloy Steel and Stainless steel) with valves, supports and fittings (Excluding TG Integral Piping).

Sl.No	Part of Activity Completed	Percentage Of Accepted Item Rates (C.S. & A.S. and S.S.)
A	Transport to work site & Erection / Placement in position	30%
B	Alignment, Fit-up & Welding	30%
C	NDT	5%
D	Post weld Heat Treatment	2%
E	Completion of Hangers and Supports	10%
F	Hydraulic Test of Pipeline	5%
G	Chemical Cleaning of Pipeline	3%
H	Steam Blowing of pipeline	2%
I	Synchronization	3%
J	Trial Operation Completion	2%
K	Completion of work related to PG Test and handing over.	1%
L	Completion of all facilities	2.0
M	Completion of Final Painting / Finish Painting, Legending, Colour Banding etc.	5.0
	Total	**100%**

(C) FOR Sl. No. 03 OF RATE SCHEDULE:- Equipments/Systems, Central Lube Oil system, Misc. Pumps, COLTS, Plate Heat Exchangers, Misc. Hoists & Chain Pulley Blocks, Self Cleaning Strainers, LP Dosing System etc.:

1. 30 % on Placement and assembly of equipments on foundation/location.
2. 20 % on Levelling & Alignment and completion of welding etc. of equipments.
3. 15 % on assembly/erection of fine fittings.
4. 10% on completion grouting of foundation frame and securing/supporting of structure.
5. 10 % on commissioning / Charging of system.
6. 5 % completion of trial run operation.
7. 5% on completion of Load test and works related to PG test & handing over.
8. 5% on completion of Final Painting / Finish Painting, Legending, Colour Banding etc.

12.2

MODE OF PAYMENT AND MEASUREMENT OF WORK COMPLETED

12.2.1

The payment for running bills will normally be released within around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

12.2.2

On receipt of the bill, joint measurement and checking of the work done will be carried out by the concerned BHEL engineer as per relevant clauses of General Conditions of the Contract and break-up given vide clause 12.0. It shall be final and binding on the contractor.

12.2.3

The payment for running bills will normally be released in around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

12.2.5

MEASUREMENT OF THE WORK COMPLETED

- Where payment is to be made on the basis of weight, the weight per unit given in the BHEL document only shall be taken in to consideration. In case such information is not available in bhel documents, then the latest relevant indian standards in this regard may be applied.
- Spares, surplus quantity, erection contingency materials will not be paid for unless the same has been consumed in place of regular item of measurable work as per the rate schedule.
- Where the payment is made on the basis of item rate, actual executed quantity measured jointly shall only be paid for.
- It is clarified that as far as weight constituted by welding consumables and other consumables supplied by BHEL as well as by the contractor, shall not be considered for payment.
- BHEL engineer's decision regarding stage of payment corresponding to progress of work, calculation of weight etc will be final and binding on the contractor.
- No separate payment will be made for the weight/volume of lubricant, oils, chemicals, gases, water, preservatives etc.
- No payment will be made for the special tools etc used in various activities of this work.

12.3. GENERAL

12.3.1

For the purpose of release of progressive payments, month-wise break up for each of the above services will be jointly worked out by BHEL and the contractor at site at the time of start of work. This will be dynamically and regularly reviewed every month or mutually agreed periodicity and shall be re-set based on expected requirement of various services keeping in view relevant aspects. On all the issues as above, BHEL engineer's decision shall be final & binding.

12.3.2
Weight of packers and shims which become permanent part of equipment, both figuring in shipping list and those fabricated at site for the items where payment is to be made on weight basis, will be paid for on shipping list based actual weight.

SECTION-13

SPECIAL CONDITIONS OF CONTRACT

Refer 'General Conditions of Contract'

SECTION-14 (rev:01 dated 02/02/2009)

SPECIAL CONDITIONS OF CONTRACT

Refer ‘General Conditions of Contract’

15.0 EARNEST MONEY DEPOSIT, SECURITY DEPOSIT & BANK GUARANTEE

15.1 Earnest Money Deposit:

Refer 'General Conditions of Contract'

15.2 Security Deposit

Refer 'General Conditions of Contract'

15.3 BANK GUARANTEE

Refer 'General Conditions of Contract'

15.3.1 Guidelines for acceptance of Bank Guarantees are as follows :

- Vendors are advised to obtain BG from any of the following BHEL consortium banks

State Bank of India	The Hongkong and Shanghai banking Corporation Ltd.
ICICI Bank Ltd	ABN Amro Bank N.V
Bank of Baroda	IDBI Ltd
Canara Bank	Punjab National Bank
Citi bank N.A	Standard Chartered Bank
Corporation Bank	State Bank of Travancore
Detshe Bank	State Bank of Hydrabad
HDFC Bank Ltd	Syndicate Bank

- The Bank Guarantees of all Public sector banks shall be accepted (Other than consortium banks also).
- The Bank Guarantees of Co-operative banks shall not be accepted.
- Bank Guarantees of other banks (banks other than consortium bank, public sector bank, & Co-operative banks) can be accepted subject to an overall exposure limit (at BHEL, PSWR, Nagpur) of RS. 10 crores for banks with net worth of more than Rs. 500 crores as on last balance sheet date and Rs 5 crores for banks with net worth between Rs. 350 to Rs 500 crores (A certificate and copy of latest Balance Sheet to be given at the time of submission of bank guarantees .
- In case Bank Guarantees given by non consortium banks (Private sector or Public sector), the bank Guarantees shall be enforceable at Nagpur, Maharastra.

SECTION 16
SUSPENSION OF BUSINESS DEALING WITH CONTRACTORS
(w.e.f 18.05.09)

16.1 A bidder may be put on HOLD for a period of 6 months, for future tenders for specific works on the basis of one or more of the following reasons:

I. Bidder does not honour his own offer or any of its conditions within the validity period.
II. Bidder fails to respond against three consecutive enquires of BHEL.
III. After placement of order, Bidder fails to execute a contract.
IV. Bidder fails to settle sundry debt account, for which he is legitimately liable, within one year of its occurrence.
V. Bidder's performance rating falls below 60% in specific category.
VI. Bidder works are under strike/ lockout for a long period.

16.2 A Bidder may be de-listed from the list of registered Bidders of the region for a period of 1 year on the basis of one or more of the following reasons:-

I. Bidder tampers with tendering procedure affecting ordering process or commits any misconduct which is contrary to business ethics.
II. Bidder has substituted, damaged, failed to return, short returned or unauthorizedly
disposed off materials/ documents/ drawings/ tools etc of BHEL.
III. Bidder no longer has the technical staff, equipment, financial resources etc. required to execute the orders/ contracts.

16.3 A Bidder can be banned from doing any business with all Units of BHEL for a period of 3 years on the basis of one or more of the following reasons:

I. Bidder is found to be responsible for submitting fake/ false/ forged documents, certificates, or information prejudicial to BHEL's interest.
II. In spite of warnings, the Bidder persistently violates or circumvents the provisions of labour laws/ regulations/ rules and other statutory requirements.
III. Bidder is found to be involved in cartel formation.
IV. The Bidder has indulged in malpractices or misconduct such as bribery, corruption and fraud, pilferage etc which are contrary to business ethics.
V. The Bidder is found guilty by any court of law for criminal activity/ offences involving moral turpitude in relation to business dealings.
VI. The Bidder is declared bankrupt, insolvent, has wound up or been dissolved; i.e ceases to exist for all practical purposes.
VII. Bidder is found to have obtained Official Company information/ documentation by questionable means.
VIII. Communication is received from the administrative Ministry of BHEL to ban the Bidder from business dealings.

SECTION 17
INTEGRITY PACT

NOT APLLICABLE

Business Rules, Terms & Conditions of Online Reverse Auction for the procurement of:

RECEIPT OF MATERIALS FROM BHEL / CUSTOMER STORES / STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION TO SITE OF WORK, ERECTION, TESTING, ASSISTANCES FOR COMMISSIONING & TRIAL OPERATION, FINAL PAINTING AND HANDING OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT FROM TRAILER, UNLOADING, HANDLING, LIFTING & PLACEMENT ON FOUNDATION), CONDENSER WITH R.E. JOINTS & BUTTERFLY VALVES, TG INTEGRAL PIPING, EXTERNAL/ REGENERATIVE PIPING INCLUDING, EQUIPMENTS / TANKS / VESSELS, HP & LP HEATERS, POWER CYCLE PUMPS WITH ASSOCIATED AUXILIARIES ETC. INCLUDING BOUGHT OUT ITEMS, PEM PACKAGES LIKE CENTRAL LUBE OIL SYSTEM, MISC. PUMPS, COLTS, PLATE HEAT EXCHANGER, MISC. HOISTS & CHAIN PULLEY BLOCKS, SELF-CLEANING STRAINERS ETC. OF 1X270 MW THERMAL POWER PLANT, IDEAL ENERGY PROJECTS LIMITED, BELA , DISTT- NAGPUR - MAHARASTRA, IN ACCORDANCE WITH THE :

TENDER SPECIFICATION NO: BHE/PW/PUR/BELAT-STG/708

BUYER'S NAME	BHARAT HEAVY ELECTRICALS LIMITED POWER SECTOR – WESTERN REGION
AUCTION TO BE CONDUCTED BY	**M/s. e-Procurement Technologies Ltd. (abcprocure)** B-705, Wall Street-II, Opp. Orient Club, Nr. Gujarat College, Ellis Bridge, Ahmedabad – 380 006, Gujarat, India. Ph. Nos. : +91 79 – 4001 6860 / 861 / 863 / 864 / 866 / 874 / 875 / 877 / 878 / 880 / 882 Fax No. : +91 79 – 4001 6876 / 816 **Auction Website: https://bhel.abcprocure.com**
DATE & TIME OF AUCTION	Auction Date : **(Shall be informed later)** *Online Sealed Bid Time : **(Shall be informed later)*** Online Reverse Auction Time :**(Shall be informed later)**)
DOCUMENTS ATTACHED	1) Business rules for reverse auction 2) Terms & conditions of reverse auction 3) Process Compliance Statement (Annexure II) 4) Final Price Confirmation (Annexure III) 5) Contact Information

BUSINESS RULES FOR REVERSE AUCTION

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION

Against this Enquiry for the subject item/system with detailed scope of supply as per our specification, BHEL-PSWR may resort to "ONLINE 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. BHEL will inform the vendor in writing in case reverse auction, the details of service provider to enable them to contact and get trained.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to email a scanned copy of the Process Compliance Form (**Annexure II**) in the prescribed (provided by service provider) before start of Online Initial Sealed Bid. Without this form, the vendor will not be eligible to participate in the event.
6. ~~BHEL will provide the calculation sheet (e.g.: EXCEL sheet), if any, which will help to arrive at "Total Cost to BHEL" like packing & forwarding charges, Taxes and duties, Freight charges, Insurance, Service tax for services and loading factors (for non-compliance to BHEL standard Commercial terms and conditions.) for each the vendor to enable them to fill-in the price and keep it ready for keying in during the auction.~~
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 email a scanned copy of the price break-up & confirmation duly signed filled-in prescribed format (as per BHEL's price excel sheet) as provided on case-to-case basis to BHEL through service provider within 24 hours of the reverse auction without fail.
10. Any variation between the on-line bid value and sealed price bid 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 procedures mentioned in the tender specifications.
12. Only those vendors, who participate in the Online Initial Sealed Bid, will be eligible to participate in the subsequent Online English Reverse Auction.
13. **The reverse auction will be treated as closed only when the bidding process gets closed in all respects for the item listed in the tender.**

REVERSE AUCTION PROCEDURE (Dtd 08/04/2010)

Business Rules for finalization of the procurement

BHEL shall finalise the procurement of the item against this Tender through reverse auction mode. BHEL has made arrangement with **M/s. e-Procurement Technologies Ltd., Ahmedabad**, who shall be BHEL's authorized service provider for the same. Please go through the guidelines given below and submit your acceptance to the same along with your Commercial Bid.

1. Computerized reverse auction shall be conducted by BHEL, on pre-specified date, while the vendors shall be quoting from their own offices/ place of their choice. Internet connectivity shall have to be ensured by vendors themselves. In extreme case of failure of Internet connectivity, (due to any reason whatsoever may be) it is the bidders' responsibility / decision to send fax communication immediately to M/s. e-Procurement Technologies Ltd., Ahmedabad. Furnishing the price the bidder wants to bid online with a request to the service provider to upload the faxed price on line so that the service provider will up load that price on line on behalf of the Bidder. It shall be noted clearly that the concerned bidder communicating this price to service provider has to solely ensure that the fax message is received by the service provider in a readable / legible form and also the Bidder should simultaneously check up with service provider about the clear receipt of the price faxed. It shall also be clearly understood that the bidder shall be at liberty to send such fax communications of prices to be up loaded by the service provider only within the closure of Bid time and under no circumstance it shall be allowed beyond the closure of Bid time / reverse auction. It shall also be noted that the service provider should be given a reasonable required time by the bidders, to upload such prices online and if such required time is not available at the disposal of the Service provider at the time of receipt of the fax message from the bidders, the service provider will not be uploading the prices and either BHEL or the service provider are not responsible for this unforeseen circumstances. In order to ward-off such contingent situation bidders are requested to make all the necessary arrangements/ alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power at the premises of vendors during the Reverse auction cannot be the cause for not participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither BHEL nor M/s. e-Procurement Technologies Ltd., Ahmedabad is responsible for such eventualities.

2. e-Procurement Technologies Ltd. shall arrange to train your nominated person (s), without any cost to you. They shall also explain you, all the Rules related to the Reverse Auction / Business Rules Document to be adopted along with bid manual. You are required to give your compliance on it before start of bid process.

3. **MATERIAL FOR BID**: Scope of Work as detailed in Tender Specification No: **BHE/PW/PUR/BELAT-STG/708**

4.

5. **Starting Bid/Bid Decrement:** The opening price of the RA and the bid decrement value can be viewed by the bidders on the bidding screen.

6. **BIDDING CURRENCY AND UNIT OF MEASUREMENT:** Bidding and evaluation will be conducted in **Indian Rupees (INR)** of the item. The price bid placed during the "Sealed Bid Auction" as well as "Reverse Auction" shall be the total amount for the entire Scope of Work as mentioned in Price Bid Specification of Tender Specification No **BHE/PW/PUR/BELAT-STG/708**

7. **BID PRICE**: The Bidder has to quote the Total Cost to BHEL for the entire Scope of work. Calculation sheet to arrive at the Total Cost to BHEL will be provided by BHEL if required.

8. The technical & commercial terms are as per BHEL Tender Specification No **BHE/PW/PUR/BELAT-STG/708**. Vendors technical and commercial bid and subsequent correspondences between BHEL and the vendors regarding commercial terms & conditions.

9. **VALIDITY OF BIDS**: The Bid price shall be firm for a period mentioned in the subject tender and shall not be subjected to any change whatsoever.

10. At the end of the reverse auction, bidder has to provide a detailed price break-up & price confirmation for his lowest offer, as per the Annexure III format, within 24 hours of the reverse auction.

11. Procedure of Reverse Auctioning:

i. **Online Initial Sealed Bid:** The opening bid (In the initial auction) of the bidders shall place a bid which shall be same as that quoted in their Final Sealed price submitted to BHEL or lesser. The bidders shall confirm in writing to BHEL that their opening bid shall be same as that quoted in their final sealed price bid submitted against Tender Specification No **BHE/PW/PUR/BELAT-STG/708**. If it is found to be otherwise at a later date, the bidder will be disqualified from the tender.

ii. **Online English Reverse (no ties) Auction {Reverse Auction}**: BHEL will declare its **Opening Price** (**OP**), which shall be visible to the all vendors during the start of the reverse Auction. You will be required to start bidding after announcement of Opening Price and decrement amount. Also, please note that the start price of an item in online reverse auction is open to all the participating bidders. Any bidder can start bidding, in the online reverse auction, from the start price itself. If the start price is your own price, you still need to bid in the online reverse auction. Also, please note that the first online bid that comes in the system during the online reverse auction can be equal to the auction's start price, or lesser than the auction's start price by one decrement, or lesser than the auction's start price by multiples of decrement. The second online bid and onwards will have to be lesser than the L1 rate by one decrement value, or lesser than the L1 rate by multiples of the decrement value.

iii. The vendor's who have participated in the Initial Sealed Bid Auction will only be eligible to participate in the subsequent English Reverse Auction.

iv. Online Initial Sealed Bid will be for **30 minutes** and Online English Reverse (no ties) Auction shall be for a **period of one hour**. If a bidder places a bid in the last 10 minutes of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another 10 minutes, for the entire auction, from the time that bid comes in. Please note that the auto-extension will take place only

if a bid comes in those last 10 minutes and if that bid gets accepted. If the bid does not get accepted, the auto-extension will not take place even if that bid might have come in the last 10 minutes. In case, there is no bid in the last 10 minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, vendors are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc.

v. The bid decrement amount shall be specified by BHEL before start of bidding.

~~vi. Any commercial loading shall be intimated to bidders in advance and it shall be added to price during dynamic auction process. For evaluation purpose, commercial loading if any, shall be added to the quoted price of respective bidder. However for ordering only the final bid placed by you shall be considered.~~

~~vii. After the completion of English Reverse (no ties), the **Closing Price** (**CP**) shall be available. In case, any commercial loading was made to L1 bidder's price, it shall be de-loaded from the closing price of L1 bidder (**CP**) for further processing.~~

viii. The ratio of CP and originally quoted price shall be applied on all elements of originally quoted prices to arrive at the final price break up.

12. Successful vendor shall be required to submit the final prices, quoted during the English Reverse (no ties) in the **Annexure III Format** after the completion of Auction to BHEL, duly signed and stamped as token of acceptance without any new condition other than those already agreed to before start of auction.

13. During the Online English Reverse (No Ties) Auction, if no bid is received in the auction system/website within the specified time duration of the reverse auction, then **BHEL**, at its discretion, may decide to revise the auction's Opening Price / scrap the online reverse auction process / proceed with the conventional mode of tendering (opening of the hard copy final bids submitted by you earlier to BHEL).

14. Your bid will be taken as an offer to supply. Bids once made by you, cannot be cancelled / withdrawn and you shall be bound to supply as mentioned above at your final bid price. **Should you back out and not supply as per the rates quoted, BHEL shall take action as appropriate**.

15. You shall be assigned a **Unique User Name** & **Password** by BHEL (or) e-Procurement Technologies Ltd. **You are advised to change the Password** and edit the information in the Registration Page after the receipt of initial Password from BHEL / e-Procurement Technologies Ltd. to ensure confidentiality. All bids made from the Login ID given to you will be deemed to have been made by your company.

16. You will be able to view the following on your screen along with the necessary fields in the English Reverse (no ties) {Reverse Auction}:
    a. Leading Bid in the Auction (only total price)

b. Bid Placed by you
c. Your Own Rank
d. Opening Price & Bid Decrement value.

17. At the end of the Reverse Auction, BHEL will decide upon the winner. BHEL's decision on award of Contract shall be final and binding on all the Bidders.

18. BHEL shall be at liberty to cancel the reverse auction process / tender at any time, before ordering, without assigning any reason.

19. BHEL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause.

20. Other terms and conditions shall be as per your techno-commercial offers and other correspondences till date.

21. You are required to submit your acceptance (Process Compliance Form - Annexure II) to the terms/ conditions/ modality given above before participating in the reverse auction.

Terms & Conditions of Reverse Auction

1. **LOG IN NAME & PASSWORD:** Each Bidder is assigned a Unique User Name & Password by e-Procurement Technologies Ltd. The Bidders are requested to change the Password and edit the information in the Registration Page after the receipt of initial Password from e-Procurement Technologies Ltd., Ahmedabad. All bids made from the Login ID given to the bidder will be deemed to have been made by the bidder.

2. **BIDS PLACED BY BIDDER:** The bid of the bidder will be taken to be an offer to execute the work. Bids once made by the bidder cannot be cancelled. The bidder is bound to execute the work the as mentioned above at the price that they bid. Should any bidder back out and not make the supplies at per the rates quoted, BHEL and / or e-Procurement Technologies Ltd., Ahmedabad shall take action as appropriate.

3. **LOWEST BID OF A BIDDER:** In case the bidder submits more than one bid, the lowest bid will be considered as the bidder's final offer to execute the work.

4. **AUCTION TYPE:** 1). Online Initial Sealed Bid
   2). Online English Reverse (No Ties) Auction (refer Bidder Manual for details)

5. **DURATION OF AUCTION**: The duration of Auction will be for one hour. If a bidder places a bid in the last 10 minutes of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another 10 minutes, for the entire auction, from the time that bid comes in. Please note that the auto-extension will take place only if a bid comes in those last 10 minutes and if that bid gets accepted. If the bid does not get accepted, the auto-extension will not take place even if that bid might have come in the last 10 minutes. In case, there is no bid in the last 10 minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, vendors are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc. (THIS SCHEDULE IS TENTATIVE. IF ANY CHANGE IN SCHEDULE, THE SAME SHALL BE COMMUNICATED TO YOU)

6. **BID DECREMENT**: The minimum Bid decrement shall be available to the Bidders at the start of the auction. The bidder can view the same by clicking on the Item details at the start of the auction. The bidder can bid lower than the Lowest Bid in the auction by a decrement, multiple of the minimum Bid decrement or at least of minimum bid decrement plus multiples of Bid Decrement. Also, please note that the start price of an item in online reverse auction is open to all the participating bidders. Any bidder can start bidding, in the online reverse auction, from the start price itself. If the start price is your own price, you still need to bid in the online reverse auction. Also, please note that the first online bid that comes in the system during the online reverse auction can be equal to the auction's start price, or lesser than the auction's start price by one decrement, or lesser than the auction's start price by multiples of decrement. The second online bid and onwards will have to be lesser than the L1 rate by one decrement value, or lesser than the L1 rate by multiples of the decrement value.

7. **VISIBLITY TO BIDDER:** The Bidder shall be able to view the following on his screen along with the necessary fields during English Reverse –NO ties Auction:

- Leading Bid in the Auction
- Bid Placed by him
- His Own Rank
- Start Price & Bid Decrement Value

8. **AUCTION WINNER:** At the end of the Reverse Auction, BHEL will evaluate all the bids submitted and will decide upon the winner.

9. **PROXY BIDS**: Proxy bidding feature is a pro-supplier feature to safe guard the supplier's interest of any Internet failure or to avoid last minute rush. The Proxy feature allows Bidders to place an automated bid against other Bidders in an auction and bid without having to enter a new amount each time a competing Bidder submits a new offer.

The bid amount that a Bidder enters is the minimum that the Bidder is willing to offer. Here the software bids on behalf of the supplier.

- **The proxy amount is the minimum amount that the Bidder is willing to offer. During the course of bidding, the Bidder cannot delete or change the amount of a Proxy Bid.**

- **Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing Bidder bids, regardless if competing bids are submitted as proxy or standard bids.**

- **This feature can be used only once during a particular Reverse Auction and only after the L1 rate is equal to or less than the minimum bid amount that the bidder has put in the system will he get the option to manually bid for the same. In no case during the bidding till the L1 rate or less is not reached as equivalent to the minimum bid amount offered by the bidder, will the bidder get the option to manually bid for the same.**

GENERAL TERMS & CONDITIONS: Bidders are required to read the "Terms and Conditions" section of the auction website (https://bhel.abcprocure.com) using the Login IDs and passwords given to them.

10. **OTHER TERMS & CONDITIONS:**

- **The Bidder shall not involve himself or any of his representatives in Price manipulation of any kind directly or indirectly by communicating with other suppliers / bidders.**

- The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

- BHEL's decision on award of Contract shall be final and binding on all the Bidders.

- BHEL along with e-Procurement Technologies Ltd., Ahmedabad can decide to extend, reschedule or cancel any Auction. Any changes made by BHEL and / or e-Procurement Technologies Ltd., after the first posting will have to be accepted if the Bidder continues to access the site after that time.

- e-Procurement Technologies Ltd., shall not have any liability to Bidders for any interruption or delay in access to the site irrespective of the cause.

- e-Procurement Technologies Ltd., is not responsible for any damages, including damages that result from, but are not limited to negligence.

- e-Procurement Technologies Ltd., will not be held responsible for consequential damages, including but not limited to systems problems, inability to use the system, loss of electronic information etc.

N.B.

- All the Bidders are required to submit the Agreement Form / Process Compliance Form **(Annexure - II)** duly signed to M/s e-Procurement Technologies Ltd., Ahmedabad before the due date (auction date). After the receipt of the Agreement Form, Login ID & Password shall be allotted to the suppliers (bidders).

- After the completion of the Auction event, all the Bidders have to submit the Price Break-up & confirmation as per the Annexure III format, within 24 hours of the reverse auction, to M/s e-Procurement Technologies Ltd., Ahmedabad for further proceedings.

ANNEXURE- I

The List of Items to be procured along with the Quantities and the Auction Start Time & Close Time is as follows:

DESCRIPTION OF WORK:

RECEIPT OF MATERIALS FROM BHEL / CUSTOMER STORES / STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION TO SITE OF WORK, ERECTION, TESTING, ASSISTANCES FOR COMMISSIONING & TRIAL OPERATION, FINAL PAINTING AND HANDING OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT FROM TRAILER, UNLOADING, HANDLING, LIFTING & PLACEMENT ON FOUNDATION), CONDENSER WITH R.E. JOINTS & BUTTERFLY VALVES, TG INTEGRAL PIPING, EXTERNAL/ REGENERATIVE PIPING INCLUDING, EQUIPMENTS / TANKS / VESSELS, HP & LP HEATERS, POWER CYCLE PUMPS WITH ASSOCIATED AUXILIARIES ETC. INCLUDING BOUGHT OUT ITEMS, PEM PACKAGES LIKE CENTRAL LUBE OIL SYSTEM, MISC. PUMPS, COLTS, PLATE HEAT EXCHANGER, MISC. HOISTS & CHAIN PULLEY BLOCKS, SELF-CLEANING STRAINERS ETC. OF 1X270 MW THERMAL POWER PLANT, IDEAL ENERGY PROJECTS LIMITED, BELA , DISTT- NAGPUR - MAHARASTRA, IN ACCORDANCE WITH THE :

TENDER SPECIFICATION NO: BHE/PW/PUR/BELAT-STG/708

Item	Quantity	Opening Prices in Rs	Bid Decrement in Rs	Opening Time	Closing Time
As Detailed IN subject tender	As Detailed IN subject tender	Would be displayed on the bidding screen	Would be displayed on the bidding screen	**Shall be informed later**	**Shall be informed later**

Annexure- II

Process Compliance Form

(The bidders are required to print this on their company's letterhead, sign & stamp before emailing a scanned copy)

To,
M/s. e-Procurement Technologies Ltd. (abcprocure)
B-705, Wall Street-II, Opp. Orient Club,
Nr. Gujarat College, Ellis Bridge,
Ahmedabad – 380 006, Gujarat, India.

Sub: Agreement to the Process related Terms and Conditions for the Reverse Auction

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the Tender Specification No BHE/PW/PUR/BELAT-STG/708

This letter is to confirm that:

1) The undersigned is authorized representative of the company.
2) We have studied the Commercial Terms and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
4) We also confirm that we will email a scanned copy or fax the Price Confirmation (Annexure-III) & break-up (as per Excel Sheet), if any, of our online quoted price, immediately after the completion of the Reverse Auction.
5) We, hereby, confirm that we will honor the Bids placed by us during the auction process.
6) We confirm that we have changed the password on the auction website after first log in.

With regards,

Signature with company seal
Name –
Company / Organization –
Designation within Company / Organization –
Address of Company / Organization –

- Scan & email this document to **abcprocure**.

Annexure III
Price Confirmation

(To be submitted by the bidder on their Letterhead, duly stamped & signed after the completion of the Reverse Auction)

To,
M/s. e-Procurement Technologies Ltd. (abcprocure)
B-705, Wall Street-II, Opp. Orient Club,
Nr. Gujarat College, Ellis Bridge,
Ahmedabad – 380 006.
Gujarat, India.

Sub: Final price quoted during Reverse Auction

Ref : 1. BHEL Tender Specification No **BHE/PW/PUR/BELAT-STG/708**
2. Reverse Auction dtd. (Shall be informed later)
3. Our Offer No. dtd.

Dear Sir,

We confirm that we have quoted.

1. _____
2. _____

(Price quoted on Total Cost to BHEL basis)

as our final lump sum prices during the Reverse Auction conducted on _____ (date).

Thanking you and looking forward to the valuable order from BHEL.

Yours sincerely,

For _____

Name:
Company:
Date:
Seal:

CONTACT INFORMATION

M/s. e-Procurement Technologies Ltd., Ahmedabad (abcprocure)	Bharat Heavy Electricals Limited, PSWR
B-705, Wall Street-II, Opp. Orient Club, Nr. Gujarat College, Ellis Bridge, Ahmedabad – 380 006, Gujarat, India. Ph. Nos. : +91 79 – 4001 6860 / 861 / 863 / 864 / 866 / 874 / 875 / 877 / 878 / 880 / 882 Fax Nos. : +91 79 – 4001 6876 / 816 Helpdesk Email-Id: helpdesk@tendertiger.com Mr. Parin Desai Cell : 0 – 93745 19754 E-mail : parin@abcprocure.com	Mr Santosh Nair Sr Deputy General Manager/Purchase E mail : snair@bhelpswr.coin Phone : 0712 - 3048645 Fax : 0712 – 3048605/3048763 (Or) Mr. Pratish Gee Varghese Engineer/Purchase Email: pgv@bhelpswr.co.in Phone: 0712 - 3048713 Fax : 0712 – 3048605/3048763

APPENDIX – I

LIST OF TENTATIVE EQUIPMENTS / COMPONENTS TO BE ERECTED AND COMMISSIONED BY THE CONTRACTOR

(AA) TG WITH TG AUXILIARIES AND ASSOCIATED EQUIPMENTS, INTEGRAL PIPING, PUMPS WITH AUX. TANKS, VESSELS ETC:

A) STEAM TURBINE

1. Steam Turbine consists of 3 cylinders (HP/IP/LP) including the following :
   a. Sole / Base Plates & Foundation Holding Bolts.
   b. Bearing Pedestals.
   c. ESV & CV, IV & CV, LPBP Valves with EHA & Suspensions, LP BP water injection valves, LP Bypass valves with Oil System equipments and oil piping.
   d. Steam Strainer Housing & Strainer Elements for Main Steam & Re-heat Steam Lines.
   e. Hydraulic Turning Gear.
   f. Electro – Hydraulic Governing System backed up with Hydro mechanical system.
   g. Governing Racks, LP By pass racks and solenoid & Test valve racks.
   h. Cross around Piping between IP & LP casing.
   i. Blanking Device / Fixtures for ESV, IV, LPBP, CRH NRV etc., for hydraulic testing and steam blowing.
   j. Extraction Steam pipeline from LP turbine to condenser dome wall.
2. Lube Oil system, Jacking oil system, Control oil / Governing oil system, LP Bypass Stop & Control Valve with EHA & Water injection valves including Governing oil system consists of piping, Oil tanks, injector assy., Oil Centrifuge, AOP, JOP and EOP with starter panels, Leak & Dirty Oil Tank with pumps, Duplex filter and oil vapour fans and other auxiliaries.

B) TURBO-GENERATOR :

1. Hydrogen cooled main Generator consists of the following.
   a. Stator
   b. Rotor with rotor insertion device.
   c. Dry air blower system
   d. End Shields & Bearing
   e. Brushless Exciter Set
   f. Generator Covers
   g. Generator accessories
   h. Seal Oil System with Seal Oil Units and other associated items.
   i. H_2 cooling system with Hydrogen distributor and other associated items.
   j. H_2 /CO_2 Gas system
   k. Liquid Detector System

l. Generator Cooler Rack Assy. For Exciter

m. Other loose items and Accessories.

C) HEAT EXCHANGERS.

1. Condenser, mainly comprising of the following parts.
   a. Bottom Plate
   b. Turbine end & Generator end Side Plates.
   c. Dome walls
   d. Front & Rear water chambers with tube plates
   e. Support plates.
   f. Hot Well
   g. Spring Elements and supports
   h. Steam Throw Device
   i. Air Extraction Pipe and Baffle.
   j. Stiffening Pipes, Rods & Slabs
   k. Instruments & Fittings, loose parts etc.
   l. Condenser tubes (Stainless Steel)
   m. Condenser R.E. Joints (Inlet & Outlet-each 2 sets)
   n. Welded Austenitic S.S. Tubes Grs.304 for Condenser-lot
   o. Condenser Butterfly Valves-(Electrical Operated, Inlet & Outlet, each 2Sets & each valve of Dia. 1800mm)

D. PUMPS WITH AUXILIARIES, TANKS, VESSELS ETC.

1. Gland Steam Condenser with attachments, fan exhausters & fittings.
2. LP Heaters 1, 2 & 3 with attachments and fittings
3. HP Heater 5 & 6 with attachments and fittings.
4. Drain Cooler with fittings.
8. Turbine Oil Coolers
9. Seal Oil Coolers.
10. Hydrogen Coolers.
11. Exciter Air Coolers
12. **Boiler Feed Pumps – Three sets : Each Comprises of:**
    a. Boiler feed pump with tubing.
    b. Booster pump with base plates & tubing.
    c. Hydraulic coupling.
    d. BFP Motor.
    e. BFP Base plate.

APPENDIX – I

LIST OF TENTATIVE EQUIPMENTS / COMPONENTS TO BE ERECTED AND COMMISSIONED BY THE CONTRACTOR

f. Hydraulic coupling stool.

g. Lube oil cooler for Hydraulic Coupling.

h. Working oil cooler for H.C.

i. Hydraulic coupling pipes & Accessories.

j. Re-circulation valves.

k. Suction Strainers for BFP.

l. Local gauge racks for BFP.

m. Lube Oil Cooling system, Seal water cooling system and other accessories for pumps.

n. Suction Strainer for Booster Pumps

13. Condensate Extraction Pumps- Two sets :Each comprises of

a) Condensate Extraction Pump assembly.

b) Foundation frame.

c) Canister.

d) Basket type suction strainer.

e) Local gauge rack.

f) CEP Motor.

14. Condenser Air Evacuation System (Vacuum Pumps) – 2 Sets- Each weighing about in skid form with associated aux. & fittings

15. Tanks & Vessels:

Sl.NO	DESCRIPTION	PACKAGE SIZE in (mm)	WT.IN KG
1.	HP Drain Flash Tank 1 No.	4100x3000x2900.	4,600
2.	LP Drain Flash Tank - 1 No.	2900x2200x2100	3,400
3.	Unit Flash Tank – 1 No.	2500x1500x1400	1,000
4.	DM CW Tank (Cpacity-10 CuM) -1 No.	Dia.2000x7150H	6,400
5.	Clean Oil Tank (Capacity-60 Cu M)-1 No.	5000x4500x3000	10,200
6.	Dirty Oil Tank(Capacity-60 Cu M) -1 No.	5000x4500x3000	10,200
7.	Oil unloading Tank(Capacity-1Cu M) -1 No.	2000x1000x500	600
		Total Weight	**36,400**

APPENDIX – I

LIST OF TENTATIVE EQUIPMENTS / COMPONENTS TO BE ERECTED AND COMMISSIONED BY THE CONTRACTOR

16. BOUGHT OUT ITEMS (BHEL HARDWAR Scope)

1. Turbine Integral Piping (along with Hangers & Supports, Valves, Drain Valves and fittings, As Part of TG INTEGRAL PIPING) Consisting of:

a. Lube Oil Piping.
a. LP Governing Oil system (EHI) with piping.
b. Seal Oil Piping.
c. Gland Seal Piping
d. Equipment Drains & Vent
e. Cross Around Piping.
f. Gas & Air System Piping.
g. Condensate Spray Piping
h. Turbine Water Drainage Piping
i. Other Misc. system Piping etc.,

2.Other equipments / items As Part of Main TG, TG Integral and PUMPS WITH AUXILIARIES, TANKS, VESSELS ETC.) Consisting of:

a. Condenser Air Evacuation Vacuum Pumps-2 sets
b. H2 Cylinders-131 Nos.
c. Co2 Cylinders –63 Nos.
d. Moisture Measuring System.
e. Vapour Exhausters-2 sets
f. Motorised temperature Control Valve with actuator – 1 set.
g. Refrigeration Gas Drier- 2 sets.
h. Sound absorbing Cover-1 set
j. Welded Austenitic S.S. Tubes Gr.304 for condenser - lot
k. Air Exhauster with motor for GSC Air Exhauster – 2 sets
l. Lifting Beam – 1 set
m. Jacking oil pump with Motor- 2 sets (1 set DC & 1 set AC)
n. Aux. oil pump & Emergency oil Pumps with Motor- 2 sets (1set AC & 1 Set DC).
o. Duplex filers for Lube oil & Jacking oil pump with Motor – 1set for each.
p. Butter fly valves – 1 lot.
q. Three way temperature Control valves – 1 set.
r. Double three way valve –1 set.
s. NRV with Al. flap – 2 sets.

t. Pressure limit valve – 2 sets.

u. Oil purification unit (Oil centrifuge) - 1 set

v. Oil Vapour Exhauster – 2 sets.

w. Lead Diaphragm – 4 sets.

x. Spay Nozzles – lot.

y. Dirt Catcher – 1 set.

z. Dampers – lot.

aa. Variable Load Spring Cages – lot.

bb. Oil Purification System (Central Lube Oil System) – 1set

cc. Flexible Bends – lot.

dd. Vacuum Breaker Valve Assy. Along with solenoid valve- 1 set.

ee. Turbine oil, Lube oil for other Power Cycle System Pumps & Control fluid - lots

ff. Dry Air preservation system.—1 set

gg. Flow Nozzle for PG Test – lot

hh. Through Port Gate Valves-lot

ii. Spring Loaded NRV'- lot

iii. Angle drain valves

kk. LP Bypass Stop & Control valve with EHA and Water injection valve. LP Governing oil system is High Pressure Governing oil system – 1 set.

ll. Electrical Hydraulic Actuator for Turbine Valves along with HPSU- 1 set

mm. Gear Pump (Lube oil Re-circulation) – 1 set.

nn. Hydraulic Accumulators with filling & Gauge device- 1 set.

oo. Seal Steam & Leakage Steam Control Valve with Pneumatic Actuator- 1 set.

pp. Seal Oil Vapour Exhauster.

qq. TG Integral Piping with Hangers & Supports and drain valves

rr. LP Dosing System

ss. CRH NRV-1 Set

3. List of TG Integral piping Schemes applicable:

(A) TG Integral Piping:

Seal Steam piping.

Condensate Spray piping.

Lube oil piping (Lube oil, Jacking oil etc).

Control/ Governing oil piping.

LP Bypass Valve (high pressure) Governing System

Turbine drainage piping

APPENDIX – I

LIST OF TENTATIVE EQUIPMENTS / COMPONENTS TO BE ERECTED AND COMMISSIONED BY THE CONTRACTOR

Cooling water piping.

Seal oil system piping.

Generator Gas system piping.

LP turbine extractions to condenser.

1. **(B) LP Bypass valve with complete High Pressure Control oil system with Stainless Steel control oil Piping, Skid etc. supplied from BHEL Hardwar vendor.**

(BB) EXTERNAL PIPING/RE-GENERATIVE PIPING WITH ASSOCIATED VALVES, COMPONENTS/ITEMS, FITTING, SUPPORTS ETC.:

1. External /Regenerative System Piping:

a. Unlisted SV Exhausts –TG Scope (PGMA 80-375)

b. HP Heater Vents – TG Scope (PGMA 80-381)

c. LP Heater Vents (PGMA 80-382)

d. Vent from Unlisted PPG/Equipment to Condenser (PGMA 80-385)

e. Condensate Pump vents (PGMA 80-387)

f. Condensate Air Evacuation Piping (PGMA 80-388)

g. Condensate Suction (PGMA 80-400)

h. CD from Pump to LPH-1/DC inlet TEE & Recir. (PGMA 80-401)

i. CD from LPH-1/DC inlet TEE to TG TP (PGMA 80-402)

j. Condensate For sealing of Vacuum (PGMA 80- 407)

k. Condensate Dump from Header (PGMS 80-408)

l. Unlisted Condensate (PGMA 80-413)

m. Condenser Drain (PGMA 80-440)

n. Gland Steam Cooler Drains (PGMA 80-442)

o. LP Heater-1 to Condenser (PGMA 80-443)

p. LP Heater-2/3/4/5 Drains & Drip Pump Incl. (PGMA 80-444)

q. Deaerating Heater Over flow and Drain (PGMA 80-446)

r. HP Heater Drains (PGMA 80-447)

s. TG Cycle piping Drains & Vents (PGMA 80-449)

t. Manifolds for HP Flash Box & Condenser (PGMA 80-457)

u. TG Aux. Cooling Water (PGMA 80-463)

v. Main Circulation Water System (PGMA 80-468)

w. Low Pressure Dosing piping (PGMA 80-601)

x. Lube oil piping system (PGMA 80-673)

y. H & S for Light up – Non Steam lines (PGMA 80-928, as applicable)

z. H & S for Synchronisation- Steam Lines (PGMA 80-930)

aa. H & S for LP Piping (PGMA 80-933)

bb. Test Thermowells (PGMA 81-415)

cc. Performance Guarantee Test materials (PGMA 81-416)

dd. Other valves /NRVs & QCNRVs as supplied for TG equipments and applicable scope of piping under this tender specification

ee. Steam Traps

ff. Air Traps

gg. Flow elements/Flow nozzles.

hh. ME Bellows

ii. Aux. PRDS

(CC) EQUIPMENTS/SYSTEMS, CENTRAL LUBE OIL SYSTEM, MISC. PUMPS, COLTS, PLATE HEAT EXCHANGERS, MISC. HOISTS & CAHIN PULLEY BLOCKS, SELF CLEANING STRAINERS, LP DOSING SYSTEM ETC. (SUPPLIED FROM PEM/ BHOPAL AND RELATED VENDORS):

Sl. NO.	DESCRIPTION	PACKAGE SIZE (mm)	Approx. WT.IN KG/ITEM
1.	**Central Lube Oil System:**		
1.1	Clean oil Pump with Drive motor, Duplex Type Strainer, Pressure Gauge& DP Gauge etc.-1 Set		450
2.	**MISC. HOISTS & CHAIN PULLEY BLOCKS**		
2.1	**Electric Hoists**		
2.1.1	Electric Hoist with straight path for ACW pumps & DMCW Pumps inside the TG Hall	1No. of Capacity 3 MT	450
2.1.2	Electric Hoist with straight path for Condenser Butterfly valves	1No. of Capacity 8 MT	580
2.1.3	Electric Hoist with straight path for Vacuum Pumps	1No. of Capacity 3 MT	450
2.1.4	Electric Hoist with straight path for ESP Control room	1No. of Capacity 3 MT	450
2.2	**Chain Pulley Blocks:**		

APPENDIX – I

LIST OF TENTATIVE EQUIPMENTS / COMPONENTS TO BE ERECTED AND COMMISSIONED BY THE CONTRACTOR

Sl. NO.	DESCRIPTION	PACKAGE SIZE (mm)	Approx. WT.IN KG/ITEM
2.2.1	Chain Pulley Block and travel trolley for DMCW Pumps (SG) inside TG hall .	1 No. of Capacity 2MT	110
2.2.2	Chain Pulley Block for Sump Pupms lifting in TG hall.	1 No. of Capacity 2MT	70
2.2.3	Chain Pulley Block for Lube Oil Barrel handling	1 No. of Capacity 1MT	50
2.2.4	Chain Pulley Block for General Maintenance	1 No. of Capacity 3MT	85
3.	**Plate Heat Exchangers** with associated components/ items, attachment, fittings etc.- 2 **sets.**	Each of size- L-4500XW - 2000XH-3000 mm and weight-4500 kg	2x4500
5.	Self Cleaning Strainers- 2Sets	Each of size L-3000xW-1500xH-1500 & weight 2500 Kg	2x2500
6.	Condenser On Load Tube Cleaning System **(COLTS)-** 2Sets (each set weighing about-6000 Kg.	Each set comprising of (i) Ball Injection Pipes. (ii) Ball re-circulating skid (iii) Ball Separator-/Ball collector strainer- (iv) D.P. Measuring system (v) Loose items	2x6000
7.	**Misc. Pumps**		
7.1	Sump Pumps / Submersible Pumps - 4 sets		4x500
7.2	DMCW Pumps (Horizontal) & Drive Motors – 3 Sets		3x6,500
7.3	DM CW Booster Pumps (Horizontal)- 2 Sets		2x1,500
8.	**LP Chemical Dosing System**		

APPENDIX – I

LIST OF TENTATIVE EQUIPMENTS / COMPONENTS TO BE ERECTED AND COMMISSIONED BY THE CONTRACTOR

Sl. NO.	DESCRIPTION	PACKAGE SIZE (mm)	Approx. WT.IN KG/ITEM
8.1	Hydrazine Dosing system-1 No.	2500x5250x3000	3,000
8.2	Ammonia Dosing Sysetm-1 No.	2500x5250x3000	3,000
8.3	NaOH Dosing System	2000x2000x2000	2,000
		TOTAL	**61,195**
		Weight in MT (Say 62 MT)	

NOTE :

1. The information furnished in this section is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components / items / system according to the site requirements / customer requirements to complete various system in all respects.
2. Any other systems / components, quantities which are the integral to equipment supplied by the manufacturing unit also to be erected and commissioned by the contractor within the quoted / accepted rate / lump sum value.
3. The dimensions, weight, quantity for "(CC) Equipments/systems, Central lube oil system, Misc. pumps, COLTS, Plate Heat Exchangers, Misc. Hoists & Chain Pulley Blocks, Self cleaning strainers, LP dosing system etc. (supplied from PEM/Bhopal and related vendors)" are tentative and contractor shall erect and commission as per supply at site. The payment will be made as per accepted item rate for actual weight erected and commissioned.

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.

(AA) FOR TG WITH TG AUXILIARIES AND ASSOCIATED EQUIPMENTS, INTEGRAL PIPING, PUMPS WITH AUX. TANKS, VESSELS ETC.:

S No.	DESCRIPTION	Size	Gross WT in Kgs.
A	**STEAM TURBINE**		
1	SOLE PLATE PEDESTAL ANCHOR	3400X1200X800	2,510.00
2	BASE PLATE ASSEMBLY	4500X1400X1200	4,500.00
3	BASE PLATE ASSEMBLY	2300X1250X600	2,560.00
4	BASE PLATE L.P.CASING	2300X2075X981	2,680.00
5	LP OUTER CASING PARTS	7060X1480X2760	8,085.00
6	LP OUTER CASING PARTS	7060X1480X2760	8,085.00
7	LPC OUTER CASING PARTS	4570X3230X980	2,500.00
8	LPC OUTER CASING PARTS	4570X3230X980	2,500.00
9	COMPONENTS OF LP CASING UPPER PART	3500X300X300	495.00
10	L.P OUTER CASING PARTS	3450X1000X1100	900.00
11	ASSEMBLY DEVICES	900X700X550	180.00
12	INSPECTION SHAFT FOR IPC	3300X700X700	775.00
13	VALVE SUPPORT FOR HP OVERHAUL	1000X1000X400	800.00
14	COMPONENTS OF ASSY.FIXTURE FOR HPT	3800X2500X1200	6,864.00
15	COMPONENTS OF ASSEMBLY FIXTURE OF HPT	2200X1200X850	1,800.00
16	COMPONENTS OF ASSY.FIXTURE FOR HPT	3300X1800X1210	3,352.00
17	COMPONENTS OF ASSEMBLY FIXTURE FOR H.P.TURBINE	5010X4000X120	3,356.00
18	HP-IP BREARING PEDESTAL ASSLY.	4080X2005X2126	13,275.00
19	HP/IP BRG.PED.PARTS	1000X600X600	438.00
20	HP/IP BRG.PED.PARTS	500X200X150	37.00
21	AUXILIARIES OF LP TURBINE	3000X1300X1000	2,100.00
22	AUXILIARIES OF LP TURBINE	2000X1000X1825	1,142.00
23	AUXILIARIES OF LP TURBINE	2000X1000X1825	1,142.00
24	LP JOINT COVERING	2300X1800X940	1,041.00
25	ASSEMBLY TOOLS	1900X1000X890	560.00
26	CAP(SPRING SUPPORT)	825X500X400	400.00
27	CAP(SPRING SUPPORT)	825X500X400	400.00
28	CAP (COMPEN.ASSY)	3240X1740X1340	3,316.00
29	CAP (COMPEN.ASSY)	3240X1740X1340	3,512.00
30	CAP(OBLIQUE REDUCER ASSLY)	1400X1400X1200	590.00
31	CAP (MITRE BEND ASSY)	1550X1550X1300	670.00
32	CAP (COMPEN.ASSY)	3240X1740X1340	3,512.00
33	CAP (MAN-HOLE ASSLY)	1500X1600X1100	750.00
34	(MAN-HOLE ASSLY)	1500X1600X1100	750.00
35	CAP(MITRE BEND ASSY)	1550X1550X1300	670.00
36	CAP (MITRE BEND ASSY)	1550X1550X1300	670.00
37	CAP (PIPE ASSLY)	2000X1100X1200	645.00
38	CAP (MITRE BEND ASSY)	1550X1550X1300	670.00
39	LONGITUDINAL GIRDER (LEFT)	6800X1820X1570	15,182.00
40	LONGITUDINAL GIRDER (RIGHT)	6800X1820X1570	15,182.00
41	LP FRONT WALL (TS)	6820X3750X910	10,053.00
42	LP FRONT WALL (GS)	6820X3750X910	10,053.00
43	LP SHAFT SEALING FRONT	1800X1700X740	2,260.00

44	LP SHAFT SEAL COMPENSATORASSLY.(TS)	1440X1420X520	1,456.00
45	LP SHAFT SEALING (REAR)	1800X1700X740	2,260.00
46	LP SHAFT SEAL COMPENSATORASSLY.(GS)	1440X1420X520	1,456.00
47	LP CASING ASSEMBLY (FASTENERS)	1800X1700X740	2,653.00
48	LP CASING ASSEMBLY (PARTS)	3760X2060X860	4,900.00
49	LP CASING ASSEMBLY (PARTS)	450X450X250	140.00
50	EXTRACTION PIPE LINE (LPC)	1600X1000X750	520.00
51	EXTRACTION PIPE LINE (LPC)	2700X1350X750	670.00
52	EXTRACTION PIPE LINE (LPC)	2000X1200X600	1,004.00
53	EXTRACTION PIPE LINE (LPC)	2900X1100X700	650.00
54	EXTRACTION PIPE LINE (LPC)	2900X1100X700	650.00
55	EXTRACTION PIPE LINE (LPC)	2700X1200X750	575.00
56	EXTRACTION PIPE LINE (LPC)	1100X850X850	307.00
57	EXTRACTION PIPE LINE (LPC)	2700X1750X1100	689.00
58	EXTRACTION PIPE LINE (LPC)	1550X1450X900	530.00
59	EXTRACTION PIPE LINE(LPC)	2000X600X600	366.00
60	L.P. EXTRACTION PIPE SHEATHING	2600X2000X1400	1,290.00
61	INNER GUIDE PLATE OF DIFFUSER(TS)	2600X2400X1000	2,118.00
62	INNER GUIDE PLATE OF DIFFUSER(GS)	2600X2400X1000	2,118.00
63	DIFFUSER (TS)	4880X1730X2340	3,640.00
64	DIFFUSER (GS)	4880X1730X2340	3,640.00
65	AUXILIARIES OF I.P. TURBINE	1050X480X550	390.00
66	AUXILIARIES OF I.P. TURBINE	1100X500X650	204.00
67	AUXILIARIES OF I.P. TURBINE	1100X500X650	204.00
68	LP-GEN. PEDESTAL ASSEMBLY	3220X2285X2075	10,200.00
69	IP-LP PEDESTAL ASSEMBLY	3700X1860X2100	14,600.00
70	LP INNER OUTER CASING (U/H)	6720X3150X2325	21,750.00
71	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2350	30,907.00
72	LP INNER CASING ASSY.FASTENERS	1800X1700X740	1,760.00
73	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000	11,722.00
74	STEAM INLET PIPE (LPT)	2700X1300X900	840.00
75	L.P. ROTOR	7210X3300X3350	62,049.00
76	BEARING PEDESTAL ARRANGT.PARTS	1800X900X800	1,100.00
77	STUD HEATING DEVICE AND BREECH NUT HEATING DEVICE.	1500X1200X250	315.00
78	GROMMET SLINGS	1500X1500X350	280.00
79	IP TURBINE	4860X3753X3210	81,679.00
80	HP TURBINE	5060X3100X2900	56,100.00
81	HP INLET ASSEMBLY	450X450X200	45.00
82	H.P.EXHAUST ASSEMBLY	1625X1335X675	1,378.00
83	HPT RELATED PARTS & EXPNMEASUREMENTS	1000X1000X500	190.00
84	HP FRONT BEARING PEDESTAL	3500X3000X2050	11,939.00
85	HP FRONT BRG. PEDESTAL PARTS	1800X1700X1000	844.00
86	I.P TURBINE PARTS	700X700X500	285.00
87	RATING, COLLABORATION AND MONOGRAM PLATES	850X550X150	50.00
88	OIL FLUSHING AND PRESSURE TEST DEVICE	750X400X550	130.00
89	SUPPORT FOR IV VALVE	1500X1000X750	410.00
90	STEAM BLOWING & HYD. TEST DEV.	2900X2100X1140	2,730.00
91	TOOLS AND PACKING DEVICES	1750X1200X980	684.00
92	ASSEMBLY DEVICE FOR VALVES	920X1000X450	213.00

93	ESV & CV CASING WITH VALVES	3000X3000X1900	9,800.00
94	ESV & CV CASING WITH VALVES	3000X3000X1900	9,800.00
95	IV & CV CASING WITH VALVES.	4500X3500X2600	21,500.00
96	IV & CV CASING WITH VALVES.	4500X3500X2600	21,500.00
97	PART OF IV & CV CASING	1500X1000X200	100.00
98	PART OF IV & CV CASING	1500X1000X200	100.00
99	INJECTOR FOR SUC. PIPE NB350	3300X1750X1210	1,029.00
100	MAIN OIL TANK & NOZZLE ARRGT.ASSY.	5180X3260X2650	9,100.00
101	MAIN OIL TANK & NOZZLE ARRANGEMENT	4200X1100X800	550.00
102	OIL STRIPPER	600X600X850	133.00
103	OIL STRAINERS	2050X1200X1410	568.00
104	VARIABLE ORIFICES THROTTLE VALVES & FLUSHING PARTS	1000X500X250	115.00
105	HOUSING FOR MS STRAINER	1700X1025X900	3,000.00
106	HOUSING FOR M.S STRAINER	1725X1250X730	3,000.00
107	STEAM STRAINER ASSEMBLY DEVICE MS & HRH	2140X1400X500	652.00
108	HOUSING FOR HRH STEAM STRAINER	2200X1450X1100	3,500.00
109	HOUSING FOR HRH STEAM STRAINER	2200X1450X1100	3,500.00
110	STEAM STRAINER (MS)	1100X700X350	374.00
111	STEAM SRAINER (HRH)	1600X1450X750	485.00
112	BLANKING ARRANGEMENT FOR MSSTRAINER HOUSING	1000X900X800	907.00
113	BLANKING ARRANGEMENT FOR HRHSTEAM STRAINER HOUSING	1600X1200X1000	2,083.00
114	STEAM STRAINER HOUSING GASKETS	700X700X300	50.00
115	COMPENSATOR	600X600X900	50.00
116	LEAKAGE OIL TANK	1000X1000X3000	515.00
117	WASTE OIL TANK	1000X1000X3000	515.00
118	INJECTOR FOR SUC. PIPE NB 400	3500X750X750	922.00
119	TURBINE INSTRUMENTS RACKS(FRAMES)	2750X1500X800	2,690.00
120	TURBINE INSTRUMENTS RACKS	2300X750X750	765.00
		Total	**582,895**
B	**HEAT EXCHANGERS (CONDENSER, HEATERS & COOLERS)**		
(I)	**CONDENSER**		
1	HOTWELL	11200X1900X1200	6,913.00
2	BOTTOM PLATE(FRONT/REAR PART)	7150X3450X625	6,793.00
3	BOTTOM PLATE(FRONT/REAR PART)	7150X3450X625	6,793.00
4	BOTTOM PLATE(MIDDLE PART)	7150X3850X625	8,296.00
5	LOOSE ITEMS(BOTTOM PLATE)	1900X700X300	271.00
6	CONDENSER SUPPORT	1750X1000X1250	3,650.00
7	CONDENSER SUPPORT	1750X1000X1250	3,650.00
8	SPRING ELEMENT (COND. SUPPORT)	1750X1000X1250	3,650.00
9	SPRING ELEMENT (COND. SUPPORT)	1750X1000X1250	3,650.00
10	LOOSE ITEM (COND. SUPPORT)	1600X950X950	4,775.00
11	FRONT WATER CHAMBER (GEN.SIDE)	5224X3610X360	6,150.00
12	FRONT WATER BOX (GEN SIDE)	5950X3610X2485	15,044.00
13	FRONT WATER CHAMBER (TUR.SIDE)	5224X3610X360	6,150.00
14	FRONT WATER BOX (TUR SIDE)	5950X3610X2485	15,044.00
15	REAR WATER CHAMBER (GEN.SIDE)	5224X3610X360	6,150.00
16	REAR WATER BOX (GEN SIDE)	4760X3610X2025	9,122.00

17	REAR WATER CHAMBER (TUR.SIDE)	5224X3610X360	6,150.00
18	REAR WATER BOX (TUR SIDE)	4760X3610X2025	9,122.00
19	SIDE WALL(TUR.END)	5248X2480X80	7,120.00
20	LOOSE ITEMS(SIDE WALL-TUR.END)	5850X350X250	782.00
21	SIDE WALL(GEN.END)	5248X2480X80	7,120.00
22	LOOSE ITEMS(SIDE WALL-GEN.END)	5850X350X250	782.00
23	RODS (SHELL INTERNALS)	3650X850X625	4,780.00
24	RODS (SHELL INTERNALS)	3650X850X625	4,780.00
25	RODS (SHELL INTERNALS)	3650X850X625	4,780.00
26	RODS (SHELL INTERNALS)	3650X850X625	4,780.00
27	RODS (SHELL INTERNALS)	1000X750X350	600.00
28	RODS (SHELL INTERNALS)	3700X850X350	4,600.00
29	AIR EXTRACTION PIPING	5460X990X410	1,200.00
30	SUPPORT TUBE PLATES(SHELL INTERNALS)	4700X3426X348	5,400.00
31	SUPPORT TUBE PLATES(SHELL INTERNALS)	4700X3426X348	5,400.00
32	SUPPORT TUBE PLATES(SHELL INTERNALS)	4700X3426X348	5,400.00
33	SUPPORT TUBE PLATES(SHELL INTERNALS)	4700X3426X348	5,400.00
34	SUPPORT TUBE PLATE(SHELL INTERNALS)	4700X3426X348	5,400.00
35	SUPPORT TUBE PLATES(SHELL INTERNALS)	4700X3426X348	5,400.00
36	SUPPORT TUBE PLATES(SHELL INTERNALS)	4700X3426X348	5,400.00
37	LOOSE ITEMS (SHELL INTERNALS)	5500X940X630	7,560.00
38	LOOSE ITEMS (SHELL INTERNALS)	4440X260X100	350.00
39	LOOSE ITEMS (SHELL INTERNALS)	3000X1500X500	4,655.00
40	LOWER DOME WALL (TUR.SIDE) LOWER PART	11000X3950X910	8,767.00
41	LOWER DOME WALL (TUR.SIDE) UPPER PART	4000X800X100	700.00
42	LOOSE ITEMS (LOWER DOME WALLTUR. SIDE)	900X300X300	270.00
43	LOWER DOME WALL (GEN.SIDE)LOWER PART	11000X3950X910	7,698.00
44	LOWER DOME WALL (GEN.END)UPPER PART	4000X800X100	700.00
45	LOOSE ITEMS (LOWER DOME WALLGEN. SIDE)	900X300X300	270.00
46	LOWER DOME WALL (FWB SIDE)LOWER PART	7502X4046X545	6,012.00
47	LOWER DOME WALL (FWB SIDE)UPPER PART	6238X934X1155	1,444.00
48	LOOSE ITEMS (LOWER DOME WALL	1325X1150X500	550.00
49	LOWER DOME WALL (RWB SIDE)LOWER PART	7550X4000X1900	6,727.00
50	DOME WALL (R.W/B SIDE)	6236X1134X1160	1,427.00
51	LOOSE ITEMS (LOWER DOME WALLRWB SIDE)	1300X1065X305	215.00
52	PIPES(DOME INTERNAL STIFFENING	6016X200X200	726.00
53	PIPES(DOME INTERNAL STIFFENING	6016X200X200	726.00
54	PIPES(DOME INTERNAL STIFFENING	6016X200X200	726.00
55	PIPES(DOME INTERNAL STIFFENING	6016X200X200	726.00
56	PIPES(DOME INTERNAL STIFFENING	3400X200X200	382.00
57	PIPES(DOME INTERNAL STIFFENING	3400X200X200	382.00
58	PIPES(DOME INTERNAL STIFFENING	1760X1480X1230	4,300.00
59	DOME INTERNAL STIFFENING	2380X1310X1100	4,295.00
60	UPPER DOME WALL(TUR. SIDE)	6800X460X310	1,083.00
61	UPPER DOME WALL(GEN. SIDE)	6800X460X310	1,083.00
62	UPPER DOME WALL(FWB SIDE)	5880X1930X380	3,635.00
63	LOOSE ITEMS (UPPER DOME WALLFWB SIDE	5400X350X32	475.00
64	LOOSE ITEMS (UPPER DOME WALLFWB SIDE	670X250X450	410.00
65	UPPER DOME WALL(RWB SIDE)	5880X1930X448	3,270.00
66	LOOSE ITEMS (W/B HINGE ARRGT.)	2500X1000X750	2,600.00

67	LOOSE ITEMS (W/B HINGE ARRGT.)	2000X1500X500	2,135.00
68	FRAME (W/BOX HINGE ARRGT)	1850X840X230	650.00
69	FRAME (W/BOX HINGE ARRGT)	1840X840X230	650.00
70	STEAM THROW DEVICE	1450X900X700	1,041.00
71	STEAM THROW DEVICE	1450X900X700	1,041.00
72	LOOSE ITEMS (CONDENSER)	2100X650X700	600.00
73	LOOSE ITEMS (CONDENSER)	2900X956X406	380.00
74	LOOSE ITEMS (CONDENSER)	1000X500X500	275.00
75	FASTENERS (CONDENSER)	1000X800X800	1,450.00
76	LOOSE ITEMS (CONDENSER)	600X320X200	6.00
77	LOOSE ITEMS (CONDENSER)	3300X250X200	200.00
78	TOOLS & TACKLES (CONDENSER)	1000X500X500	600.00
79	STAND PIPE NO.1 (CONDENSER)	2750X420X400	60.00
80	LOOSE ITEMS (STAND PIPE)	3150X350X330	300.00
81	STAND PIPE NO.2 (CONDENSER)	2750X420X390	62.00
82	CONDENSER TUBES (WELDED AUSTENITIC STAINLESS STEEL TUBES SA249 GRADE-304, Dia 28.575 x Thk-0.889 and Dia28.575 x Thk-0.71 mm. Total about 15800 tubes))	LOT	86,443.00
83 (i)	Condenser inlet assembly R.E. Joints -2 Sets	2800x3950x6275	2x17,200.00
83 (ii)	Condenser Outlet Assembly R.E. Joints -2 Sets	3100x3000x3800	2x15,200.00
84	CW piping Butterfly valves for Condenser inlet & Outlet (Electrically operated, each of Dia.1800 mm) with fittings.- 4sets	2800x2000x750	4x7,000.00
		TOTAL	**374911.00**
(II)	**HEATERS & COOLERS**		
1	HP Heater No.-5	11500x2100x2500	44,000.00
2	HP Heater No.-6	12500x2100x2500	53,500.00
3	GLAND STEAM CONDENSER	1015X1180X1400	825.00
4	STAND PIPE/LOOSE ITEM (GSC)	2100X500X400	200.00
5	LOOSE ITEMS FRAGILE (GSC)	600X800X400	100.00
6	LOOSE ITEMS GSC(NON FRAGILE)	1500X650X450	320.00
7	DRAIN COOLER	4650X1000X1250	3,500.00
8	LOOSE ITEMS (DRAIN COOLER)	800X500X300	101.00
9	LOOSE ITEMS (DRAIN COOLER)	500X300X300	24.00
10	LOOSE ITEMS (DRAIN COOLER)	400X400X60	6.00
11	LP HEATER NO.1	11520X1400X1550	11,880.00
12	LP HEATER NO.1&STAND PIPES	2700X500X400	150.00
13	LP HEATER NO.1 STAND PIPE	2200X700X500	50.00
14	LOOSE ITEMS LP HEATER NO. 1	700X500X500	150.00
15	LP HEATER NO.2	9600X1350X1735	9,950.00
16	LP HEATER NO.2 & STAND PIPES(LOOSE ITEMS)	2700X500X400	140.00
17	LP HEATER NO.2, STAND PIPES	2200X700X500	100.00
18	LOOSE ITEMS, LP HEATER NO.2	2600X500X350	200.00
19	LP HEATER NO.3	9600X1270X1835	9,875.00
20	LP HEATER NO.3 & STAND PIPES(LOOSE ITEMS)	2700X500X400	140.00
21	LP HEATER NO. 3, STAND PIPES	2200X700X500	100.00
22	TUBRINE OIL COOLER	5050X1650X1980	8,200.00
23	TUBRINE OIL COOLER	5050X1650X1980	8,200.00
24	LOOSE ITEMS (TOC)	750X500X200	80.00

25	LOOSE ITEMS (TOC)	800X600X600	60.00
26	EXCITER AIR COOLER	2850X650X600	892.00
27	EXCITER AIR COOLER	2850X650X600	892.00
		Total	**56135.00**
C	**GENERATOR :**		
1	FOUNDATION ITEMS OF GENERATOR	3550X715X880	4,656.00
2	FOUNDATION ITEMS OF GENERATOR	3100X1050X850	3,374.00
3	ONSUMABLES FOR FOUNDATION	500X500X200	15.00
4	GENERATOR STATOR	7520X4200X4870	228,000.00
5	GENERATOR ROTOR	10550X1560X1660	47,742.00
6	END SHIELD (TE) LOWER HALF	3640X1140X2000	6,020.00
7	END SHIELD (EE) LOWER HALF	3640X1140X2000	6,020.00
8	H.V.BUSHING	2000X950X600	590.00
9	LOOSE ITEMS OF WOUND STATOR	1500X1200X1000	1,010.00
10	GENERATOR ACCESSORIES	1800X1000X550	1,546.00
11	GENERATOR ACCESSORIES(TERMINAL BUSHING BOX)	3500X1800X1250	4,075.00
12	GAS BAFFLE RING,INSERT COVERETC.	3700X3500X1340	4,364.00
13	BEARING SHELLS	1100X835X950	953.00
14	END SHIELD (EE) UPPER HALF	3640X1140X2000	5,620.00
15	END SHIELD (TE) UPPER HALF	3640X1140X2000	5,620.00
16	SEAL RINGS	600X600X200	73.00
17	DEVICE FOR ROTOR INSERTIONINTO STATOR	2240X940X1220	1,036.00
18	ERECTION DEVICES	2250X1180X800	997.00
20	DRY AIR BLOWER	1350X1250X800	190.00
21	TERMINAL CONNECTORS	1840X660X400	506.00
22	CONSUMABLES	500X600X300	30.00
23	BRUSHLESS EXCITER SET	5670X2390X2810	30,400.00
24	EXCITER FRONT COVER	4310X2950X2950	4,122.00
25	RR WHL.COVER & SEALING WALL DEFOR EXCITER	1800X1600X1600	970.00
26	EXCITER REAR COVER	4330X3050X2950	3,909.00
27	EXCITER BED PLATE ACCESSORIES	5500X1050X800	3,212.00
28	EXCITER ACCESSORIES	2000X500X500	350.00
29	COOLER RACK ASSEMBLY FOR EXCITER	3000X1800X1100	1,551.00
30	SEAL OIL UNIT	6000X2500X3000	9,325.00
31	SEAL OIL STORAGE TANK	3500X1300X1280	1,460.00
32	GAS UNIT	2550X1790X2560	1,150.00
33	HYDROGEN DISTRIBUTOR	3480X1540X440	333.00
34	CO2 DISTRIBUTOR	2770X1240X440	247.00
35	LIQUID DETECTOR RACK	1700X900X1800	450.00
36	LOOSE VALVES	2000X1000X1000	959.00
37	LOOSE INSTRUMENTS	500X500X300	40.00
38	CO2 VAPOURISER	1520X640X840	225.00
		Total	**381140.00**

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.

D- PUMPS WITH AUX, TANKS & VESSELS ETC.

(I) DETAILS OF BOILER FEED PUMP PACAKGES

Sl. No.	Description	Qty	Each Size in mm	Total wt. In Kg.
1.	BFP skid (Pump assly. + Base plate+Tubing+seal coolers)	3	2250x1000x1050	3x5770
2.	Booster Pump Skid(Pump assly. + Base plate+ Tubing)	3	1650x1200x950	3x2511
3.	Hydraulic Coupling assly. and accessories	3 sets	1800x1700x1800	3x3560
4.	Hydraulic Coupling working oil cooler.	3	3700x1500x500	3x1475
5.	Hydraulic Coupling lube oil cooler .	3	3100x1300x450	3x775
6.	Hydraulic Coupling loose items	3	Loose for 3 sets	3x710
7.	Suction Strainer for BP	3	900x800x1400	3x800
8.	BFP Recirculation Valve	3	1800x550x1400	3x350
9.	Suction strainer for BFP	3	900x800x1100	3x460
10.	Local Gauge Board racks with instruments	3	2200x300x1800	3x650
11.	Loose items with piping etc.	1 set	loose	1x2449
12.	Motor tubing	3	4000x3000x3000	3x15000
			Total wt.	**98,632**

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.

(II) DETAILS OF CONDENSATE EXTRACTION PUMPS

SN	Description	Qty.	Dimensions (mm)	Weight (Kg.)
1.	Condensate Extraction Pump Assembly	2	Dia.11000x3250	2x6150
2.	Canister	2	Dia.900x3100	2x2700
3.	CEP Foundation Ring	2	1100x1100x150	2x580
4.	CEP suction Strainer	2	900x800x1400	2x1350
5.	Motor Stool	2	-	2x545
6.	Local Gauge Board Rack	1	2000x300x1800	1x300
7.	Loose items	2 sets	Loose	2x210
8.	CEP Motors	2	2020x1810x1150	2x6000
			Total Wt.	**35,370**

III- Tanks & Vessels:

Sl.NO	DESCRIPTION	PACKAGE SIZE in (mm)	WT.IN KG
1.	HP Drain Flash Tank 1 No.	4100x3000x2900.	4,600
2.	LP Drain Flash Tank - 1 No.	2900x2200x2100	3,400
3.	Unit Flash Tank – 1 No.	2500x1500x1400	1,000
4.	DM CW Tank (Cpacity-10 CuM) -1 No.	Dia.2000x7150H	6,400
5.	Clean Oil Tank (Capacity-60 Cu M)-1 No.	5000x4500x3000	10,200
6.	Dirty Oil Tank(Capacity-60 Cu M) -1 No.	5000x4500x3000	10,200
7.	Oil unloading Tank(Capacity-1Cu M) -1 No.	2000x1000x500	600
		Total Weight	**36,400**

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.

E. BOUGHT OUT ITEMS (BHEL HARDWAR SCOPE)

(I) TG-INTEGRAL PIPING

a. Carbon Steel & Alloy Steel piping 65.0 MT

(II) Bought out Equipments – 150 MT

(BB) FOR EXTERNAL PIPING/RE-GENERATIVE PIPING WITH ASSOCIATED VALVES, COMPONENTS/ITEMS, FITTING, SUPPORTS ETC.:

SN	PGMA	DESCRIPTION	WT. (KG)	IBR (I)/ NON-IBR (N)
1	80-375	Unlisted SV Exhausts –TG Scope	3,000	N
2	80-381	HP Heater Vents – TG Scope	1,000	N
3	80-382	LP Heater Vents	1,500	N
4	80-385	Vent from Unlisted PPG/Equipment to Condenser	6,000	N
5	80-387	Condensate Pump vents	1,000	N
6	80-388	Condensate Air Evacuation Piping	3,500	N
7	80-400	Condensate Suction	3,000	N
8	80-401	CD from Pump to LPH-1/DC inlet TEE & Recir.	7,000	N
9	80-402	CD from LPH-1/DC inlet TEE to TG TP	6,000	N
10	80-407	Condensate For sealing of Vacuum	3,500	N
11	80-408	Condensate Dump from Header	2,500	N
12	80-413	Unlisted Condensate	2,000	N
13	80-440	Condenser Drains	1,000	N
14	80-442	Gland Steam Cooler Drains	500	N
15	80-443	LP Heater-1 to Condenser	2,500	N
16	80-444	LP Heater-2/3/4/5 Drains & Drip Pump Incl.	3,500	N
17	80-446	Deaerating Heater Over Flow and Drain	2,000	N
18	80-447	HP Heater Drains	7,000	N
19	80-449	TG Cycle piping Drains & Vents	12,500	N

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.

SN	PGMA	DESCRIPTION	WT. (KG)	IBR (I)/ NON-IBR (N)
20	80-457	Manifolds for HP Flash Box & Condenser	2,500	N
21	80-463	TG Aux Cooling water	66,000	N
22	80-468	Main Circulation Water Piping	120,000	N
23	80-601	Low Pressure Dosing Piping	1,500	N
24	80-673	Lube Oil Piping System	3,500	N
25	80-901	Sub-Delivery Valves for Light up	1,700	N
26	80-928	H & S for Boiler Light up – TG	40,000	N
27	80-930	H & S for Synchronisation-TG	2,000	N
18	80-933	H & S for LP Piping	10,000	N
29	80-992	Imported Electrodes	10	N
30	81-415	Test Thermowells	100	N
31	XX-XXX	Root valves, Butterfly Valves, QCNRVs, Steam Traps, ME Bellows etc.	50,000	
32	XX-XXX	Aux. PRDS a. High Capacity PRDS-1400 Kg. b. Low Capacity PRDS-600 Kg. c. CRH PRV-350 Kg.	2350	
		TOTAL WEIGHT	**368,660**	

(CC) EQUIPMENTS/SYSTEMS, CENTRAL LUBE OIL SYSTEM, MISC. PUMPS, COLTS, PLATE HEAT EXCHANGERS, MISC. HOISTS & CHAIN PULLEY BLOCKS, SELF CLEANING STRAINERS, LP DOSING SYSTEM ETC. (SUPPLIED FROM PEM/ BHOPAL AND RELATED VENDORS):

Sl. NO.	DESCRIPTION	PACKAGE SIZE (mm)	Approx. WT.IN KG/ITEM
1.	**Central Lube Oil System:**		
1.1	Clean oil Pump with Drive motor, Duplex Type Strainer, Pressure Gauge& DP Gauge etc.-1 Set		450

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.

Sl. NO.	DESCRIPTION	PACKAGE SIZE (mm)	Approx. WT.IN KG/ITEM
2.	**MISC. HOISTS & CHAIN PULLEY BLOCKS**		
2.1	**Electric Hoists**		
2.1.1	Electric Hoist with straight path for ACW pumps & DMCW Pumps inside the TG Hall	1No. of Capacity 3 MT	450
2.1.2	Electric Hoist with straight path for Condenser Butterfly valves	1No. of Capacity 8 MT	580
2.1.3	Electric Hoist with straight path for Vacuum Pumps	1No. of Capacity 3 MT	450
2.1.4	Electric Hoist with straight path for ESP Control room	1No. of Capacity 3 MT	450
2.2	**Chain Pulley Blocks:**		
2.2.1	Chain Pulley Block and travel trolley for DMCW Pumps (SG) inside TG hall .	1 No. of Capacity 2MT	110
2.2.2	Chain Pulley Block for Sump Pupms lifting in TG hall.	1 No. of Capacity 2MT	70
2.2.3	Chain Pulley Block for Lube Oil Barrel handling	1 No. of Capacity 1MT	50
2.2.4	Chain Pulley Block for General Maintenance	1 No. of Capacity 3MT	85
3.	**Plate Heat Exchangers** with associated components/ items, attachment, fittings etc.- 2 **sets.**	Each of size- L-4500XW - 2000XH-3000 mm and weight-4500 kg	2x4500
5.	Self Cleaning Strainers- 2Sets	Each of size L-3000xW-1500xH-1500 & weight 2500 Kg	2x2500
6.	Condenser On Load Tube Cleaning System **(COLTS)-** 2Sets (each set weighing about-6000 Kg.	Each set comprising of (i) Ball Injection Pipes. (ii) Ball re-circulating skid	2x6000

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.

Sl. NO.	DESCRIPTION	PACKAGE SIZE (mm)	Approx. WT.IN KG/ITEM
		(iii) Ball Separator-/Ball collector strainer- (iv) D.P. Measuring system (v) Loose items	
7.	**Misc. Pumps**		
7.1	Sump Pumps / Submersible Pumps -4 sets		4x500
7.2	DMCW Pumps (Horizontal) & Drive Motors – 3 Sets		3x6,500
7.3	DM CW Booster Pumps (Horizontal)- 2 Sets		2x1,500
8.	**LP Chemical Dosing System**		
8.1	Hydrazine Dosing system-1 No.	2500x5250x3000	3,000
8.2	Ammonia Dosing Sysetm-1 No.	2500x5250x3000	3,000
8.3	NaOH Dosing System	2000x2000x2000	2,000
		TOTAL	**61,195**
		Total Weight Say (62 MT)	

NOTE:

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

APPENDIX – III

SUMMARY OF TENTATIVE WEIGHT SCHEDULE

SN	EQUIPMENT / PACKAGE	APPROX. WT. (MT)
A.	STEAM TURBINE & AUX.	583
B.	TURBO GENERATOR & AUX.	381
C.	CONDENSER WITH AUX,	375
D.	HEATERS ETC. (HEAT EXCHANGERS)	56
E.	BOILER FEED PUMPS & AUX.	99
F.	CONDENSATE EXTRACTION PUMPS & AUX.	35
G.	FLASH TANK & VESSELS	37
I.	TG INTEGRAL PIPING	65
K.	BOUGHT OUT ITEMS (BHEL Haridwar Scope) + GEN. AUX.	150
	TOTAL WT.	**1781**

Details as in above table correspond to Item SN 01 of Rate Schedule. Broad description of the Equipment/Package has been furnished here for general guidance of the bidder. Contractor shall carry out the work of all these equipment/ packages in totality including all their accessories even though names of such accessories may not be specifically appearing in this Tender Specs.

L. EXTERNAL/RE-GENERATIVE PIPING SYSTEM WITH VALVES, H & S, FITTINGS AND OTHER RELATED PEM BOUGHT OUT ITEMS:

(i) Carbon steel & Alloy Steel Piping: 370 MT (Item 02. of Rate Schedule)

(ii) Stainless Steel Piping: 2 MT (Item 02. of Rate Schedule)

M. EQUIPMENTS/SYSTEMS OF CENTRAL LUBE OIL SYSTEM, MISC. PUMPS, CONDENSE ON-LOAD TUBE CLEANING SYSTEM, PLATE HEAT EXCHANGERS, MISC.HOISTS & CHAIN PULLEY BLOCKS, SELF CLEANING STRAINERS, LP DOSING SYSTEM ETC: **62 MT (Item 03 of Rate Schedule)**

NOTE:

The details indicated above are approximate and there is likelihood of variations in weight & quantity of equipment/package/system. Variations will be dealt with in accordance with relevant provisions available in Section-11 of Special Conditions of Contract.

APPENDIX – IV

LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS

SN	Description	Capacity	Remarks
1	EOT Crane in TG hall 100/25 MT capacity	01 No.	Customer EOT crane for handling and Erection between **A-B Bay of TG building**, subject to its capacity & accessibility / approachability.
2	Crawler Crane	100/120 MT (Hired)	On sharing basis for erection as per absolute decision of BHEL Engineer I/C at site subject to its availability / spareability, approachability, accessibility and capacity.
3	Crawler Crane	75 / 80 MT (Hired)	On sharing basis for erection as per absolute decision of BHEL Engineer I/C at site subject to its availability / spareability, approachability, accessibility and capacity.

Note:

1. All these cranes are to be used on sharing basis with other agencies working in the project. Contractor shall furnish his requisition for particular crane to BHEL sufficiently in advance to ensure proper planning and timely deployment. Decision of BHEL for allocation of cranes to different agencies in the project will be based on the overall interest of the project and priority of the activity. Such decision of BHEL will be binding on the contractor.

2. Contractor shall make necessary arrangements like laying of sleepers; minor earth filling & consolidation; assembly & dismantling of heavy lift attachment, boom, jib etc for movement and operation of the crane.

3. Contractor shall transport this equipment from BHEL stores, install, operate, carry out preventive as well as breakdown maintenance, dismantle after use and return to BHEL stores.

4. BHEL's cranes depending on their accessibility will also be utilised in BHEL storage yard for unloading & loading of equipments whose weight as a single equipment / single item is more than 40 MT (excluding the Generator Stator).

5. BHEL will not provide any crane / arrangement for unloading & handling of Generator Stator. Contractor shall make his complete arrangements for responsibility and carry out the liaisoning and follow up with transporters, filling of ditches/levelling etc. for marching of trailer to unload at suitable location/point of lifting near the TG building, Shifting/dragging of Generator Stator by providing required arrangements like rails/plates/sleepers etc. (as per requirement), arranging the Strand And Jacks/Lift & Shift arrangements & their assembly /installation with expert supervision till lifting & placement of Generator, making resting Foundations/Footings to suit the installation of his Strand and Jack arrangements (as required) and Lifting & Placement of Generator

Stator to required/designed foundation/elevation (refer clause 4.6 of tender specification)

6. Complete operation of EOT crane along with providing the operator, day today operation/ maintenance, general cleanliness, attending of gear box leakages etc., applying caladium Compound on slings and holding / supporting the supply cables etc. provided by the contractor as per requirement.

   EOT crane will be used on sharing basis by other agencies working within the TG hall under the instruction of BHEL Engineer In-charge. Contractor has to plan his activities well in advance and inform BHEL engineer In-charge / Construction Manager the date of actual use. Contractor shall extend the services of EOT crane operator with EOT crane for the other agencies as per instruction of BHEL Engineer In-charge at site as part of scope of work to whom, the services of EOT crane has been allotted/ recommended by BHEL Engineer In-charge.

   As above crane will be shared with other agencies / contractors of BHEL. The requirement of crane shall be planned well in advance with indenting procedure in consultation/ direction of BHEL engineer at site and with allocation of crane shall be as decided by BHEL engineer and his decision shall be binding on contractor.

   HP Heaters (Horizontal Type), LP Heaters (Horizontal Type) are to be located in B-C Bay of TG Building at their designed foundations which are at elevation of 15.8M & 09.30M respectively. The customer's EOT crane 100/25T is located in A-B Bay of TG Building and as such this EOT crane may not have direct accessibility /approachability to handle and place these equipments to their foundations. Contractor may make use of this EOT crane as per prior approval of BHEL/Customer engineer subject to its readiness and approachability to carry out lifting and placement of these equipments to nearest location by using additional platform etc. along with dragging arrangements, wherever required. Contractor shall make his own arrangement of such requirements for shifting/dragging/making additional platforms etc. to place and assembled/ install these equipments to their respective designed foundations & elevations as part of scope of work. BHEL / Customer shall not provide any additional arrangements/infrastructure for this purpose.

   Boiler feed pumps with Auxiliaries are to be installed/erection between B-C Bay of TG Building at an elevation about 00.30M. TG hall crane which is located in A-B row will not be accessible for erection and handling of these BFPs. Contractor shall make his own arrangement for placement and installation of these equipments as part of scope of work so that the progress of work is not affected.

APPENDIX –V

MAJOR TOOLS AND PLANTS & MMD TO BE DEPLOYED BY THE CONTRACTOR

A: TOOL & PLANTS

SL.NO.	DESCRIPTION	QUANTITY
01.	CRANES (OF SUITABLE CAPACITY)	AS PER REQUIREMENT
02.	TRAILER WITH HORSE (SUITABLE CAPACITY)	-DO-
03.	TRACTOR TROLLEY (SUTABLE CAPACITY)	-DO-
04.	WELDING GENERATOR SETS (SUFFICIENT QUNTITY) (ELECTRIC AS WELL DIESEL)	-DO-
05.	3- PHASE COMPLETE SET UP FOR DRAWAL OF POWER	-DO-
06.	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER	-DO-
07.	TIG WELDING SETS (SUFFICIENT QUNTITY)	-DO-
08.	STRESS RELIEVING EQUIPMENTWITH TEMPERATURE RECORDERS	-DO-
09.	ELECRTRICAL BAKING OVEN – BIG	-DO-
10.	ELECTRODE BAKING OVEN-- PORTABLE	-DO-
11.	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS	-DO-
12.	VACUUM CLEANER (INDUSTRIAL)	-DO-
13.	PIPE CUTTING AND BEVELLING MACHINE	-DO-
14.	PIPE BENDING M/C (ELECTRIC/ ELECTRO-HYDRAULIC-UPTO 4" SIZE)	-DO-
15.	AIR COMPRESSOR 120 CFM	01 NO
16.	STEP DOWN TRANSFORMER, 230V/24V	AS PER REQUIREMENT
17.	CONDENSER TUBE EXPANDER SET	-DO-
18.	ELECTRICALLY OPERATED WINCHES 3T/5T CAP.	-DO-
19.	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)	-DO-

20. HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR:

- JACKS OF 100 T CAPACITY 04 NOS (WITH HAND OPERATED PUMPS)
- JACKS OF 50 T CAPACITY 04 NOS. (- DO -)
- JACKS OF 63 T CAPACITY 04 NOS. (- DO -)
- GANG OPERATED JACKS CONSISTING OF THE FOLLOWING:
- JACKS OF 100 T CAPACITY 04 NOS (HAVING BROAD BASE ONE INCH LIFT)
- LONG HIGH PRESSURE HOSES 12 NOS.(FOR GENERATOR ALIGNMENT)

ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.

APPENDIX –V

21.TORQUE WRENCH	0 TO 200 N-M CAP.	01 NO.
22.TORQE WRENCH	UPTO 2000 N-M CAP.	01 NO.
23. SLINGS FOR	LP TURBINE ROTOR	01 SET
24. SLINGS FOR	HP TURBINE MODULE	01 SET
25. SLINGS FOR	GENERATOR ROTOR	01 SET
26. BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FDN. BOLTS)		AS PER REQUIREMENT
27. LONG FEELER GAUGE SET		AS PER REQUIREMENT
28. SPANNERS / EYE BOLTS (OF ALL SIZES)		AS PER REQUIREMENT
29. CHEMICAL CLEANING PUMPS WITH STARTER, MOTOR, CABLES, ETC.- OF REQUIRED QUANTITY & CAPACITY)		**AS PER REQUIREMENT**
30. Pressurising Pump for Hydraulic Testing of Pipe lines : 450 Kg/Cm2 with flow rate of 25 to 30 LPM with starter & Cables		**As per requirement**
31. Hand Operated Hydraulic Test Pump of suitable capacity. –		**as per requirement.**

32. Strands & Jacks / Lift & Shift arrangement for Generator Stator Lifting along with Lifting slings.

ANY OTHER MAJOR T&P REQUIRED FOR SATISFACTORY COMPLETION OF THE WORKS.

B: MEASURING AND MONITORING DEVISES (MMD):

AS PER REQUIREMENT TO BE FINALIZED AT SITE.

NOTE :

THIS ABOVE LIST IS ONLY INDICATIVE AND NEITHER EXHAUSTIVE NOR LIMITING. QUANTITIES INDICATED ABOVE ARE ONLY THE MINIMUM REQUIRED. CONTRACTOR SHALL DEPLOY ALL NECESSARY T&P TO MEET THE SCHEDULES & AS PRESCRIBED BY BHEL ENGINEER AND REQUIRED FOR COMPLETION OF WORK.

APPENDIX –VI

ANALYSIS OF UNIT RATE QUOTED

SL. NO.	DESCRIPTION	% OF QUOTED RATE	REMARKS
01	SITE FACILITIES VIZ., ELECTRICITY, WATER OTHER INFRASTRUCTURE.		
02	SALARY AND WAGES + RETRENCHMENT BENEFITS		
03	CONSUMABLES		
04	T&P DEPRECIATION & MAINTENANCE		
05	ESTABLISHMENT & ADMINISTRATIVE EXPENSES		
06	OVERHEADS		
07	PROFIT		
TOTAL		100%	

SIGNATURE OF THE TENDERER

DATE:

APPENDIX –VII

FORMAT FOR MONTH-WISE MANPOWER DEPLOYMENT PLAN FOR EACH UNIT

(CATEGORY-WISE NUMBERS TO BE INDICATED FOR EACH MONTH)

SN	CATEGORY	MONTHS										
		1	2	3	4	5	6	7	8	9	10	SO ON*
01	RESIDENT ENGINEER											
02	ERECTION ENGINEERS											
03	ERECTION SUPERVISORS											
04	QUALITY ASSURANCE ENGINEER											
05	SAFETY ENGINEER											
06	MATERIALS MANAGEMENT SUPERVISORS											
07	HIGH PRESSURE WELDERS											
08	STRUCTURAL & OTHER WELDERS											
09	FITTERS											
10	CRANE OPERATOR											
11	TRUCK/TRAILER DRIVERS											
12	STORE KEEPERS											
13	ELECTRICIANS											
14	SEMISKILLED/ UNSKILLED WORKERS											
	MONTH WISE TOTAL											

*Please use additional sheets in same format for additional period.

SIGNATURE OF TENDERER

DATE:

.....

APPENDIX –VIII

FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

SL. NO.	DESCRIPTION & CAPACITY OF T&P	MONTHS										
		1	2	3	4	5	6	7	8	9	10	SO ON
01												
02												
03												
04												
05												
06												
07												
08												
09												
10												

Date

Signature of Tenderer

APPENDIX IX

CONCURRENT COMMITMENTS

SL. NO	FULL POSTAL ADRESS OF CLIENT AND NAME OF OFFICER IN-CHARGE	DESCRIPTION OF THE WORK	VALUE OF THE CONTRACT	COMMENC-EMENT DATE	SCHEDU-LED COMPLE-TION	% COMPL-TD. AS ON DATE	ANTICIPA-TED COMPLN. DATE	REMARKS

DATE

SIGNATURE OF THE TENDERER:

DRAWING No. PE-DG-328-100-M003

CUSTOMER'S DRAWING No.

FIRST ANGLE PROJECTION — ALL DIMENSIONS ARE IN MM

NORTH

PLAN AT 21.0M

PLAN AT 15.5M

REFERENCE DRGS:–

1.	CONDENSER	01601070055C160 (HWR)
2.	GENERATOR OUTLINE	0–139–00–01341 (HWR)
3.	FOUNDATION PLAN	0–13100–B7153 (HWR)
4.	OIL ROOM ARRANGEMENT	013100B7004 (HWR)
5.	GA SPRAY CUM TRAY DEAERATOR	11631011332 (HYD)
6.	OIL CANAL DETAILS	0–13100–B7001 (HWR)
7.	GA OF DMCW TANK	–(BPL)
8.	GA OF HP HEATER 1	1–17500–40138 (HYD)
9.	GA OF HP HEATER 2	1–17500–40139 (HYD)

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 METERS UNLESS STATED OTHERWISE.
2. ALL ELEVATIONS ARE WITH RESPECT TO TG HALL 0.0M WHICH CORRESPONDS TO RL (+)248.5M.
3. FOR TG COLs & FLOOR FRAMING REFER CIVIL DRGs SEPARATELY.
4. ALL CIVIL DETAILS SUCH AS DOORS/WALLS/CLADDINGS/OPENINGS/TOILETS/STAIRCASES ETC. ARE INDICATIVE ONLY & FOR EXACT DETAILS REFER CIVIL/ARCHITECTURE DRAWINGS.
5. DETAILS OF LAYOUT AS SHOWN FOR OTHER THAN BHEL SCOPE ARE SUGGESTIVE ONLY.
6. CIVIL TO PROVIDE 2NOs. EPS (TOS) 150MM WIDEx13500MM LONG FOR HPH–5, 150MM WIDEx15800MM LONG FOR HPH–6 FOR MOVEMENT OF HP.HEATERS AS PER LOCATION SHOWN IN THE DWG.

REV	DATE	ALTD	CHD	APPD
01	25.11.09	VJ	BKA	AJ

1. Revision made as per customer comments vide DCPL Transmittal dt. 21.08.2009 & 12.10.2009..
2. Changes made are marked as △

CUSTOMER	IDEAL ENERGY PROJECTS LTD.
CUSTOMER'S CONSULTANT	DCPL, NEW DELHI
JOB No. 328	1x270MW BELA NAGPUR TPP NAGPUR, MAHARASHTRA
STATUS CONTRACT	
DISTRIBUTION	
TO	
No.OF	

DEPT CODE	NAME	SIGN	DATE
DRN	V.KUMAR	Sd/–	05.08.2009
DESN	V. JAIN	Sd/–	05.08.2009
CHD	SB/BKA	Sd/–	05.08.2009
APPD	ANIL JOSHI	Sd/–	05.08.2009

TITLE: T.G. HALL EQUIPMENT LAYOUT PLAN AT 15.5M & 21.0M FLOOR

MPL	C	MSE	I	MAX.	E	DEPT.	SCALE 1:150	DRAWING No. PE–DG–328–100–M005
						SIGN		
						DATE		SHEET 1 OF 1 REV. 01

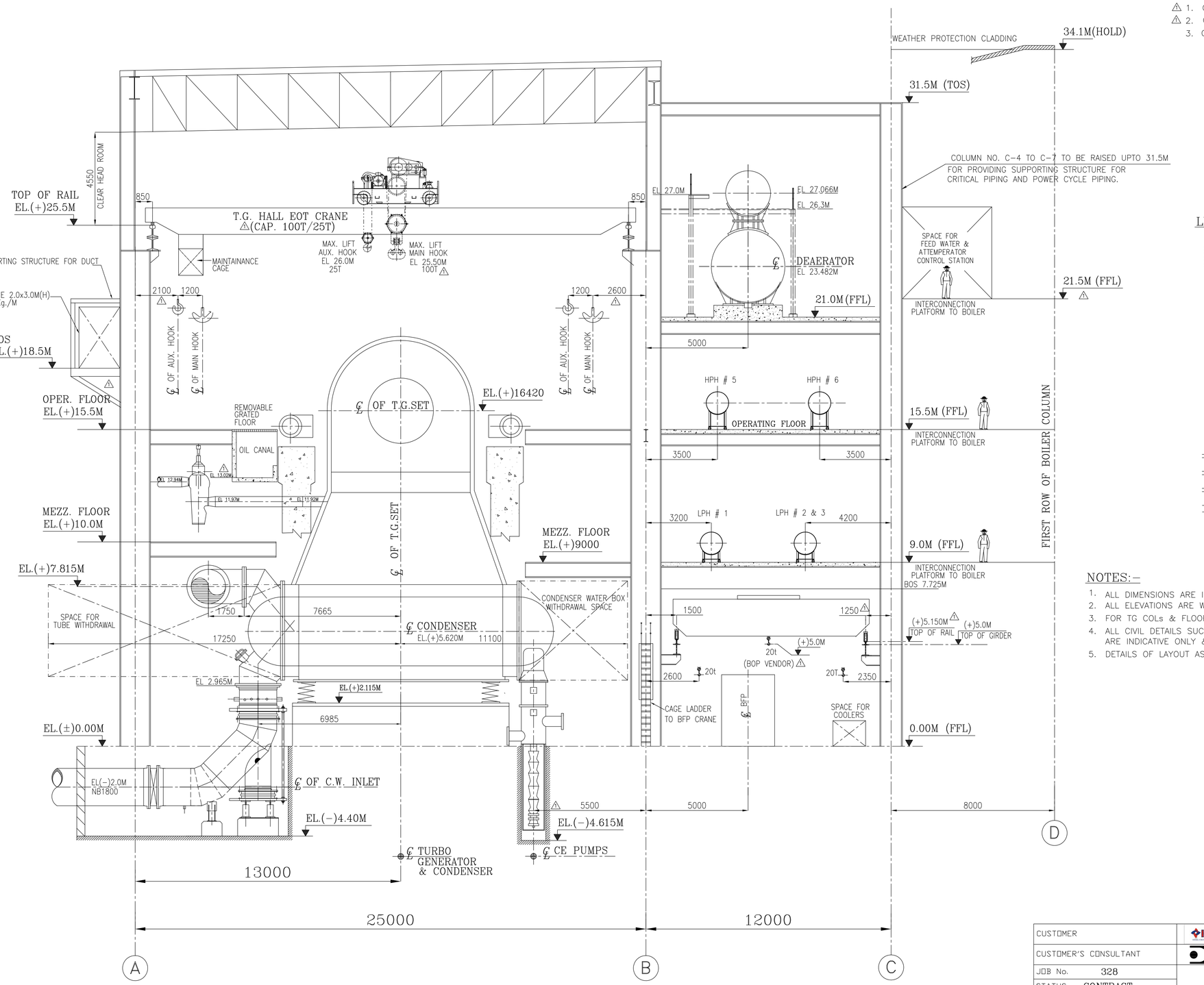
SIZE–A0

COMPUTER FILE NAME: 328_100_M003_R01

COMPUTER FILE NAME: 328_00_M006_R01

REFERENCE DRGS:-

⚠ 1.	CONDENSER	01601070055C160 (HWR)
⚠ 2.	GA OF SPRAY CUM TRAY DEAERATOR	11631011332 (HYD)
3.	GA OF CEP	HY-DG-1-18100-57136 (HYD)



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 METERS UNLESS STATED OTHERWISE.
2. ALL ELEVATIONS ARE WITH RESPECT TO TG HALL 0.0M WHICH CORRESPONDS TO RL (+)248.5M⚠
3. FOR TG COLs & FLOOR FRAMING REFER CIVIL DRGs SEPARATELY.
4. ALL CIVIL DETAILS SUCH AS DOORS/WALLS/CLADINGS/OPENINGS/TOILETS/STAIRCASES ETC. ARE INDICATIVE ONLY & FOR EXACT DETAILS REFER CIVIL/ARCHITECTURE DRAWINGS.
5. DETAILS OF LAYOUT AS SHOWN FOR OTHER THAN BHEL SCOPE ARE SUGGESTIVE ONLY.

REV	DATE	ALTD	CHD	APPD

REV	DATE	ALTD	CHD	APPD
01	25.11.09	VJ	BKA	AJ

1. Revision made as per customer comments vide DCPL Transmittal dt. 21.08.2009 & 12.10.2009.
2. Changes made are marked as ⚠

CUSTOMER	IDEAL ENERGY PROJECTS LTD.
CUSTOMER'S CONSULTANT	DCPL, NEW DELHI
JOB No. 328	1x270MW BELA NAGPUR TPP NAGPUR, MAHARASHTRA
STATUS CONTRACT	
DISTRIBUTION	
TO	
No.OFF	

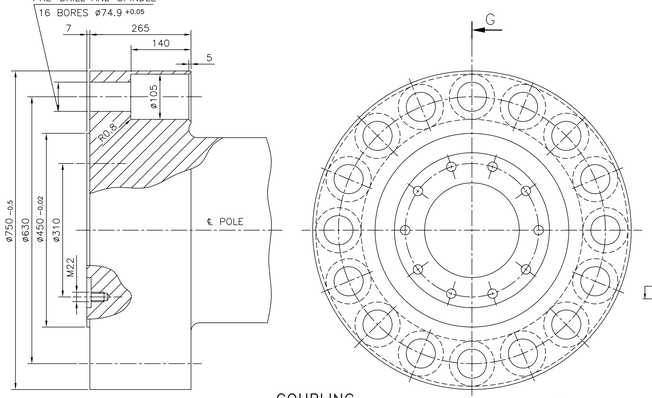
BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE		NAME	SIGN	DATE
M	DRN	V.KUMAR	Sd/-	05.08.2009
	DESN	V. JAIN	Sd/-	05.08.2009
	CHD	SB/BKA	Sd/-	05.08.2009
	APPD	ANIL JOSHI	Sd/-	05.08.2009

TITLE
CROSS SECTION OF T.G. HALL

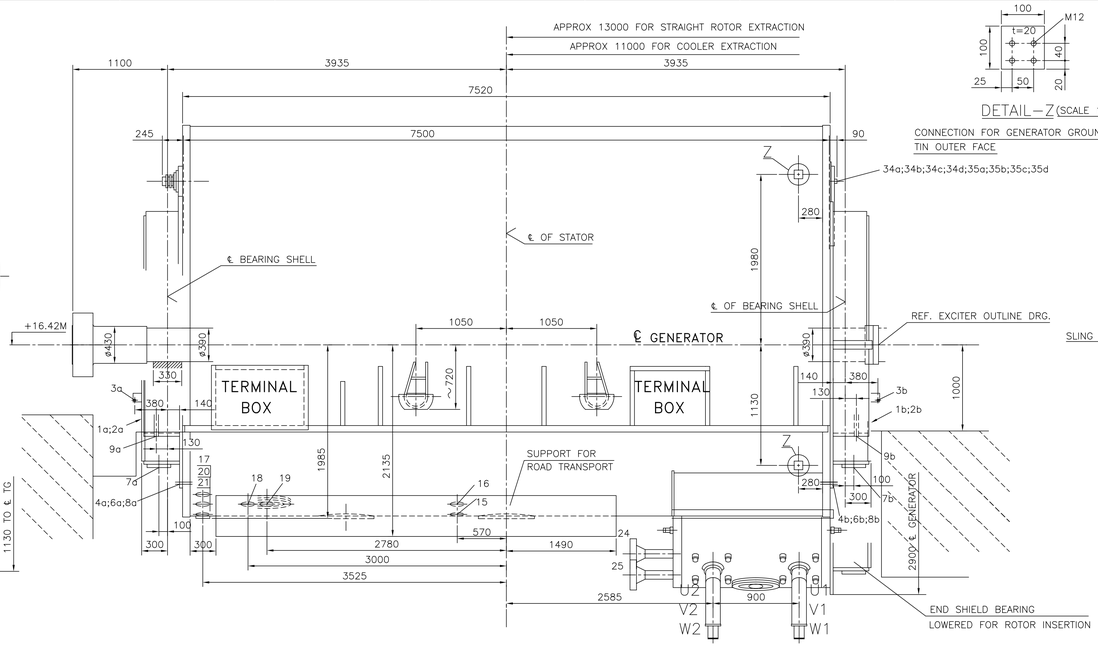
DEPT. SCALE 1:100 DRAWING No. PE-DG-328-100-M006
SIGN
DATE
SHEET 1 OF 1 REV 01
SIZE-A1

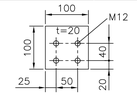
PRE-DRILL AND SPINDLE
16 BORES ø74.9 +0.05



SECTION G-G (SCALE 1:5)

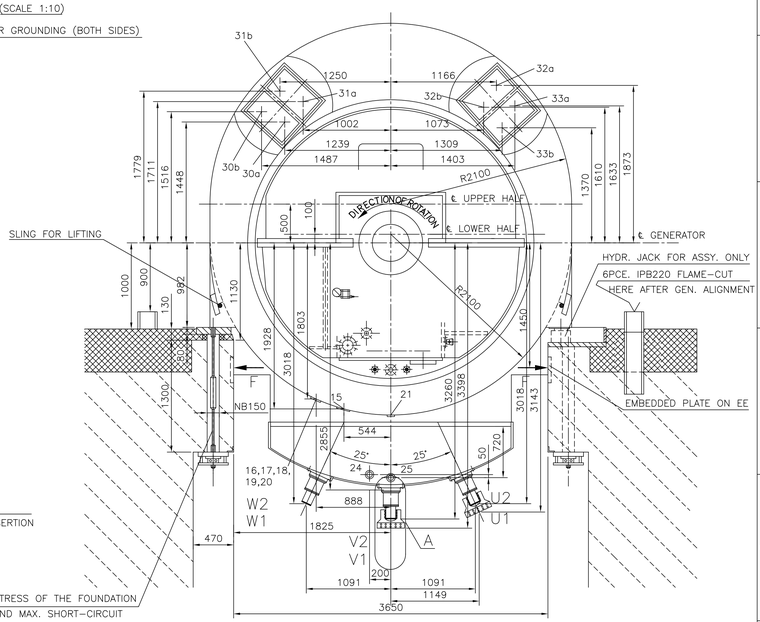
COUPLING





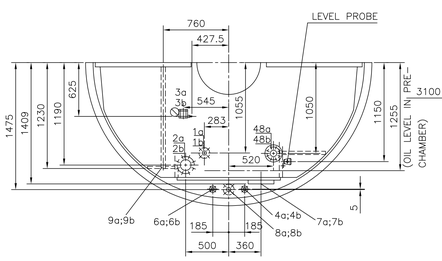
DETAIL-Z (SCALE 1:10)

CONNECTION FOR GENERATOR GROUNDING (BOTH SIDES)
TIN OUTER FACE

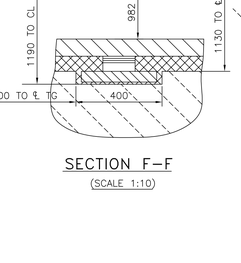


VIEW FROM 'TE' (SECTION A-B-C-D)

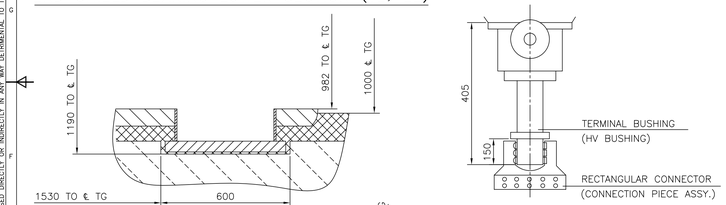
THE CHOSEN PRESTRESS OF THE FOUNDATION BOLT IS 260 KN AND MAX. SHORT-CIRCUIT FORCE IS 238 KN.



END SHIELD BEARING LOWER SECTION (TE; EE)



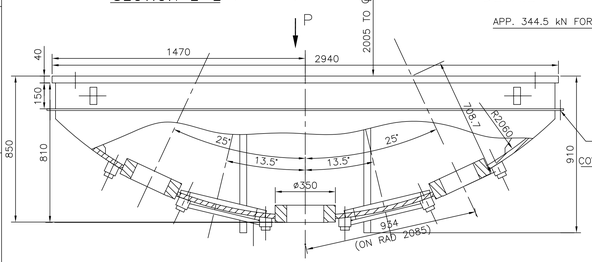
SECTION F-F (SCALE 1:10)



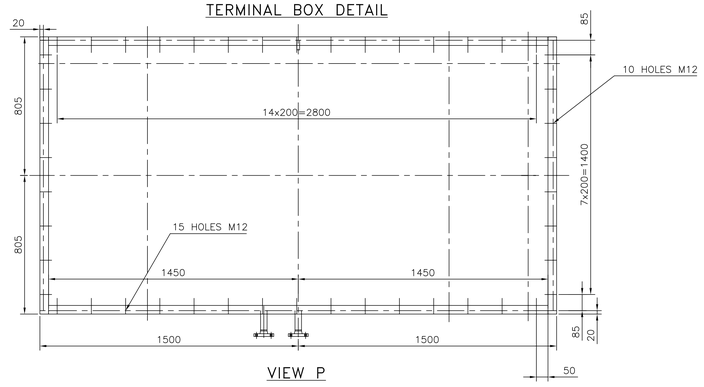
SECTION E-E (SCALE 1:10)

DETAIL 'A'

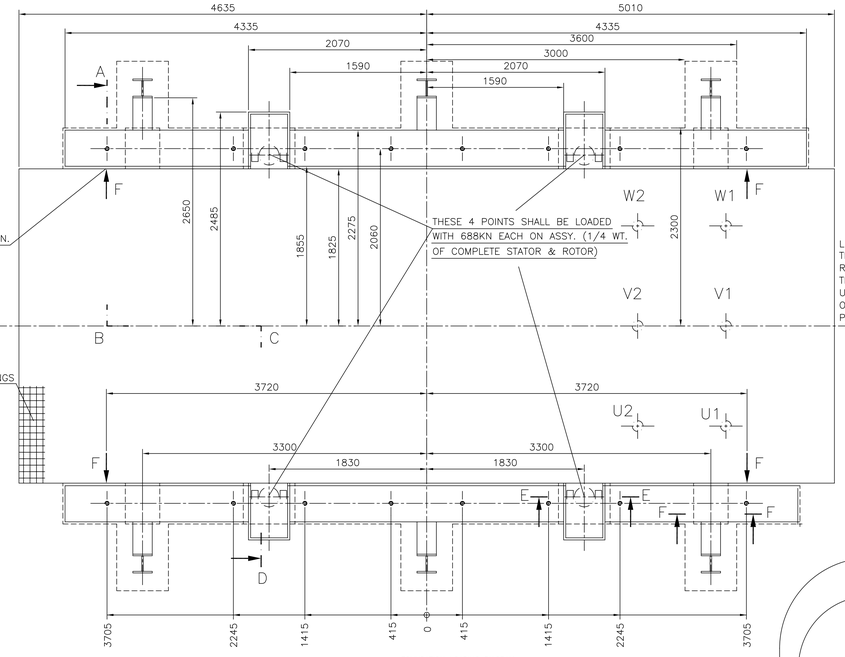
APP. 344.5 kN FOR LATERAL ALIGNMENT OF GEN.



TERMINAL BOX DETAIL

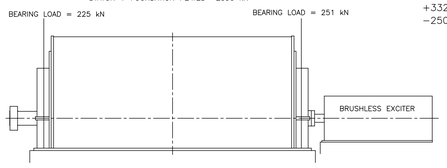


VIEW P



FOUNDATION LOADING DIAGRAM
(DEAD LOAD)

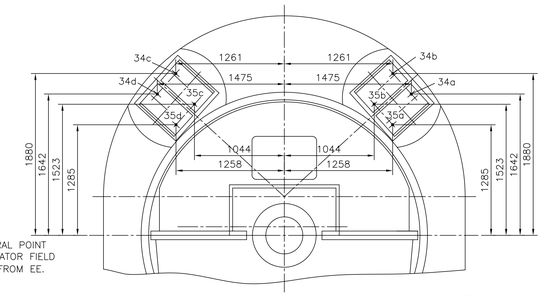
STATOR + FOUNDATION PLATES= 2390 kN



LINE TERMINALS ARE MARKED U1,V1,W1. NEUTRAL POINT TERMINALS ARE MARKED U2,V2,W2. THE GENERATOR FIELD ROTATES IN CLOCKWISE DIRECTION AS SEEN FROM EE. TERMINAL VOLTAGE GETS POSITIVE MAXIMUM IN U1,V1,W1 SEQUENCE.
ONLY FLEXIBLE CONNECTIONS ALLOWED.
PHASE SEQUENCE: U1-V1-W1

NAME/RATING PLATE DETAILS

K.W.	270000
P.F.	0.85 LAG
K.V.A.	317700
STATOR VOLTS	16500
STATOR AMPS	11115
ROTOR VOLTS	325
ROTOR AMPS	2666
RPM	3000
HZ	50
PHASE	3
CONNECTION	YY
COOLANT	HYDROGEN
INSULATION CLASS	F
GAS PRESSURE	4 BAR (G)



VIEW FROM 'EE'

TERMINATION DETAILS

1a	FLANGED	65	INLET BRG. OIL TE
1b	FLANGED	65	INLET BRG. OIL EE
2a	FLANGED	150	OUTLET BRG. OIL TE
2b	FLANGED	150	OUTLET BRG. OIL EE
3a	FLANGED	15	JACKING OIL INLET TE
3b	FLANGED	15	JACKING OIL INLET EE
4a	FLANGED	40	INLET SEAL OIL TE
4b	FLANGED	40	INLET SEAL OIL EE
6a	FLANGED	15	RING RELIEF TE
6b	FLANGED	15	RING RELIEF EE
7a	FLANGED	50	OUTLET S.O. TE H2 SIDE
7b	FLANGED	50	OUTLET S.O. EE H2 SIDE
8a	FLANGED	50	OUTLET S.O. TE AIR SIDE
8b	FLANGED	50	OUTLET S.O. EE AIR SIDE
9a	FLANGED	65	EXHAUST BRG. CHAMBER TE
9b	FLANGED	65	EXHAUST BRG. CHAMBER EE
15	FLANGED	50	CONNECTION FOR CO2
16	FLANGED	50	CONNECTION FOR H2
17	FLANGED	25	PRESSURE BEFORE FAN
18	FLANGED	25	PRESSURE AFTER FAN
19	FLANGED	50	CONN. TO GAS DRIER
20	FLANGED	50	CONN. FROM GAS DRIER
21	FLANGED	50	TO LIQUID DETECTOR RACK
24	WELDED	25	TO LIQUID DETECTOR RACK
25	WELDED	25	TO LIQUID DETECTOR RACK
30a,31a,32a,33a	FLANGED	100	COOLING WATER INLET TO H2 COOLER
30b,31b,32b,33b	FLANGED	100	COOLING WATER OUTLET FROM H2 COOLER
34a,34b,34c,34d	THREADED	G1/2"	VENT COOLERS A,B,C,D
35a,35b,35c,35d	THREADED	G1/2"	DRAIN COOLERS A,B,C,D

SHORT-CIRCUIT FORCES; WEIGHTS CONSIDERED

MAX. FORCE CALULATED FROM MAX. MOMENT FOR A 2-POLE TERMINAL SHORT-CIRCUIT AT 100% NOM. VOLTAGE. ANY ALLOWANCES NOT INCLUDED. THE FORCES ARE AS SHOWN ALTERNATING FORCES, INDEPENDENT OF THE DIRECTION OF ROTATION.

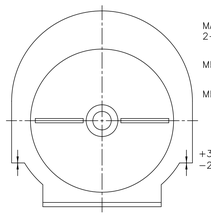
SHORT-CITCUIT + 1/2 GEN. WEIGHT = FOUNDATION LOAD
LOAD

1910kN	+	1410 kN	=	3320 kN
-1910 kN	+	1410kN	=	-500 kN

MASS MOMENT OF INERTIA OF STATOR AT IST LONG AXIS 458×10^3 kgm^2

MASS MOMENT OF INERTIA OF ROTOR 5330 kgm^2

FOUNDATION LOAD AT SHORT-CIRCUIT (ALTERNATING FORCES)



MAX. SHORT CIRCUIT TORQUE AT
2-POLE TERMINAL FAULT (t IN s; M IN kNm)

$Mk = 5582e^{-t/0.2344} \times \sin wt - 2791e^{-t/0.2367} \times \sin 2wt + 814e^{-t/0.2602}$

Mk=7842kNm

WEIGHT:

STATOR SHIPPING WEIGHT	228.0 Mg
COOLERS	8.6 Mg
END SHIELD & COMPLETING ASSEMBLIES	23.3 Mg
ROTOR	42.915 Mg
TOTAL WEIGHT OF GENERATOR	297.5 Mg
BRUSHLESS EXCITER ASSEMBLY	30.4 Mg

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

CBOM NO.			STATUS OF DRG.
AGREED DCPT.	NAME	SIGN	DATE

REV.	DATE	ALTERED	
01	16.10.09	CHECKED	RCS sd/-

REVIEWED IN LINE WITH CUSTOMER COMMENTS.

DEVELOPMENT CONSULTANTS PRIVATE LIMITED
CONSULTING ENGINEERS

1X270MW BELA NAGPUR TPP
NAGPUR, MAHARASHTRA

BHARAT HEAVY ELECTRICALS LTD.
HARDWAR

	NAME	SIGN	DATE	NO.OF VAR.
DRN	ASHISH	sd/-	02.06.09	
CHD	RC SHARMA	sd/-	08.06.09	
APD	R C BAJPAI	sd/-	08.06.09	

DEPT.	SCALE	WEIGHT(Kg.)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
EME	1:25	-	-		
CODE 4033					

TITLE
GENERATOR OUTLINE

DRAWING NO. 0-139-00-01341 REV. -
SHEET NO.01 NO.OF SHEETS 01
SIZE A0

REF. DRG NO. | SIGN & DATE | INVENTORY NO.