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

TENDER NO. BHEL/NR/SCT/HARDUAGANJ/TG/631

FOR

ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF TG SETS AT 2X250 MW HARDUAGANJ UNITS 8 & 9, ALIGARH , UP.

PART I – TECHNICAL BID

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

ISO 9001-2000, ISO 14001 and OHSAS 18001 certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120-2515476 / 2515464 / 2515479
Fax 091-0120-2515464 / 2515467
Email: sku@bhelpsnr.co.in / swapan@bhelpsnr.co.in

TENDER NO. BHEL/NR/SCT/HARDUAGANJ/TG/631

IMPORTANT NOTE

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

THIS TENDER SPECIFICATION ISSUED TO:

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

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Sub: Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF TG SETS AT 2X250 MW HARDUAGANJ UNITS 8 & 9, ALIGARH , UP.

TENDER NO. BHEL/NR/SCT/HARDUAGANJ/TG/631

QUALIFYING REQUIREMENTS:

1.1 Tenderers who wish to participate must have successfully completed, during last seven years, at least one similar work consisting of TG Set of 60 MW Unit 'OR' higher rating unit.

OR

Should be executing works of similar nature, as covered in this tender, against direct BHEL's order for a TG set of 195 MW Unit 'OR' higher rating unit.

1.2 Tenderers should also have an average annual turnover of minimum of Rupees 300 lacs (Rs. Three Hundred Lacs Only) based on the audited accounts of last three financial years (2005-06, 2006-07 & 2007-08). Bidders shall submit audited balance sheets and profit & loss account in support of this.

NOTES:

(i) The Tender Documents comprise of following;
(a) General Conditions of Contract
(b) Special Conditions of Contract, Tender Notice, Project Synopsis etc.
(c) Rate Schedule

(ii) Tender Documents with complete details are hosted in this web page. Bidder(s) intending to participate may download the tender document from the web site. Bidder(s) downloading the tender documents from the web site, shall remit Rs.1000/- (Rupees One thousand only) in the form of crossed demand draft (non-refundable), in favour of BHEL, NOIDA along with their offer.

(iii) Bidder(s) can also purchase hard copy of tender documents from this office. Tender documents (non transferable) will be issued on all working days between 09.30 Hrs. to 12.30 Hrs within the sale period i.e ***upto*** **22.06.009** on payment of Rs.1,000/- (non-refundable) either in cash or by crossed demand

draft in favour of BHEL, NOIDA. Request for issue of tender document should clearly indicate Tender No. and work.

(iv) Tenders must be submitted to the undersigned in Room No. 104 **latest by 15:00 Hrs. on 22.06.009.** Technical bids shall **be opened at 15.30 Hrs. on 22.06.009**.

(v) Earnest Money Deposit (EMD) : Refundable, Non-interest bearing **EMD of *Rs 2,00,000/-*** shall be deposited by Account Payee Pay Order 'OR' Demand Draft in favour of " Bharat Heavy Electricals Limited" payable at Delhi/NOIDA . Those bidders who have already deposited ' One Time 'EMD' of Rs. 2,00,000/- with BHEL, PSNR, NOIDA need not submit EMD with the present tender.

(vi) Tenders not accompanied with Full Earnest Money Deposit, as indicated above, will not be considered.

(vii) All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper. Bidders shall keep themselves updated with all such amendments.

(viii) BHEL reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.

(ix) BHEL takes no responsibility for any delay/loss of documents or correspondences sent by courier/post.

(x) **BHEL reserves the right to go for a Reverse Auction instead of Opening the submitted sealed bid, which will be decided after technical evaluation. As such, the bidders should submit their best prices in the 'Sealed Price Bid'. However, bidders are required to confirm their acceptance of "General terms and conditions" governing RA specifically in their technical bid. The "General terms and conditions" governing RA are given in the SCC of the NIT. Bidders are also required to furnish following details in their techno-commercial bid, for this purpose (RA).**

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

1. Name and Designation of official
2. Postal Address (Complete)
3. Telephone Nos. (Land line & Mobile both)
4. FAX No.
5. E-mail address
6. Name of Place/State/Country, wherefrom he will participate in the RA

(xi) Purchase Preference will be given to CPSUs as per Govt. Guidelines.

(xii) **Unsolicited rebate / discount shall not be accepted after bid opening.**

DGM/SCP

SubContract and Purchase Deptt.

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DOMESTIC NOTICE INVITING TENDER

DUE DATE OF SUBMISSION : 22.06.009
DATE OF OPENING : 22.06.009

NIT NO. / NAME OF WORK
TENDER NO. BHEL/NR/SCT/HARDUAGANJ/TG/631 **Sub: Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF TG SETS AT 2X250 MW HARDUAGANJ UNITS 8 & 9, ALIGARH , UP**

NOTES
1. Purchase Preference will be given to CPSU as per Govt. Guidelines.
2. Please visit our website at www.bhel.com for details of NIT.

DGM/SCP

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
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PROCEDURE FOR SUBMISSION OF SEALED TENDERS:

The tenderers 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** also indicating on each of the cover tender specification no., date and time as mentioned in tender notice.

TECHNICAL BID (COVER-I)

Except **Price bid Part-II**, complete set of tender document consisting of General conditions of Contract, "Technical specification & Special terms and condition" (Part-I) issued by BHEL 'OR' Downloaded copy from website against this NIT shall be enclosed in **Part I Technical Bid only**. All schedules, data sheets and details called for in the specification shall also be submitted along with technical bid. All details / Data / Schedules including offer letter duly signed and stamped are to be **submitted in duplicate**.

PRICE BID (COVER-II)

Tenderers may please note that price bid is **to be submitted only in original copy** of Tender i.e. Price bid (Part-II) issued by BHEL 'OR' Downloaded copy from website.

These Two separate covers i.e. cover I & II shall together be enclosed in a **third envelope (Cover-III)** and this sealed cover shall be superscribed with tender specification No., due date, time and submitted to officer inviting tender as indicated in tender notice on or before due date as indicated.

PROJECT SYNOPSIS

1.	Name of the Owner:	Uttar Pradesh Rajya Vidyut Utpadan Nigam Ltd
2.	Installed capacity:	7 units of 50,60 &110 MW
3.	Proposed Extention :	2 x 250 MW
4.	Nearest Railway station :	ALIGARH -- 15 km
5.	Nearest City :	ALIGARH 15 km by road
6.	Nearest Airport :	DELHI - 200 km
7.	Maximum Tempreture :	48 Deg C
8.	Minimum tempreture :	Appx. 2 Deg C

SECTION - III `A'

SPECIAL CONDITIONS OF CONTRACT

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SECTION - III `A'

SPECIAL CONDITIONS OF CONTRACT

34.0 GENERAL

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

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

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

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

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

B Proper out-turn as per BHEL's plan and commitment

C Completion of work as per BHEL Schedule.

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

E Repair and rectification

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

34.5 Health, Safety & Environment management (HSE)

34.5.1 BHEL-Power Sector(NR) is ISO 9001-2000, ISO 14001-1996, OHSAS 18001-1999, ISO 27001 and SA-8000 certified company. Quality of work, to customer's satisfaction and system requirements is the essence of these certifications. The contractor in all respects will organize his work, systems, environment, process control documentation, tools, plant, inspection, measuring and testing equipments etc. as per instructions of BHEL engineer.

Besides provision with regard to SAFETY under Clause 27 of GCC, the contractor will be responsible for Health, Safety & Environment management at site for the construction activities to be carried out by them in accordance with requirements **given under section I(a) of GCC of this document**. The contractor shall continuously take special care to ensure the safety and prevention of human and equipment accidents and maintain good sanitary conditions in and around the site. All the construction work and plant operation must be carried out in the safest possible manner. The Engineer reserves the right to stop any process which, in the Engineer's opinion, is being performed dangerously. In this case the contractor must immediately adhere the requisite safety precautions and any delays attributed to the work stoppage on this account shall not affect the agreed contractual finishing dates.

The contractor shall appoint dedicated full-time Qualified Safety Officers who shall have full authority to ensure that all necessary safety precautions are observed by the Contractor's employees and sub-contractors. These appointees shall have full responsibility for the safety of all personnel within the contractor's area of the works.

34.5.2 Some of the common safety rules to be followed during working are as follows **:-**

- No body is allowed to enter at construction site without Safety Shoe.
- Never enter work area without Safety helmet & chin strap in place.
- No climbing/working allowed without proper safety belt above 2 m. height.
- Do not exceed the speed limit 25 Kmph within premises.
- No debris obstacles allowed on the roads & passages.
- Do not walk on pipelines or false ceiling.
- Maintain good Housekeeping at work site.
- No photography/ Videography allowed without permission
- All Site supervisors & engineers (including subcontractor's) must be imparted structured training on construction safety before start of the job & record to be maintained.
- Availability of qualified & trained Site Engineer at site during all working hours.
- Site Safety training to be imparted to all workers & plan to be made to cover every worker.
- Tools box talk (5-15 minutes) by supervisor prior to commencement of any job.
- All accident / incidents(Near Miss) to be reported & investigated.(formats & procedure should be finalized)
- Daily Safety Checking by Each Site Engineer along with Safety engineer.
- Weekly co-ordination meeting of all Safety engineers with BHEL safety officer.
- Monthly safety meeting with Site In-charges.
- All Safety equipment must be ISI marked & checked by Safety officer before use.
- Tag system for erection & use of scaffoldings.
- Bamboo/wooden Scaffolding material not allowed.
- LPG cylinders not allowed for gas cutting.
- Good House keeping. Separate waste bins to be used for flammable & non flammable material.
- Safety awareness programs for workers by display of boards, posters, competitions, talks etc.
- Deployment of Safety Supervisors for every 250 workers and part there of at work site.
- Display of List of First Aid trained persons.
- Testing certificates for lifting tools & tackle.
- Provision & maintenance of fire extinguishers at construction site & material stores.
- Display of emergency telephone numbers at various locations.

- For work in confined space use 24 V lamp fitting & use tools with air motors or electric tools with max. 24 V.
- For confined space entry Gas test must be done before & at regular intervals.
- Checking & tag of equipment like grinding machine, welding machine, gas cutting set etc. by supervisors before use.

Further, the contractor is required to provide proper Safety Net System wherever the hazard of fall from height is present as per instructions of BHEL Engineer at site. The safety net shall be fire resistant, duly tested and shall be of ISI mark and the nets shall be located as per site requirement to arrest or to reduce the consequences of a possible fall of persons working at different heights.

34.5.3 Contractor shall ensure following:

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

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

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

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

   In addition to above, BHEL (through its other contractor) has arranged ambulance at work site for emergency purpose, which can be utilized by contractor in case of emergency.The charges for the same will be decided mutually at site . In case , under unavoidable circumstances , if the ambulance is not available , the contractor will have to arrange for the same as under clause 34.5.3 (1).

34.5.4 The Contractor shall be fully responsible for accidents caused due to him or his agents or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries. **It may be noted that non-compliance to HSE requirements will result in penal action. In case of violations of safety requirements, the Contractor shall be liable for a penalty of Rs. 200/- for the first violation and Rs. 500/- for the subsequent violations. For serious lapses, as decided by BHEL Engineer, fines upto Rs. 5000/- at a time can be imposed.**

The amount towards penalties as above will be deducted from running bills of the Contractor. The amount so collected above will be utilized for supporting the safety activities at site. The decision of BHEL on above will be final and binding on the Contractor.

34.5.5 The contractor shall comply with following towards Social Accountability;

(a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged , the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.

(b) The contractor shall not engage Forced/Bonded Labour and shall abide by abolition of Bonded Labour System(Abolition) Act, 1976.

(c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour(Regulation & Abolition) Act,1970.

(d) The Contractor shall abide by UN convention w.r.t Human Rights and shall be liable for Discrimation/Corporal punishment for failure in meeting with relevant requirements.

(e) The Contractor shall abide the requirement of Contract Labour(Regulation & Abolition) Act,1970 for working hours.

(f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.

(g) The Contractor shall arrange potable drinking water to its employees & workers.

34.5.6 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain 300 trees in the vicinity of the project as per the available space and as per the advise of Engineers. In case no area is earmarked for tree plantation, the contractor may take up any other equivalent environment related project after due approval of the BHEL Engineer.

35.0 PRELIMINARY WORKS

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

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

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

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

35.4 The contractor shall set up longitudinal and transverse axes and two or more level bench marks accurately on TG floor. BHEL Engineer shall certify these. The

certified TG-Center lines and datum level shall be the reference for TG and all auxiliaries' erection and alignment work. The contractor shall transfer these axes to all the floors to facilitate further execution.

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

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

36.0 CIVIL WORKS, FOUNDATIONS AND GROUTING.

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

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

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

36.4 The grouting of all the equipments will be carried out by the Civil Agency . In both the cases, the the contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor.

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

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

37.0 CONSUMABLES

37.1 The contractor shall provide within finally accepted price, all consumables like all welding electrodes (including alloy steel and stainless steel), filler wires, TIG wires, all gases (inert, welding, cutting), soldering material, dye-penetrants, radiography films. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding materials hardware items etc required for temporary works such as supports, scaffoldings are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers, for temporary work, required for completion of work except those which are specifically supplied by manufacturing unit are also to be arranged by him.

37.2 All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost.

37.3 It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of consumables. Non-availability of any consumable materials or equivalent suggested by BHEL cannot be considered as reason for not attaining the required progress or for additional claim.

37.4 It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of electrodes etc before procurement of welding electrodes / TIG Filler wire. On receipt of electrodes at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number, date of expiry etc and produce test certificate for each lot / batch with correlation of batch / lot number with respective test certificate. No electrode without a valid test certificate will be used.

37.5 BHEL reserves the right to reject the use of any consumable including electrodes, gases, lubricants / special consumables if it is not found to be of the required standard / make / purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained.

37.6 Storage of all consumables including welding electrodes shall be done as per requirement / instruction of the Engineer by the contractor at his cost.

37.7 In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first subsequent bill at market value plus the departmental charges of BHEL from time to time (30% at present). Postponement of such recovery is normally not permitted. The decision of Engineer in this regard shall be final and binding on the Contractor.

37.8 All lubricants and chemicals required for cleaning, pre-commissioning, commissioning, testing, preservation and lubricants for trial runs of the equipment

shall be supplied by BHEL / BHEL's client. All services including labour and T&P will be provided by the contractor for handling, filling, emptying, refilling etc. the consumption of lubricants / chemicals shall be properly accounted for. Surplus material if any shall be properly stacked / packed and returned to stores.

37.9 Special consumables that are required for final box up like anti-seize compounds, jointing compound and sealing compound shall be provided by BHEL However the contractor shall use them to the satisfaction of BHEL Engineer.

38.0 TOOLS AND PLANTS / IMTE's

38.1 T&P being provided by BHEL to sub-contractor free of hire charges shall be shared by other subcontractors working for BHEL at site and the allotment done by BHEL Engineer shall be final and binding.

38.2 Besides the T&Ps and IMTEs being made available to contractor, free of hire charges by BHEL, all other T&Ps and IMTEs required for successful and timely execution of the work covered within the scope of this tender, shall be arranged and provided by the contractor. He should ensure that these are in good in working condition. In the event of the failure of contractor to bring necessary and sufficient T&Ps/ and IMTEs, BHEL will be at liberty to arrange the same at the risk and cost of contractor and hire charges as applicable shall be deducted from contractor's bill. Decision of BHEL in this regard shall be final and binding on contractor.

38.3 All distribution boards, connecting cables, wire ropes, hoses, pipes etc, including temporary air / water / electrical connections etc shall have to be arranged by the contractor at his own cost.

38.4 In case of non-availability of the T&Ps to be provided by BHEL due to breakdown, major overhauls, distribution pattern or any other reason, the contractor shall plan / amend / alter his activities to meet erection / commissioning targets in consultation with BHEL.

38.5 The operation of all BHEL's T&P being provided free of hire charges shall be in the scope of the contractor. The contractor shall arrange, at his own cost, trained operators, fuel and other consumables for their operation. All lubricants shall be provided by BHEL free of cost. The contractor will give the requirement well in advance.

38.6 The contractor shall engage trained and experienced operators for the operation of BHEL's T&Ps. Their skill / performance will be checked by BHEL Engineer before they are allowed to operate the same. However checking of skills by BHEL does not absolve the contractor of his responsibilities for proper and safe handling of equipment, consistent good performance of operators and regular performance evaluation of operators.

38.7 The day to day and routine maintenance of BHEL's T&Ps should be carried out by contractor as per manufacturer's / BHEL's maintenance schedule at his cost. These shall be maintained in good working condition during the entire period of use. T&Ps in defective / damaged condition shall be rectified promptly to the full satisfaction of BHEL engineer. Contractor shall maintain records for maintenance of major T&Ps that shall be made available for Inspection whenever required. In case of any lapses on the part of the contractor BHEL at

its own discretion get the servicing / repair of equipment done at the risk and cost of the contractor with BHEL overheads.

38.8 The contractor shall arrange at his cost all spares needed for upkeep of all T&Ps other than cranes and Hydraulic Test pumps supplied by BHEL. For cranes, repair / replacement of filter, batteries, self, dynamo, shall be the responsibility of the contractor. However, the charges of the replacement of the other damaged / worn out parts of BHEL cranes will be borne by BHEL, provided the damage is not due to the negligence of the contractor. However, if there are breakdowns / damages due to negligence of the contractor, the complete service / repair charges and cost of all the spares damaged with BHEL overheads shall be to the account of contractor and shall be recovered from his RA bills.

38.9 The contractor, at his own cost shall arrange all supervision and labour required for maintenance and attending breakdowns.

38.10 Increasing / shortening of the crane boom to suit work requirements shall have to be arranged by the indenting contractor at his cost. All necessary manpower tools, support, consumables, illumination etc. will have to be arranged by contractor at his cost. If required, contractor has to return the crane with original boom.

38.11 The area and infrastructure development of the area to be carried out by the customer. However in construction projects of this magnitude it is possible that all the areas / approaches may not be ready. In such cases consolidation of ground and arrangement of sleepers / sand bag filling etc for safe operation / movement of equipment including cranes / trailers etc shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable.

38.12 In the event of contractor not using and maintaining BHEL T&Ps according to BHEL's instructions. BHEL will have the right to withdraw such item without any notice and no claim in this regard shall be entertained and contractor shall be responsible for delay in execution on this account.

38.13 The contractor shall furnish regular utilization report of the BHEL T&Ps, as per requirement of BHEL.

38.14 Any loss / damage to any part of BHEL T&Ps and IMTEs shall be to the contractor's account and any expenditure on these accounts by BHEL will be recovered from the contractor's bill in case the contractor fails to make good the loss.

38.15 It shall be responsibility of the contractor to take delivery of T&Ps from stores or place of use by other contractor at project site, transport the same to site and return the same to BHEL store / place as intimated by Engineer in project site in good working conditions after use.

38.16 The contractor shall return BHEL T&Ps and IMTEs issued to him in good working condition as and when desired by BHEL (on completion or reduction of workload). If contractor delays return of T&P and IMTE, hire charges as applicable shall be levied by BHEL from time, it was requisitioned till the time of actual return. *Hire charges shall also be charged on the T&Ps and IMTEs returned in damaged / unserviceable condition to BHEL till their satisfactory repair*. T&Ps & IMTEs returned in damaged / unserviceable condition shall be

got repaired by BHEL at its own discretion and entire cost of repair with BHEL overheads shall be recovered from the contractor.

38.17 Replacement cost including BHEL overheads in respect of irreparable / completely damaged / non return of T&Ps and IMTEs shall be recovered from the contractor's running / final bills

38.18 EOT crane(s) as available in the TG hall shall be provided to the contractor. The crane may be provided with a trailing cable that has to be handled by the contractor till the charging of the down shop leads. **The contractor shall have to deploy his own operator for operating the crane under supervision of BHEL / UPRVUNL**. The running / capital maintenance of the EOT cranes is excluded from the contractor's scope. Routine maintenance like cleaning and oil topping (oil will be provided by BHEL/ UPRVUNL) will be carried out by the contractor.

38.19 200/ 250 T capacity Crawler crane will be provided by BHEL free of hire charges and on sharing basis to the contractor for handling of feed storage tank and de-aerator. The operation & maintenance of BHEL 200/250 T crane shall be carried out by BHEL. The contractor shall provide however required maintenance crew and fuel.

38.20 Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, Manila-ropes, winches and slings etc. History card and maintenance records for major T&Ps will be maintained by the contractor and will be made available to BHEL Engineer for inspection as and when required. Identification for such T&Ps will be done as per BHEL Engineer's advice.

38.21 Contractor shall ensure deployment of reliable and calibrated IMTEs (Inspection, Measuring and Test Equipment). The IMTEs shall have test/ calibration certificates from authorized/ Govt. approved / accredited agencies traceable to National / International standards. Each IMTE shall have a label indicating calibration status i.e. date of calibration, calibration agency and due date for calibration. A list of such instruments deployed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control.

38.22 Retesting / 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 IMTE so that work does not suffer when the particular instrument is sent for calibration. Also if any IMTEs 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 i.e. repeat the readings taken by that instrument, failing which BHEL may deploy IMTEs and retake the readings at contractor's cost.

38.23 BHEL shall have lien on all T&P, IMTEs & other equipment of the contractor brought to the site for the purpose of erection, testing and commissioning. BHEL shall continue to hold the lien on all such items throughout the period of contract. The contractor and/ or his Sub-contractors without the prior written approval of the Engineer shall remove no material brought to the site.

38.24 The month wise T&P deployment plan to be submitted as per format (at Annexure-D to General Conditions of Contract) is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the

contractor's responsibility to deploy the required T&P, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account.

39.0 SUPERVISORY STAFF AND WORKMEN

39.1 The contractor shall deploy all the skilled workmen like millwright fitters, welders, crane-operators, drivers, gas cutters, riggers, sarangs, masons, carpenters, electricians, helpers and instrument technicians to carry out the works as per specifications. In addition to skilled, semi-skilled and unskilled workmen required for all the works, suitable workmen required for handling and transporting of equipment from site storage to erection site, erection, testing and commissioning as contemplated under this specification shall be deployed. Only fully trained and competent men with previous experience on the job shall be employed. They shall hold valid certificates wherever necessary.

BHEL reserves the right to decide on the suitability of the workers and other personnel who will be deployed by the contractor. BHEL reserves the right to insist on removal of any employee / workman of the contractor at any time, if they find him unsuitable. The contractor shall remove him forthwith.

39.2 The supervisory staff including qualified Engineers deployed by the contractor shall ensure proper out-turn of work and discipline on the part of the labour put on the job by the contractor. They should in general see and ensure that the works are carried out in a safe and proper manner and in coordination with other labour and staff deployed directly by BHEL or other contractors of BHEL or BHEL's client / other agency.

39.3 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations / activities at site. The contractor and his personnel shall cooperate with other personnel / contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

39.4 The contractor's supervisory staff shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. The contractor shall be responsible to ensure that assembly and workmanship conforms to the dimensions and tolerances given in the drawings / documents / instructions given by BHEL Engineer from time to time.

39.5 The contractor shall deploy the necessary number of qualified and approved full time electricians at his cost to maintain his temporary electrical installation till the completion of work.

39.6 It is the responsibility of the contractor to engage his workmen in shifts or on overtime basis for achieving the targets set by BHEL and also during the period of commissioning and testing of unit. The contractor's finally accepted rates / prices shall include all these contingencies.

39.7 During the course of erection,

- If the progress is found unsatisfactory,

- If the target dates fixed from time to time for every mile stones are to be advanced / not being met,
- if it is found that the skilled workmen like fitters, operators, technicians etc deployed are not sufficient,

BHEL after giving reasonable opportunity to the contractor will induct on the work the required workmen in addition to contractor's workmen to improve the progress. The expenses so incurred will be recovered from the contractor's bills with overheads.

39.8 If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road kerbs, fence, enclosure, water pipes, cables, drains, electric / telephone poles, wire, trees or any other property or to any part of erected components, the contractor shall make the same good at his own expense. In default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses from any money due to the contractor. BHEL's decision will be final and binding.

39.9 Though every endeavor shall be made to ensure that all plant materials are supplied as per schedule. However in a job of this kind it is possible that some materials may be delayed. In order to achieve the ultimate targets, the contractor may have to augment his manpower and resources. No compensation on this account shall be admissible.

39.10 The month wise manpower deployment plan to be submitted as per format (at Annexure-C to general conditions of contract) is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the contractor's responsibility to deploy the required manpower, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account. The contractor shall identify separate persons at site for quality control and safety.

39.11 The Contractor has to ensure deployment of qualified Level-2 NDT Engineer and Welding Engineer exclusively for the welding works envisaged under the Package works.

40.0 MATERIAL HANDLING AND STORAGE

40.1 All the equipment furnished under this contract shall be received from the project stores, sheds / storage yards and transported to pre assembly area / erection site and stored in the storage spaces in a manner so that they are easily retrievable till the contractor erects them. While drawing / lifting material from BHEL / customer stores, contractor shall ensure that the balance / other materials are stacked back immediately.

40.2 While BHEL will endeavor to store / stack / identify materials properly in their open / close / semi closed / tarpaulins covered storage yard / shed, it shall be contractor's responsibility to assist BHEL in identifying materials well in time for erection. They should take the delivery of the same, following the procedure indicated by BHEL, and transport the material safely to pre-assembly yard / erection site in time, according to program.

40.3 The contractor shall take delivery of components, equipment / consumables from storage area after getting the approval of BHEL Engineer on standard indent forms.

40.4 The contractor shall identify and deploy necessary Engineers / supervisors / workmen for the above work in sufficient number as may be needed by BHEL, for areas covering their scope.

40.5 All the equipment shall be handled very carefully to prevent any damage or loss. No untested wire ropes, slings, lifting equipment, d-shackles, dog-clamps, eyebolts shall be used for unloading / handling. The equipment shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at site.

40.6 Contractor shall ensure that while lifting slings shall be put over the points indicated on the equipment or as indicated in the manufacturer's drawings. Slings / shackles of proper size shall be used for all lifting and rigging purposes. All care shall be taken to safe guard the equipment against any damage. Dragging of piping / valves should be avoided. In case of any damage the cost shall be covered from the contractor.

40.7 Approach road conditions from the stores / yards to the erection site may not be equipped and ideal for smooth transportation of the equipment. Contractor may have to be adequately prepared to transport the materials under the above circumstances without any extra cost.

40.8 Contractor shall be responsible for examining all the plant and materials issued to him and notify the Engineer immediately of any damage, shortage, discrepancy etc before they are moved out of the stores / storage area. The contractor shall be solely responsible for any shortages or damages in transit, handling, storage and erection of the equipment once received by him. As the erection work will be spread in different areas / locations of the project, contractor has to arrange sufficient number of watch / ward personal to avoid any pilferage of material. As per General Conditions of contract under provisions of clause No 29 BHEL will reserve the right to recover the cost of repair / replacement, if any, to bring back the equipment in original order, in case the equipment / material is lost / damaged while in the custody of the contractor. BHEL's decision in this regard shall be final and binding on the contractor.

40.9 The contractor shall maintain an accurate and exhaustive record, detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the engineer at any time.

40.10 All the material in the custody of contractor and stored in the open or dusty locations must be covered with suitable weather proof / fire retardant covering material wherever applicable and shall be blocked up on raised level above ground. All covering materials including blocks and sleeper shall be arranged by the contractor at his cost.

40.11 If the material belonging to the contractor are stored in area other than those earmarked for his operation the engineer will have the right to get it moved to the area earmarked for the contractor at the contractors risk and cost.

40.12 The contractor shall be responsible for making suitable indoor storage facilities to store all equipment (drawn by the contractor from BHEL / customer stores), which require indoor storage till the time of their installation. The Engineer will direct the contractor in this regard, which item in his opinion will require indoor storage, and the contractor shall comply with Engineer's decision.

40.13 The contractor shall ensure that all surplus / damaged / scrap / unused material, packing wood / containers/ special transporting frames etc are returned to BHEL at a place in project area identified by the Engineer. The contractor will maintain an account for all items received and returned to BHEL. Any shortage in returning such items shall be chargeable to the contractor except for a 5% allowable against wastage for packing wood only.

40.14 The contractor shall hand over all parts / materials remaining extra over the normal requirement with proper identification tags to the stores as directed by the concerned BHEL engineer.

40.15 The contractor shall ensure that all the packing materials and protective devices installed on equipment during transit and storage are removed before installation.

40.16 It shall be the responsibility of the contractor to keep the work / storage areas in neat, tidy and working conditions. All surplus / unusable packing and other materials shall be removed and deposited at location(s) specified by BHEL within the project premises. If required weighing of the same within the project premises will have to be carried out.

40.17 Contractor shall also ensure that for lifting rotors from the casing, only rotor lifting tackle supplied by the manufacturer is used as per the instruction given and on one side of the sling turn buckle of required size shall be used and rotor shall be lifted slowly only when it is in perfect level. Contractor shall ensure that the sling points on the rotor are as per the instructions of the manufacturer given in the drawings and he shall ensure that rubber or leather pads are given between the sling and rotor shaft to avoid any damage, scratches/ nicks on the rotor shaft. Under no circumstance shall the contractor put his slings around journal shaft or shall lift the rotor till it is fully balanced.

Contractor shall ensure that all rotors when removed from package / casing are placed over suitable stands and supported at the points as shown in the drawings. Contractor shall cover the journals of the rotors with grease and cloth, and also cover the rotor with cloth tarpaulin to avoid any damage to the rotor blades. The rotors shall be kept in a place, which is safe from falling objects and away from main passages.

40.18 For unloading, turning & lifting stator to the TG floor level and placing of stator on its foundation the contractor shall strictly comply with the instructions of the BHEL Engineers.

41.0 PRESERVATION OF COMPONENTS

41.1 After taking delivery from BHEL / customer's stores, plant materials storage shall be subjected to the following protection besides other provisions indicated in these specifications elsewhere.

Items stored outdoors shall be blocked up at least six inches (150mm) off the ground.

Motors, valves, electrical equipment, control equipment and instruments etc shall be stored indoors in a warehouse to be provided by the contractor. Motor windings shall be kept dry by use of external heat or space heaters.

Bearings and other wearing surfaces of plant materials shall be protected against corrosion and kept clean.

Insulation materials shall be stored indoors or otherwise protected against getting wet.

41.2 It shall be the responsibility of the contractor to apply preservatives / touch up paints (primer) on equipment handled and erected by him till such time of final painting. It shall be contractor's responsibility to arrange for required paints (primer), thinners, labour, scaffolding materials, cleaning materials like wire brush, emery sheets, etc, cleaning of surface and provide one coat of preservatives / paints (primer) from time to time as decided by BHEL engineer. The accepted rate shall include this work also. It is to be noted that such painting may have to be done as and when required till such time the final painting is carried out.

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

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

42.0 CLEANING OF EQUIPMENTS

42.1 The contractor shall thoroughly clean all the components before installation. The components whose surfaces are coated with protective coating and sent to site are to be thoroughly cleaned by suitable mechanical / chemical means as per the approved procedures.

42.2 Contractor shall ensure that turbine cylinders, rotors, pedestals, diaphragms, glands, packing rings, etc. shall be cleaned with kerosene, petrol, approved solvents or and carbon tetra chloride before assembly and erection of the equipment. For cleaning purposes he shall use only soft cotton cloth. Contractor shall never use cotton waste for cleaning any TG equipment. Generator and other electrical equipments before erection shall be cleaned with dry air / vacuum cleaner.

42.3 The contractor shall clean inside of all pipes and fittings from dirt, sand and loose scales, mechanically and by air blowing before being erected. All pipelines shall be thoroughly blown and / or flushed. If necessary certain pipelines may have to be cleaned by acid pickling/chemical cleaning. The procedure for the same shall be provided by BHEL. However, all chemicals and inhibitors shall be provided by BHEL free of cost. Disposal of chemical has to be carried out by the contractor at his own cost as per advice of the engineer.

43.0 ERECTION

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

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

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

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

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

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

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

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

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

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

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

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

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

43.10 Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with petrol or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

43.36 Layout of small bore piping as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines even after completion of erection or from aesthetic point of view. Contractor at no extra cost should carry this out.

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

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

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

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

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

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

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

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

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

43.44 All cabling work (system cabling i.e. cables from local control panel to system drives / instruments etc.) including laying of cable trays for oil centrifuge machine, gas drier and on load condenser tube cleaning system is in the scope of subject work.

43.45 Wherever cables are to be laid under the scope of subject work the same shall be laid in cable trays, dressed, properly glanded and terminated.

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

43.47 Certain skid mounted instruments like pressure gauge, pressure transmitters, temperature gauges, flow switches, flow indicators, etc., are received in assembled condition as integral part of equipment. Contractor shall dismantle such instruments and hand over them to BHEL for calibration. Contractor shall re-erect them in position just before commissioning of the equipment or as and when directed by BHEL

43.48 The feed storage tank will be received in 3 pieces and is to be assembled, welded and tested at site. Besides the provisions under Clause No. 38.19, all other arrangements for erection of feed storage tank and deaerator has to be made by contractor with in their finally accepted price

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

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

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

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

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

work place at all times. He may be stopped from work if he is not found in possession of the same.

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

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

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

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

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

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

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

44.11 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or other wise of the welds shall be final.

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

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

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

44.15 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. The contractor should take a note of the following,

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

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

44.16 The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by BHEL. Necessary help in conducting the UT shall however be rendered by contractor.

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

44.18 Contractor for radiography work shall use iridium-192. The geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).

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

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

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

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

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

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

44.25 Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.

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

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

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

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

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

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

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

44.33 However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.

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

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

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

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

45.0 APPLICATION OF INSULATION

45.1 All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length.

Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

46.0 TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING.

46.1 The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would include hydraulic test of condenser, land flow test, chemical cleaning, alkali flushing and water flushing of piping, , oil flushing of oil system etc. as instructed by BHEL.

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

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

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

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

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

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

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

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

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

46.5 Thermal shocks will be required during oil flushing operations. The contractor is required to make all arrangements for the same. This would include fabrication of heating tank with nozzles and requisite piping with supports. Complete erection

with pumps, tanks, electrical fittings including and other accessories is to be carried out. All material and equipment will be provided on returnable basis by BHEL.

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

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

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

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

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

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

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

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

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

46.14 The water boxes of the condenser will be tested hydraulically to 1.5 times the design pressure after its assembly at site. The arrangement of all the blanking for carrying out the hydraulic test shall be the responsibility of the contractor at no additional cost. However only the main blanking flanges with fasteners for CW

inlet and CW outlet of the condenser shall be provided by BHEL free of cost. Fabrication of blanks will be carried out by the contractor.

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

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

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

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

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

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

47.0 CONDENSER PAINTING

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

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

48.0 FINISH PAINTING

48.1 All exposed metal parts of the equipment, structure, auxiliaries, piping, and other items (covered within the scope of this contract) after installations are to be painted. Mostly the equipment / components installed are with one coat each of primer paint and synthetic enamel / heat resistant paint. However, due to aging, the same may have got deteriorated for peeled off. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL. The same will be inspected and approved by the engineer before painting.

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

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

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

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

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

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

48.8 The contractor shall ensure availability of

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

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

49.0 PROGRESS REPORTING

49.1 Contractor is required to draw mutually agreed monthly erection program in consultation with BHEL well in advance. Contractor shall ensure achievement of

the program. He shall also timely arrange for additional resources considered necessary for the same at no extra cost to BHEL

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

49.3 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report and other reports as per performa considered necessary by the Engineer.

49.4 The progress report shall indicate the progress achieved against planned, with reasons indicating delays, if any, and shall give the remedial actions which the contractor intends to take to make good the slippage or lost time, so that further works again proceed as per the original program and the slippage does not accumulate and affect the overall program.

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

50.0 DRAWING AND DOCUMENTS

50.1 The detailed drawings, specifications available with BHEL engineers will form part of this tender specification. These documents will be made available to the contractor during execution of work at site. The contractor will also ensure availability of all drawings / documents at work place.

50.2 Necessary drawings to carry out the erection work will be furnished to the contractor by BHEL on loan, which shall be returned to BHEL Engineer at site after completion of work. Contractor shall ensure safe storage and quick retrieval of these documents.

50.3 The contractor shall maintain a record of all drawings and documents available with him in a register as per format given by BHEL Engineer. Contractor shall ensure use of pertinent drawings/ data/ documents and removal of obsolete ones from work place and returning to BHEL.

50.4 The data furnished in various annexure enclosed with this tender specification are only approximate and for guidance. However, the change in the design and in the quantity may occur as is usual in any such large scale of work

50.5 Should any error or ambiguity be discovered in the specification or information the contractor shall forthwith bring the same to the notice of BHEL before commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor.

50.6 Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimension / details, without specific approval of BHEL.

51.0 INCOME TAX , SERVICE TAX AND SALES TAX ETC

51.1 TDS under Income Tax, Sales Tax, VAT etc, if any, shall be deducted at prevailing rates on gross invoice value from the running bills unless Exemption Certificate from appropriate Authority / Authorities is furnished

51.2 Price quoted shall be inclusive of all taxes except service tax. The service tax, as legally leviable & payable by the contractor under the provisions of applicable law/act, shall be paid by BHEL as per contractor's bill. However, contractor shall have to submit proof of service tax deposited by them immediately after the deposit but not later than the next bill submitted after the due date of deposit. The contractor shall furnish proof of Service Tax registration with Central Excise Division covering the services covered under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by contractor on BHEL for this project The contractor shall obtain prior approval of BHEL before billing the service tax amount.

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 used for providing the output service and service tax paid on input service can be taken credit of against the service tax payable on output service. As such, while offering the rates, the contractors may take into account the benefit of above provisions as the cost of input to contractors will be the cost net of excise duty and service tax and adjust their offer price accordingly to make it more competitive.

51.3 In VAT applicable States, "Tax Invoice" if required under the relevant State VAT law shall be submitted alongwith other compliances as per concerned VAT Act.

51.4 Contractor shall get his organization registered with concerned sales tax/VAT authorities within 15 days of award of this contract, if applicable. The delay on this account and delay in bringing the material shall be to contractor's account and no extension of time shall be allowed on this account. The sales tax/VAT registration for this contractor shall be forwarded to BHEL within 30 days from the date of LOI. In case the contractor is already registered for sales tax/VAT with Govt. Authorities he must quote his registration no, while submitting their tender.

51.5 Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax Authorities, for bringing his materials, plants and equipment at site for the execution of the work under this contract. No road permit shall be issued by BHEL for contractor's materials/equipments.

52.0 EXTRA WORK

52.1 BHEL may consider for payment of extra works on man hour basis @ Rs.30/- (Rupees thirty only) per man hour only for such of those works which:

a Require major revamping or rework and which are totally unusual to normal erection work.

b Require rectification / modification for improvement in the design during commissioning,

c Requiring fresh fabrication of components in place of rejected / replaced components

52.2 The rates indicated as above, shall include over time, if any, consumables, supervision, use of tools and tackles and other site expenses and incidentals.

52.3 The extra works, if any, shall be carried out by a separate gang, which will be identified for certification of man-hours. This gang will not be utilized for any other work during the period that they are engaged in the extra-work. Logbook should be maintained and should be signed jointly by the contractor's representative and BHEL Engineer on day-to-day basis. However, signing of the logbook does not necessarily mean acceptance of the extra works, which would be identified by Engineer, whether work is covered in one of the above categories. Only those works and man-hours that are certified by the BHEL Engineer-in-charge will be considered for payment. The decision of BHEL in this regard shall be final and binding on the contractor.

53.0 PRICE VARIATION

53.1

The rates quoted for scope of work as defined in this tender are subject to price variation provisions as per following formula:

$$P1 = \frac{0.75 \times P0\ (F1 - F0)}{F0}$$

P_1 = Increase / decrease in billed amount (variation) for the particular month of billing.

P_0 = Gross billed amount for the month as per contract provisions.

F_1 = All India CPI published by Labour bureau, Simla, Govt. of India, for Industrial workers (Base 2001 =100) applicable for the month under consideration i.e. for which bill has been raised.

F_0 = All India CPI published by Labour bureau, Simla, Govt. of India, for Industrial workers (Base 2001 =100) applicable for the month of opening of technical bid.

53.2 The contractor will be required to raise the bills for price variation payments on a monthly basis irrespective of the facts whether any increase or decrease in CPI. Price variation as per above formula will be calculated and paid/deducted on the total contract value (excluding payments towards extra works and over run, if any) on month-to-month basis. BHEL however reserves the right to freeze variation for that much of duration of delays, from time to time, which are entirely attributable to the contractor. **Average of applicable price indexes paid shall be taken as index for PVC for final 5 % amount.**

53.3 With the provision of price variation as above NO CLAIM / COMPENSATION on account of any increase whatsoever, (irrespective of whether variation are steep / unanticipated or not compensated by the above escalation provisions in full towards minimum wages, consumables, electrodes, gases or any other item /

reason) will be payable during the entire period of execution including extended period, if any.

54.0 RATE SCHEDULE

54.1 Contractor shall fully understand equipment description and scope of work before quoting. The scope of work and responsibility of the contractor as mentioned under these specifications shall be covered within the quoted rates.

54.2 The tenderer shall quote the rates as per the rate schedule only, in part II price bid (Original). Conditional price bids or price bids with any deviation / clarification etc. are liable to be rejected. No cutting / erasing / over writing shall be done.

55.0 INSTRUCTIONS TO TENDERER

55.1 Offers received without data / information required to be submitted under tender clauses-11.1 to 11.11 are liable to be rejected. All these data / information should be duly supported by documentary evidences (Refer note below clause-11)

55.2 No deviations to the tender conditions will normally be accepted.

55.3 The tenderer is advised to actually visit the site and fully acquaint themselves with site conditions, location of stores, transportation routes, quantum of work etc. before quoting their rates for this work. BHEL shall not be responsible in any way for non-familiarization of site conditions. Once the tenderer has quoted for the work, it is implied that he has ascertained various site condition and NO CLAIM whatsoever will be entertained by BHEL on any such account.

55.4 The contractor in the event of this work awarded to him, shall establish a site office at site and keep posted an authorized responsible officer who should hold a valid power of attorney for the purpose of the contract. Any order or instruction of the Engineer or his duly authorized representative shall be communicated to the contractor's representative at site office and the same will be deemed to have been communicated to the contractor at his legal address.

55.5 LIQUIDATED DAMAGES (LD)

For delay in completion of work attributable to the contractor, the LD shall be applicable at the rate of ½% of the contract value per week of delay or part thereof limited to a ceiling of 10% of the contract value as mentioned under clause no.25.5 of the GCC of the tender.

55.6 SECURITY DEPOSIT

The contractor shall submit Security Deposit within 15 days from the date of issue of LOI as per clause no. 16.2 of the General Conditions of Contract (GCC). In case the contractor opts to furnish Bank Guarantee as a part of Security Deposit, the BG shall be issued as per the Performa enclosed as per Annexure-H of the GCC and also that the BG should be issued preferably through any of the Member Banks listed in GCC;

For BG through any other Nationalized Bank (Not covered in the list of Member Banks of GCC), the discretion of its acceptance shall lie solely with BHEL.

55.7 OTHERS

55.7.1 In case of any contradiction between General Conditions of Contract (GCC) and Special Conditions of Contract (SCC), the latter shall prevail.

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

SECTION - III B

SPECIAL CONDITIONS OF CONTRACT

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SECTION - III B

SPECIAL CONDITIONS OF CONTRACT

56.0 SCOPE OF WORK

56.1 BHEL has been awarded the work of Design, Manufacture, supply, installation, erection & commissioning of BTG package of 2x250 MW units at HARDUAGANJ Ext II)Units 8 & 9 , HARDUAGANJ , ALIGARH by UPRVUNL. The equipment consists of boiler, Electro-static precipitator, Fans, milling systems, steam turbines, generators, boilers feed pumps, condensate extraction pumps and piping along with the associated auxiliary supports and controls.

The scope of work under this tender consists of

- taking delivery of the Turbo-generator materials (consisting of condenser, turbine, generator along with there rotating & static auxiliaries like BFPs, CEPs, De-aerator, CST, etc from the project storage yard / stores / sheds **(some of which is outside the plant area)** to erection site (approximately 3 to 5 Km),
- Shifting of Stator of Unit -8 ,9 from present location near unloading bay to under hook for shifting to Foundation
- Their preservation, safe keeping, watch and ward.
- Checking, dressing, chipping and leveling of foundations.
- Pre-assembly, erection, alignment of various equipment, machining and grouting.
- Welding, heat treatment, radiography and other non-destructive tests wherever required
- Hydraulic testing, air leak test, and other pre commissioning tests,
- Insulation and finish painting including supply of paints etc.,
- Cleaning of Oil System
- Steam blowing including erection and dismantling of all temporary piping, valves etc. required for above operations and other commissioning activities including post commissioning operations and stabilization of the unit.
- Unit trial operation, resolving any deficiencies observed and handing over of 2x250 MW units at HARDUAGANJ Ext) Units 8 & 9, HARDUAGANJ , ALIGARH

56.2 The contractor has to provide the following services exclusively for BHEL within the quoted price :

a) Skilled computer operator – 18 manmonths

b) Skilled worker - 36 manmonths

c) UnSkilled worker - 54 manmonths

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

In case contractor fails to provide above-mentioned manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man months as per above provision, fully or partly; recovery at the rate of the prevailing minimum wages at HARDUAGANJ for the categories given plus 10% will be made from the final bill of the contractor.

The scope of work will also include providing qualified Supervisors for direct supervision of various works other than the scope covered under this tender. These qualified Supervisors shall be provided for 18 (EIGHTEEN) man-months as per site conditions. The supervisors shall possess a minimum qualification of a mechanical / electrical engineering diploma. They shall be deployed in all areas covered under various specifications as well as other related areas as may be deemed essential based upon work requirements, though not specified. They shall be guided by BHEL Engineers to ensure smooth work progress as and when /where required /deployed. No separate payment shall be paid for providing the services as per this clause. The contractor shall provide these free of cost services within the quoted rates as per Rate Schedule.

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

56.3 Major equipment to be installed, tested and commissioned under this specification is given below. However, changes in design may occur as is usual in any such large scale work for which no compensation will be payable and contractor shall complete the entire work as detailed in tender specifications within finally accepted rates / prices.

(A) CONDENSER [ANNEXURE – III – ITEM-AA (A)]

Condenser complete with all accessories such as

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

(B) STEAM TURBINE [ANNEXURE – III – ITEM-AA (B)]

- High Pressure, intermediate pressure and low pressure steam turbines complete with sole plates, foundation holding down bolts, bearing, bearing pedestals, rotors, couplings, main oil pumps, steam gland seals, hydraulic turning gear and hand barring gear.
- Combined main steam stop and control valves, combined reheat stop and control valves, steam strainers (including its housing & blanking arrangement) for main and reheat steam lines etc., LP bypass stop and control valves along with their servomotors necessary supports for Integral piping and secondary structure if required.
- Cold reheat and extraction NRV along with their servomotors, necessary supports and secondary structure if required.
- Complete Installation of necessary blanking to protect the valves and turbine internals during hydraulic testing and steam blowing. If required CRH NRV may have to be dismantled and replace with a spool during steam blowing. It will be re-installed after completion of steam blowing.
- **Complete High Pressure governing system** for the turbine including governing control rack, LP bypass control, rack, valve test devices and racks, turbine gland sealing system complete with converters, associated piping, valves and fittings, specialties, fire protection valves and devices, hangers and supports to make the system complete in all respects.
- Complete cross around piping along with their supports from IP turbine to LP turbine.
- Complete extraction piping along with their supports and protective covers from LP turbine to condenser dome walls.

(C) GENERATOR [ANNEXURE – III – ITEM-AA (C)]

- Generators complete with its auxiliary systems.
- **The Generator stator for Unit-8 will have to be shifted / dragged from its present location to under the EOT Hook for lifting .The Generator stator for Unit-9 is planned to be unloaded using EOT cranes. Contractor has to interact with the transporters for the same if required. However, in case the T G bay is not ready, the generator for Unit – 9 will have to be dragged as in case of Unit – 8 and will be paid as per Sl. No. 6 of the Rate Schedule.**
- Installation of hydrogen and air coolers.
- Insertion of rotor, levelling, alignment & coupling with LPR.
- Erection of Bushings.
- Brush less excitation system along with PMG, placement, levelling, centring and coupling with generator rotor.
- End shields, Shaft seals, gas coolers, terminal bushings, connected piping, valves, fittings, hangers and supports etc.

(D) STATIC AUXILLIARIES [ANNEXURE – III – ITEM-AA (D)]

- Flash tanks with drains & vents.

- Deaerator & feed storage tank (in three pieces), complete with ladders platform and other accessories.
- Condensate storage tank.
- Drain coolers along with fittings, piping, steam traps and gland steam condensers and air exhausters with motor and fittings, associated piping, hangers and supports etc. to make the system complete in all respects.
- LP and HP heaters, fittings, group protection device, stand pipes along with fittings including gauge glasses for level indication, safety valves etc. to make the equipment complete in all respects.
- RE Joints along with in built CW pipes, flanges and tie rods and spool pieces, H&S etc. to make system complete in all respect.
- Suction strainers for boiler feed and condensate extraction pumps along with supports and other fixtures.
- Turbine oil coolers, gland steam condenser, drain coolers, seal oil coolers, steam jet main ejectors, along with stand pipes and fittings including gauge glasses for level indication, safety valves etc. to make the equipment complete in all respects.
- Oil strippers, strainers, oil injectors and duplex oil filters.
- Main oil, drain oil and dirty oil tanks along with fittings including gauge glasses for level indication, to make the equipment complete in all respects.
- Coolers , Tank , Filters etc of Control Fluid System
- Hydraulic coupling, working oil and lubricating oil coolers of Boiler feed pumps.
- Seal oil storage tank, seal oil unit, pre-chambers, gauge glasses along with stand pipes, gauge glasses for level indication etc. etc. to make the system complete in all respects.
- Hydrogen cooling system, nitrogen and carbon dioxide systems including H_2 dryers, gas control units and gas stands, racks and distributors to make the system complete in all respects.
- Exciter air cooler.
- **Central lube oil storage & purifying system** consisting of clean oil storage tank, dirty oil storage tank, central oil purifier, dirty & clean oil transfer pumps, drain oil return pumps, oil unloading vessel & interconnecting piping.

(E) ROTATING AUXILLIARIES [ANNEXURE – III – ITEM-AA (E)]

- AC motor driven boiler feed pumps mounted on common frames, hydraulic couplings, and BFP motors, BFP booster pumps, working oil and lube oil coolers including integral piping.
- AC Motor driven condensate extraction pumps complete with associated motor and its accessories including integral piping.

- Air evacuation pumps, including priming pumps for maintaining condenser vacuum, along with motors and its accessories, to make the equipments complete in all respects.
- A.C. and DC motor driven lubricating oil pumps including DC motors starters along with resistance box.
- AC & DC motor driven jacking oil pumps including DC motors starters along with resistance box.
- Unit oil centrifuging and purification equipment machines.
- Seal oil pumps with drives and fittings to make the system complete in all respects.
- Oil vapour and gland steam exhausters.
- Gas Driers.
- Pumps of Control Fluid System
- HP/LP dozing skids. Accessories
- Condenser on load tube cleaning system with drives and fittings to make the system complete in all respects.

(F) PIPING [ANNEXURE – IV – ITEM-A]

Major PIPING SYSTEMS including LP Piping systems to be erected, tested and commissioned under this specification are given below. Indicative weights of **some of the major items are as per Annexure-IV**. Bidders are required to quote rate in per metric tonne for entire work as per tender specification for piping systems as per item no. 2 and 3 of rate schedule.

INTEGRAL & SYSTEM PIPING (ANNEXURE – IV-ITEM-A)

i. INTEGRAL PIPING SYSTEMS

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

ii. GENERATOR PIPING

- Seal oil piping.
- H_2 & CO_2 gas piping.

- H_2 coolers and exciter cooler ACW piping

iii. TG- CYCLE PIPING

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

iv. MISCELLANOUS PIPING

- HP/LP dosing skid piping including dressing drains to neutralizing pit.
- Impulse piping up to and including first battery of root valves.

V. LP PIPING [ANNEXURE – IV – ITEM-B]

- CW Piping from ‘A’ row to condenser.
- ACW piping from header in TG area to TG Aux.
- Condenser air evacuation piping through vacuum pumps and steam jet air ejectors.
- Service and Instrument Air Piping from header in TG area.

- Misc. drains up to pits & vents to return to CST / atmosphere.
- DM water make-up line to condenser.

NOTES:-:-

a) All the above systems of piping include the erection of pipes, bends, elbows, valves, fittings, impulse piping up to and including first root valve(s), sampling lines, drains, hangers and supports and other accessories so as to make the system complete in all respects.

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

c) The equipment and piping systems indicated above are only major items and does not cover all the equipment / piping system to be erected / commissioned. Contractors are however, required to erect / commission within the price quoted by them, all connected equipment / system shown in manufacturer's drawings / other documents which may be necessary for erection completion and overall commissioning of TG set.

ADDITIONAL PLATFORM / STRUCTURES [ANNEXURE –IV – ITEM-C]

Additional platforms and approaches wherever required by the engineer to facilitate operation are to be fabricated and installed. Bidders are required to quote rate in Rs per MT against ITEM NO.-4 of RATE SCHEDULE for fabrication & erection of such platforms & approaches. This does not include those of de-aerator and FST. These are covered under the erection of static auxiliaries.

INSULATION [ANNEXURE – IV – ITEM-D]

All piping and equipment, as per requirement / drawings are to be thermally insulated with bonded / unbounded mineral wool /LRB mineral wool and to be covered with aluminum cladding. Bidders are required to quote rate in Rs per MT against ITEM NO.-5 of RATE SCHEDULE for entire insulation work. **Only spray insulation wherever applicable is not covered in this scope of work.**

56.4 Terminal points and Exclusions as applicable to this specification have been **given in Annexure I & II respectively.**

Approx. weight of major components has been indicated in Annexure III

The contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above system and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted rates. The contractor undertakes to erect / commission actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually erected at site and payments will also be regulated for the same. **However, in case of overall reduction in contract value beyond 30%, the contractor will be eligible for compensation as per the following provision:**

"The actual executed value shall be raised by 10 % subject to the condition that the total value of work executed plus increase as above shall be limited to 70 % of the awarded contract value"

Contractors shall take above into account while quoting the unit rates quoted as per Rate Schedule so as to take care of such variation during execution stage.

57.0 FACILITIES TO BE PROVIDED BY BHEL/CONTRACTOR

57.1 BHEL shall provide free of charge limited open space, for office & storage shed, as and where made available by M/s UPRVNL. It is the responsibility of the contractor to construct sheds, provide all utilities and dismantle and clear the site after completion of work or as and when required, as a part of his scope of work.

57.2 BHEL shall provide limited open space for labour colony near the plant free of rental charge. The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

Electricity will be provided at one point on chargeable basis. Water will be provided at one point on free of cost basis. Meter for electricity will have to be provided by the Contractor at his own cost.

57.3 **Construction power, for construction purposes will be provided free of cost** at one point near erection site (at a distance upto 500 meters) . The contractor shall submit to the Engineer his electrical power requirements. Further distribution of power shall be done by contractor at his cost. All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply

NOTES:

- The contractor will be provided construction power free of charge.
- They will however ensure that there is no wastage. Periodical audits will be held to ensure that these resources are being optimally used. For this the contractor has to provide an energy meter at his end .
- In case any wastage is observed bhel reserves the right to recover any charges / penality as deemed fit.
- Contractor will have to provide proper insulated cables for power distribution and joints, if any, will be done with proper jointing kits .

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57.4 **Water for construction purposes shall be provided free of charge** at a one point each for Boiler within erection site. Contractor shall arrange further distribution of water for construction purposes.

57.5 Permanent lighting inside the powerhouse will be provided at a later stage. Till such time such arrangements are made, the contractor at his cost should arrange for temporary lighting in and around his work area. **Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc. within finally accepted rates.**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

57.11 Adequate lighting facilities such as floodlights, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc. Within finally accepted rates.

57.12 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed, as per instructions of BHEL, by the contractor at

his cost. In the event of his failure to do so, the Engineer will get it done and expanses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.

58.0 TIME SCHEDULE

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

58.2 **Entire work as detailed in the tender specifications shall be completed within 18 months from the Zero date** as per programme / milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL commitments to the customer as indicated from time to time.

58.3 The various milestones as per present status of the contract with Customer are as under:

MILE STONES	MONTHS
a) Erection Start	ZERO
b) Box – up for oil flushing	EIGHT
c) Oil Flushing Completion.	TEN
d) Barring Gear	ELEVEN
e) Rolling & Synchronising	TWELVE
f) Trial operation & handing over	FOURTEEN

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

Note:

1. Contractor has to mobilise all required resources including manpower to achieve schedule given from time to time for which no compensation will be payable. However in case of contractor discharges his contractual responsibility even before schedule contract period, he will be allowed to wind up his set up without any financial implications on either side.
2. **In order to meet the Customer schedule , the Contractor may have to mobilize additional resources to compress the schedule upto 1 month within the quoted price.**
3. **There shall be three shifts working for the execution of awarded contract.** It is the responsibility of the contractor to engage his workmen to execute the awarded scope of work in three shifts basis. The contractor may have to organize his work on overtime basis also for achieving the targets set

by BHEL and also during the period of commissioning and testing of unit. The contractor's finally accepted rates / prices shall include all these contingencies within finally awarded rates / prices of this contract.

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

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

59.0 OVER RUN

59.1 In case due to reasons not attributable to the contractor, the work gets delayed and the scheduled completion gets extended, the contractor shall not be entitled for any over run compensation for a period of first 3 (THREE) months after the contractual completion date. In case the scheduled completion time gets extended beyond 3 (THREE) months as stated above, the contractor shall be considered for payment of fixed over run charges, @ Rs.50, 000/- per month (Rupees Fifty thousand only) on receipt of advance notice intending to claim over run and on fulfillment of following conditions: -

1) The reasons for delay in completion of work are not attributable to contractor but however subject to the provisions of clause – 31.

2) Contractor achieves the targets fixed during the over run period.

59.2 Once the claim of over run charges is admitted no other compensation whatsoever (like for delays in receipt of materials, availability of fronts etc.) will be entertained.

59.3 The contractor shall maintain sufficient workforce and other resources required for completion of the job expeditiously for the entire contractual period including total extended period.

60.0 TERMS OF PAYMENT

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

60.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices and ***payment shall be released within 30 days from the receipt of Bill complete in all respect***.

60.3 Subject to any deduction, which BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for

payment as explained hereunder.

(A) PROGESSIVE PAYMENT ON PRORATA BASIS

(AA) An amount limited to **1.0 % of** the awarded contract value shall be payable in **one or more installments**, solely at the discretion of Construction Manager/ BHEL at different stages of the contract execution to facilitate resource augmentation or to meet any exigency of work. In case of its non-utilization 'OR' its part utilization, the entire/balance payment against this category shall be released along with commissioning of STG.

(AB) PROGESSIVE PAYMENT ON PRORATA BASIS

84% of Lump sum price (item No.1 of rate schedule)

(Applicable on items covered under ANNEXURE – III)

1.	CONDENSER	2 X 8%
2.	TURBINE	2 X 12%
3.	GENERATOR	2 X 8%
4.	STATIC AUXILIARIES	2 X 6%
5.	ROTATING AUXILIARIES	2 X 7.5%
6.	CENTRAL LUB OIL SYSTEM	1%

(AC) 84% of UNIT RATE (item No.2 & 3 of rate schedule)

(Applicable on items covered under ANNEXURE – IV ITEM A & B)

1.	On transportation, pre assembly wherever applicable, placement in position and rough alignment.	30 %
2.	On completion of alignment / fastening / welding / grouting along with proper supports.	40 %
3.	On completion of radiography / NDT / stress relieving / other quality checks.	10 %
4.	On system completion	4 %

(AD) 84% of UNIT RATE (item No. 4 of rate schedule)

(Applicable on items covered under ANNEXURE – IV ITEM C)

1.	On transportation and fabrication	50%
2.	On completion of erection alignment / fastening / welding / grouting along with proper supports.	34%

(AE) 84% of UNIT RATE (item No. 5 of rate schedule)

(Applicable on items covered under ANNEXURE – IV ITEM D)

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

(AF) 84% of UNIT RATE (item No. 6 of rate schedule)

1.	On completion of shifting of Stator to under Crane Hook	84%

NOTES :

1. Further break-up of above terms of payment, if required can be carried out at site entirely at the discretion of BHEL.
2. The above break up is only for payment purposes and does not cover all equipment in the scope of the subject work. The total scope of work shall be as detailed in the tender specification.
3. Pro-rata payments shall be made every month in proportion to the work carried out by the contractor during the month, which shall be measured on the basis of percentages fixed above. The engineer shall carry out the assessment of the work for payment within the above percentages and it shall be final and binding on contractor. However, further percentage break up for payment against above clauses, will be mutually discussed and finalised at site.

B PRE-COMMISSIONING & COMMISSIONING (8% of CV)

1.	Completion of Detergent Cleaning of pre-boiler system.	2 x 0.5%
2.	Completion of Oil flushing.	2 x 0.5%
3.	Completion of Generator gas tightness test	2 x 0.5%
4.	Completion of Barring Gear	2 x 0.5%

5.	Completion of Steam rolling and synchronising	2 x 1%
6.	Completion of Trial operation	2 x 1%

NOTE:
If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site incharge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone / commissioning activity.

C **PAINTING: 2 % (1 % for each unit) Payable on prorata basis for PAINTING**

D 2.5% (1.25 % for each unit) of contract value will be payable on handing over of the unit to BHEL's Customer or 3 months after contractor has discharged his responsibilities as stipulated in this contract, whichever is earlier, if delay in handing over is not attributable to contractor. The unit shall be considered as handed over on completion of trial operation.

E **The balance 2.5% CV shall be payable on completion of all pending work, rework wherever required, area cleaning, reconciliation of materials and fulfillment of contractual obligations.**

NOTE:
Payments at D & E shall be released after adjustment of the CV based on actual work carried out.

ANNEXURE-I

TERMINAL POINTS

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

ANNEXURE – II

EXCLUSIONS

1. All civil works other than dressing and chipping of foundation surfaces, fixing of supports and hangers in trenches, walls and Grouting of TG and BFP

2. All cabling work other than those supplied by BHEL with the equipment.

3. Complete control and instrumentation work other than those specifically included in this specification.

4. All AC & DC motor starters, switchgears and associated controls center unless otherwise specifically mentioned in the specification.

5. Application of spray insulation for steam turbine and other equipment.

6. Supply of lubricants for TG set.

7. Supply of chemicals required for chemical cleaning.

8. Supply of H2 and CO2 gases for generator filling.

9. Supply of all shims and gaskets, which go finally as part of equipment.

ANNEXURE-III

TENTATIVE WEIGHT SCHEDULE

Weight per Unit (MT)

	SUMMARY OF WEIGHTS	NET WEIGHT
AA	**TURBINE , GENERATOR & AUXILIARIES**	
A	CONDENSER	359
B	TURBINE	520
C	GENERATOR	350
D	STATIC AUXILIARIES	460
E	ROTATING AUX.	199
	TOTAL (FOR ONE UNIT)	**1888**

FOR DETAILS OF WEIGHTS OF ABOVE SYSTEM REFER ANNEXURE IIIA .

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
A	**TURBINE PACKAGE**					
1	501	SOLE PLATE PEDESTAL ANCHOR	3400X1200X800	1	2310	2310
2	503	BASE PLATE ASSEMBLY	4500X1400X1200	1	3716	3716
3	504	BASE PLATE ASSEMBLY	2300X1250X600	1	2360	2360
4	505	BASE PLATE L.P.CASING	2300X2075X981	1	2230	2230
5	507	LP OUTER CASING PARTS	7060X1480X2760	1	8070	8070
6	508	LP OUTER CASING PARTS	7060X1480X2760	1	8070	8070
7	509	LPC OUTER CASING PARTS	4570X3230X980	1	2455	2455
8	510	LPC OUTER CASING PARTS	4570X3230X980	1	2455	2455
9	511/1	COMPONENTS OF LP CASING UPPER PART	3500X300X300	1	405	405
10	511/2	L.P OUTER CASING PARTS	3450X1000X1100	1	478	478
11	512	ASSEMBLY DEVICES	900X700X550	1	100	100
12	513	INSPECTION SHAFT FOR IPC	3300X700X700	1	575	575
13	514	VALVE SUPPORT FOR HP OVERHAUL	1000X1000X400	1	690	690
14	515	COMPONENTS OF ASSY.FIXTURE FOR HPT	3800X2500X1200	1	6394	6394
15	516	COMPONENTS OF ASSEMBLY FIXTURE OF HPT	2200X1200X850	1	1511	1511
16	517	COMPONENTS OF ASSY.FIXTURE FOR HPT	3300X1800X1210	1	2852	2852
17	518	COMPONENTS OF ASSEMBLY FIXTURE FOR	5010X4000X120	1	2540	2540
18	519	HP-IP BREARING PEDESTAL ASSLY.	4080X2005X2126	1	12100	12100
19	520/1	HP/IP BRG.PED.PARTS	1000X600X600	1	338	338
20	520/2	HP/IP BRG.PED.PARTS	500X200X150	1	12	12
21	521	AUXILIARIES OF LP TURBINE	3000X1300X1000	1	1710	1710
22	522	AUXILIARIES OF LP TURBINE	2000X1000X1825	1	1142	1142
23	523	AUXILIARIES OF LP TURBINE	2000X1000X1825	1	1142	1142
24	524	LP JOINT COVERING	2300X1800X940	1	841	841
25	525	ASSEMBLY TOOLS	1900X1000X890	1	510	510
26	526	CAP(SPRING SUPPORT)	825X500X400	1	300	300
27	527	CAP(SPRING SUPPORT)	825X500X400	1	300	300
28	528	CAP (COMPEN.ASSY)	3240X1740X1340	1	2800	2800
29	529	CAP (COMPEN.ASSY)	3240X1740X1340	1	3000	3000
30	530	CAP(OBLIQUE REDUCER ASSLY)	1400X1400X1200	1	340	340
31	531	CAP (MITRE BEND ASSY)	1550X1550X1300	1	435	435
32	532	CAP (COMPEN.ASSY)	3240X1740X1340	1	3000	3000
33	534	CAP (MAN-HOLE ASSLY)	1500X1600X1100	1	550	550
34	535	CAP (MAN-HOLE ASSLY)	1500X1600X1100	1	550	550
35	536	CAP(MITRE BEND ASSY)	1550X1550X1300	1	435	435
36	537	CAP (MITRE BEND ASSY)	1550X1550X1300	1	435	435
37	538	CAP (PIPE ASSLY)	2000X1100X1200	1	455	455
38	539	CAP (MITRE BEND ASSY)	1550X1550X1300	1	435	435

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
39	541	LONGITUDINAL GIRDER (LEFT)	6800X1820X1570	1	15107	15107
40	542	LONGITUDINAL GIRDER (RIGHT)	6800X1820X1570	1	15107	15107
41	543	LP FRONT WALL (TS)	6820X3750X910	1	9878	9878
42	544	LP FRONT WALL (GS)	6820X3750X910	1	9878	9878
43	545/1	LP SHAFT SEALING FRONT	1800X1700X740	1	1801	1801
44	545/2	LP SHAFT SEAL COMPENSATOR ASSLY.(TS)	1440X1420X520	1	1351	1351
45	546/1	LP SHAFT SEALING (REAR)	1800X1700X740	1	1801	1801
46	546/2	LP SHAFT SEAL COMPENSATOR ASSLY.(GS)	1440X1420X520	1	1351	1351
47	550/1	LP CASING ASSEMBLY (FASTENERS)	1800X1700X740	1	2190	2190
48	550/2	LP CASING ASSEMBLY (PARTS)	3760X2060X860	1	4511	4511
49	550/3	LP CASING ASSEMBLY (PARTS)	450X450X250	1	65	65
50	551	EXTRACTION PIPE LINE (LPC)	2600X1100X700	1	437	437
51	552	EXTRACTION PIPE LINE (LPC)	1400X1300X700	1	176	176
52	553	EXTRACTION PIPE LINE (LPC)	1400X1300X700	1	176	176
53	554	EXTRACTION PIPE LINE (LPC)	2600X1100X700	1	437	437
54	555	EXTRACTION PIPE LINE (LPC)	1650X800X450	1	320	320
55	556	EXTRACTION PIPE LINE (LPC)	2700X1200X750	1	375	375
56	557	EXTRACTION PIPE LINE (LPC)	1100X850X850	1	226	226
57	558	EXTRACTION PIPE LINE (LPC)	2700X1750X1100	1	390	390
58	560	EXTRACTION PIPE LINE (LPC)	1550X1450X900	1	380	380
59	561	EXTRACTION PIPE LINE(LPC)	2000X600X600	1	235	235
60	562	L.P. EXTRACTION PIPE SHEATHING	2600X2000X1400	1	929	929
61	563/1	INNER GUIDE PLATE OF DIFFUSER (TS)	2600X2400X1000	1	1334	1334
62	563/2	INNER GUIDE PLATE OF DIFFUSER (GS)	2600X2400X1000	1	1334	1334
63	564	DIFFUSER (TS)	4880X1730X2340	1	3630	3630
64	565	DIFFUSER (GS)	4880X1730X2340	1	3630	3630
65	566	AUXILIARIES OF I.P. TURBINE	1050X480X550	1	320	320
66	567	AUXILIARIES OF I.P. TURBINE	1100X500X650	1	204	204
67	568	AUXILIARIES OF I.P. TURBINE	1100X500X650	1	204	204
68	569	LP-GEN. PEDESTAL ASSEMBLY	3220X2285X2075	1	9300	9300
69	570	IP-LP PEDESTAL ASSEMBLY	3700X1860X2100	1	13500	13500
70	574	LP INNER OUTER CASING (U/H)	6720X3150X2325	1	20800	20800
71	575/1	LP INNER OUTER CASING (L/H) & LP INNER	6750X3500X2350	1	29207	29207
72	575/2	LP INNER CASING ASSY.FASTENERS	1800X1700X740	1	1300	1300
73	576	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000	1	10800	10800
74	577	STEAM INLET PIPE (LPT) STEAM INLET PIPE	2700X1300X900	1	512	512
75	578	L.P. ROTOR	7210X3300X3350	1	58277	58277
76	579	BEARING PEDESTAL ARRANGT.PARTS	1800X900X800	1	850	850
77	581	STUD HEATING DEVICE AND BREECH NUT	1500X1200X250	1	190	190
78	582	GROMMET SLINGS	1500X1500X350	1	230	230

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
79	583	IP TURBINE	4860X3753X3210	1	80000	80000
80	584	HP TURBINE	5060X3100X2900	1	54000	54000
81	585	HP INLET ASSEMBLY	450X450X200	1	20	20
82	586	H.P.EXHAUST ASSEMBLY	1625X1335X675	1	1187	1187
83	587	HPT RELATED PARTS	1000X1000X500	1	120	120
84	588/1	HP FRONT BEARING PEDESTAL	3500X3000X2050	1	11228	11228
85	588/2	HP FRONT BRG. PEDESTAL PARTS	1800X1700X1000	1	767	767
86	589	I.P TURBINE PARTS	700X700X500	1	250	250
87	591	RATING, COLLABORATION AND MONOGRAM	850X550X150	1	25	25
88	593	OIL FLUSHING AND PRESSURE TEST DEVICE	750X400X550	1	102	102
89	594	SUPPORT FOR IV VALVE	1500X1000X750	1	330	330
90	600	STEAM BLOWING & HYD. TEST DEV.	2900X2100X1140	1	2000	2000
91	602	TOOLS AND PACKING DEVICES	1750X1200X980	1	384	384
92	606	ASSEMBLY DEVICE FOR VALVES	920X1000X450	1	123	123
93	609/1	ESV & CV CASING WITH VALVES	3000X3000X1900	1	8500	8500
94	609/2	ESV & CV CASING WITH VALVES ESV & CV	3000X3000X1900	1	8500	8500
95	610/1	IV & CV CASING WITH VALVES.	4500X3500X2600	1	17500	17500
96	610/2	IV & CV CASING WITH VALVES.	4500X3500X2600	1	17500	17500
97	709	HOUSING FOR MS STRAINER	1700X1025X900	1	3000	3000
98	710	HOUSING FOR M.S STRAINER	1725X1250X730	1	3000	3000
99	711	STEAM STRAINER ASSEMBLY DEVICE MS &	2140X1400X500	1	552	552
100	714	HOUSING FOR HRH STEAM STRAINER	2200X1450X1100	1	3450	3450
101	715	HOUSING FOR HRH STEAM STRAINER	2200X1450X1100	1	3450	3450
102	716	STEAM STRAINER (MS)	1100X700X350	1	184	184
103	717	STEAM SRAINER (HRH)	1600X1450X750	1	385	385
104	718/1	BLANKING ARRANGEMENT FOR MS ST RAINER	1000X900X800	1	776	776
105	718/2	BLANKING ARRANGEMENT FOR HRH S TEAM	1600X1200X1000	1	1740	1740
106	719	STEAM STRAINER HOUSING GASKETS	700X700X300	1	20	20
107	720	COMPENSATOR	600X600X900	1	27	27
108	729	INJECTOR FOR SUC. PIPE NB 400	3500X750X750	1	472	472
				1	520376	520376
				1		0
B	**GENERATOR**			-		-
1	201	FOUNDATION ITEMS OF GENERATOR	3550X715X880	1	4306	4306
2	202	FOUNDATION ITEMS OF GENERATOR	3100X1050X850	1	2974	2974
3	203	CONSUMABLES FOR FOUNDATION	500X500X200	1	5	5
4	204	GENERATOR STATOR GENERATOR STATOR	7520X4200X4770	1	218000	218000
5	205	GENERATOR ROTOR	10550X1560X1660	1	43230	43230
6	206	END SHIELD (TE) LOWER HALF	3640X1140X2000	1	5050	5050
7	207	END SHIELD (EE) LOWER HALF	3640X1140X2000	1	5050	5050

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
8	209	H.V.BUSHING	2000X950X600	1	480	480
9	209/1	LOOSE ITEMS OF WOUND STATOR	1500X1200X1000	1	860	860
10	213	GENERATOR ACCESSORIES	1800X1000X550	1	1046	1046
11	214	GENERATOR ACCESSORIES GENERATOR	3500X1950X1250	1	3325	3325
12	215	GAS BAFFLE RING,INSERT COVER ETC.	3700X3500X1340	1	2388	2388
13	216	BEARING SHELLS	1100X835X950	1	782	782
14	217	END SHIELD (EE) UPPER HALF	3640X1140X2000	1	4650	4650
15	218	END SHIELD (TE) UPPER HALF	3640X1140X2000	1	4650	4650
16	219	SEAL RINGS	600X600X200	1	48	48
17	220	DEVICE FOR ROTOR INSERTION INTO STATOR	2240X940X1220	1	691	691
18	221	ERECTION DEVICES	2250X1180X800	1	535	535
19	222	WIRE ROPE	1800X1450X200	1	102	102
20	223	DRY AIR BLOWER	1350X1250X800	1	40	40
21	224	TERMINAL CONNECTORS TERMINAL	660X660X400	1	186	186
22	226	CONSUMABLES CONSUMABLES	500X600X300	1	20	20
23	230	BRUSHLESS EXCITER SET	5670X2390X2810	1	20047	20047
24	231	EXCITER FRONT COVER	4310X2950X2950	1	1487	1487
25	231/1	RR WHL.COVER & SEALING WALL DE FOR	1800X1600X1600	1	770	770
26	232	EXCITER REAR COVER	4330X3050X2950	1	1881	1881
27	233	EXCITER BED PLATE ACCESSORIES	5500X1050X800	1	2430	2430
28	234	EXCITER ACCESSORIES	2000X500X500	1	150	150
29	236	COOLER RACK ASSEMBLY	3000X1800X1100	1	801	801
30	250	SEAL OIL UNIT-I	3550X2900X3700	1	7660	7660
31	251	SEAL OIL STORAGE TANK	3500X1300X1280	1	1025	1025
32	252	GAS UNIT	2550X1790X2560	1	572	572
33	253	HYDROGEN DISTRIBUTOR	3480X1540X440	1	150	150
34	254	CO2 DISTRIBUTOR	2770X1240X440	1	116	116
35	255	SEAL OIL UNIT-II	3610X2040X2350	1	2235	2235
36	256	LIQUID DETECTOR RACK	1700X900X1800	1	274	274
37	258	LOOSE VALVES	2000X1000X1000	1	759	759
38	259	LOOSE INSTRUMENTS	500X500X300	1	25	25
39	260	CO2 VAPOURISER	1520X640X840	1	145	145
40	291/1	GENERATOR PIPING	6500X1200X1000	1	6174	6174
41	291/2	GENERATOR PIPING	6500X1000X800	1	1626	1626
42	291/3	GENERATOR PIPING GENERATOR PIPING	1900X1500X800	1	1365	1365
43	78431	EXCITER AIR COOLER	2850X650X600	1	772	772
44	78432	EXCITER AIR COOLER	2850X650X600	1	772	772
				1	349654	349654
C	**CONDENSER**			-	-	-
1	58001	CONDENSER (HOTWELL)		1	6497	6497

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
2	58002	LP HEATER SUPPORT ARRANGEMENT		1	4216	4216
3	58003	TROLLEY FOR LP HEATER		1	365	365
4	58004	BOTTOM PLATE		1	6884	6884
5	58005	BOTTOM PLATE		1	6884	6884
6	58006	BOTTOM PLATE		1	8296	8296
7	58010	BOTTOM PLATE		1	222	222
8	58012	CONDENSER SUPPORT		1	3680	3680
9	58013	CONDENSER SUPPORT		1	3680	3680
10	58014	CONDENSER SUPPORT		1	2760	2760
11	58015	CONDENSER SUPPORT		1	2762	2762
12	58018	CONDENSER SUPPORT		1	4419	4419
13	58020	WATER CHAMBER (LHS)		1	6065	6065
14	58022	FRONT WATER BOX (GEN SIDE)		1	14894	14894
15	58023	WATER CHAMBER(RHS)		1	6065	6065
16	58025	FRONT WATER BOX (TUR SIDE)		1	14894	14894
17	58026	WATER CHAMBER (RHS)		1	6065	6065
18	58028	REAR WATER BOX (GEN SIDE)		1	9032	9032
19	58029	WATER CHAMBER (LHS)		1	6065	6065
20	58031	REAR WATER BOX (TUR SIDE)		1	9032	9032
21	58032	SIDE WALL(TUR.END)		1	1105	1105
22	58033	SIDE WALL(TUR.END)		1	1645	1645
23	58034	SIDE WALL(TUR.END)		1	1645	1645
24	58035	SIDE WALL(TUR.END)		1	1645	1645
25	58036	SIDE WALL(TUR.END)		1	1080	1080
26	58038	SIDE WALL(TUR.END)		1	170	170
27	58039	SIDE WALL(TUR.END)		1	484	484
28	58040	SIDE WALL(GEN.END)		1	1105	1105
29	58041	SIDE WALL(GEN.END)		1	1645	1645
30	58042	SIDE WALL(GEN.END)		1	1645	1645
31	58043	SIDE WALL(GEN.END)		1	1645	1645
32	58044	SIDE WALL(GEN.END)		1	1080	1080
33	58046	SIDE WALL(GEN.END)		1	170	170
34	58047	SIDE WALL(GEN.END)		1	484	484
35	58048	SHELL INTERNAL DETAILS		1	5395	5395
36	58049	SHELL INTERNAL DETAILS		1	3616	3616
37	58050	SHELL INTERNAL DETAILS		1	5395	5395
38	58051	SHELL INTERNAL DETAILS		1	3616	3616
39	58055	SHELL INTERNAL DETAILS		1	653	653
40	58056	SHELL INTERNAL DETAILS		1	4165	4165
41	58058	AIR EXTRACTION PIPING		1	1070	1070

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
42	58059	SHELL INTERNAL DETAILS		1	3860	3860
43	58060	SHELL INTERNAL DETAILS		1	3860	3860
44	58061	SHELL INTERNAL DETAILS		1	3860	3860
45	58062	SHELL INTERNAL DETAILS		1	3860	3860
46	58063	SHELL INTERNAL DETAILS		1	3860	3860
47	58064	SHELL INTERNAL DETAILS		1	3860	3860
48	58065	SHELL INTERNAL DETAILS		1	3860	3860
49	58069	SHELL INTERNAL DETAILS		1	7126	7126
50	58070	SHELL INTERNAL DETAILS		1	4614	4614
51	58071	SHELL INTERNAL DETAILS		1	861	861
52	58075	LOWER DOME WALL (TUR.END)		1	8767	8767
53	58076	LOWER DOME WALL (TUR.END)		1	668	668
54	58078	LOWER DOME WALL (TUR.END)		1	245	245
55	58103	LOWER DOME WALL (GEN.SIDE)		1	8368	8368
56	58104	LOWER DOME WALL (GEN.END)		1	668	668
57	58106	DOME WALL (GEN.END)		1	245	245
58	58109	LOWER DOME WALL (F.W/B SIDE)		1	6012	6012
59	58110	LOWER DOME WALL (F.W/B SIDE)		1	1444	1444
60	58112	LOWER DOME WALL (F.W/B SIDE)		1	514	514
61	58115	LOWER DOME WALL (R.W/B SIDE)		1	6728	6728
62	58116	DOME WALL (R.W/B SIDE)		1	1427	1427
63	58118	LOWER DOME WALL (R.W/B SIDE)		1	193	193
64	58121	DOME INTERNAL STIFFENING		1	726	726
65	58122	DOME INTERNAL STIFFENING		1	726	726
66	58123	DOME INTERNAL STIFFENING		1	726	726
67	58124	DOME INTERNAL STIFFENING		1	726	726
68	58125	DOME INTERNAL STIFFENING		1	380	380
69	58126	DOME INTERNAL STIFFENING		1	380	380
70	58127	DOME INTERNAL STIFFENING		1	3610	3610
71	58128	DOME INTERNAL STIFFENING		1	4199	4199
72	58132	UPPER DOME WALL(TUR/GEN.SIDE)		1	1083	1083
73	58133	UPPER DOME WALL(TUR/GEN.SIDE)		1	1083	1083
74	58136	UPPER DOME WALL(F/W/B SIDE)		1	3635	3635
75	58137	UPPER DOME WALL,(LOOSE ITEMS)		1	475	475
76	58138	UPPER DOME WALL (LOOSE ITEMS)		1	390	390
77	58139	UPPER DOME WALL(RWB SIDE)		1	3702	3702
78	58142A	W/BOX REMOVAL DEVICE		1	1239	1239
79	58142B	W/BOX REMOVAL DEVICE		1	788	788
80	58143	W/B REMOVAL DEVICE (CONDENSER)		1	2500	2500
81	58150	FRAME		1	594	594

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
82	58151	FRAME		1	594	594
83	58154	STEAM THROW DEVICE		1	1029	1029
84	58155	STEAM THROW DEVICE		1	1029	1029
85	58157	CONDENSER (LOOSE ITEMS)		1	1252	1252
86	58161	CONDENSER LOOSE ITEMS		1	103	103
87	58162	CONDENSER LOOSE ITEMS		1	541	541
88	58166	STAND PIPE NO.1		1	73	73
89	58167	CONDENSER STAND PIPE		1	285	285
90	58169	STAND PIPE NO.2		1	75	75
		CONDENSER TUBES		1	90000	90000
					359078	359078
D	**STATIC AUXILLARIES**			-		-
1	250	SEAL OIL UNIT-I		1	7660	7660
2	251	SEAL OIL STORAGE TANK		1	1025	1025
3	252	GAS UNIT		1	572	572
4	253	HYDROGEN DISTRIBUTOR		1	150	150
5	254	CO2 DISTRIBUTOR		1	116	116
6	255	SEAL OIL UNIT-II		1	2263	2263
7	256	LIQUID DETECTOR RACK		1	238	238
8	260	LOOSE VALVES		1	759	759
9	260	CO2 VAPOURISER		1	145	145
10		H2 CYLINDER		120	60	7200
11		CO2 CYLINDER		63	60	3780
12		DUPLEX OIL FILTER		1	500	500
13		JACKING OIL FILTER		1	500	500
14	51101	ASSY. OF H.P. HEATER NO.-5		1	29240	29240
15	51102	LOOSE ITEMS FOR H.P. HEATER NO.-5		1	600	600
16	51201	ASSY. OF H.P. HEATER NO.6		1	37870	37870
17	51202	LOOSE ITEMS FOR H.P. HEATER NO.-6		1	600	600
18	56101	ASSY. OF L.P. HEATER NO.-1		1	11000	11000
19	56102	LOOSE ITEMS FOR L.P. HEATER NO.-1		1	225	225
20	56201	ASSY. OF L.P. HEATER NO.2		1	10103	10103
21	56202	LOOSE ITEMS FOR L.P. HEATER NO.-2		1	400	400
22	56301	ASSY. OF L.P. HEATER NO.3		1	10050	10050
23	56302	LOOSE ITEMS FOR L.P. HEATER NO.-3		1	400	400
24	56401	ASSY. OF DRAIN COOLER.		1	2960	2960
25	56402	LOOSE ITEMS FOR DRAIN COOLER		1	60.6	60.6
26	56501	ASSY. OF GLAND STEAM CONDENSER		1	905	905
27	56502	LOOSE ITEMS FOR GLAND STEAM CONDENSER		1	400	400

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
28	53101	HP DRAIN FLASH TANK		1	4590	4590
29	53102	LOOSE ITEMS HP DRAIN FLASH TANK		1	15.82	15.82
30	53201	LP DRAIN FLASH TANK		1	2400	2400
31	53202	LOOSE ITEMS LP DRAIN FLASH TANK		1	15.82	15.82
32	53301	FLASH VESSEL		1	1090	1090
33	53303	LOOSE ITEMS FLASH VESSEL		1	10.05	10.05
34	52101	RE JOINTS (INLET)		1	34000	34000
35	52102	RE JOINTS (OUTLET)		1	34000	34000
36	59101	ASSY. OF TURBINE OIL COOLER NO.1		1	8100	8100
37	59102	LOOSE ITEMS FOR TURBINE OIL COOLER NO. 1		1	61.6	61.6
38	59201	ASSY. OF TURBINE OIL COOLER NO. 2		1	8100	8100
39	59202	LOOSE ITEMS FOR TURBINE OIL COOLER NO. 2		1	61.6	61.6
40		DEAERATOR TANK (3 PIECES)		1	55000	55000
41		DEAERATOR HEADER		1	16000	16000
42		BUTTERFLY VALVE		4	6000	24000
43		UNLOADING OIL TANK **		1	600	600
44		CLEAN OIL TANK **		1	10200	10200
45		DIRTY OIL TANK **		1	10200	10200
46		OVERHEAD CONSENSATE STORAGE TANK		1	21000	21000
47	700	INJECTOR FOR SUC. PIPE NB350	3300X1750X1210	1	529	529
48	702	MAIN OIL TANK & NOZZLE ARRGT. ASSY.	5180X3260X2650	1	9100	9100
49	703	MAIN OIL TANK & NOZZLE ARRANGE MENT	3600X1100X800	1	390	390
50	704	OIL STRIPPER	600X600X850	1	83	83
51	705	OIL STRAINERS	2050X1200X1410	1	168	168
52	708	VARIABLE ORIFICES THROTTLE VAL VES &	1000X500X250	1	100	100
53	725	LEAKAGE OIL TANK	1000X1000X3000	1	515	515
54	728	WASTE OIL TANK	1000X1000X3000	1	515	515
55		CHEMICAL DOZING SYSTEM		4	2500	10000
56		AUXILLARY PRDS		1	2500	2500
57		PLATE HEAT EXCHANGERS		5	4500	22500
58		ME BELLOWS		1		
59		STEAM TRAPS		1		
60		VALVES		1		
61		COLTCS		2	15000	30000
62		PLATFORMS FOR ACTUATORS / EQUIPMENT / DEAERATOR		1	25000	25000
						460566
E	**ROTATING AUXILLARIES**					
1		AUX. OIL PUMP WITH DRIVE		2	750	1500
2		EMERGENCY OIL PUMP		1	1000	1000

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
3		JACKING OIL PUMP WITH DRIVE (AC/DC)		2	1000	2000
4		VACUUM PUMPS		2	13000	26000
5		FAN EXHAUSTER WITH MOTOR FOR GSC		2	250	500
6		OIL VAPOUR EXHAUSTER		2	125	250
7		OIL CENTRIFUGE (SKID MOUNTED)		1	4500	4500
8		CENTRAL OIL CENTRIFUGE (SKID MOUNTED)		1	4501	4501
9		LPBP STOP+CV WITH EHA & WATER INJECTION		1	10000	10000
10		DUPLEX GAS DRIER WITH CONTROLS		1	200	200
11		BFP Skid (Pump Assly. + Base Plate + tubing + Seal Coolers)	2250 x 1000 x1050	3	5770	17310
12		BP Skid (Pump Assly. + Base Plate + tubing)	1650 x 1200 x 950	3	2511	7533
13		BFP Motor + Coolers , Accessories		3	12000	36000
14		Grillage	10200 x 2500 x 900	3	5030	15090
15		Hydraulic Coupling (DD)	1800 x 1700 x 1800	3	3560	10680
16		Hyd. Coupling W. O. Cooler (DD)	3700 x 1500 x 500	3	1475	4425
17		Hyd. Coupling L. O. Cooler (DD)	3100 x 1300 x 450	3	775	2325
18		Hyd. Coupling Loose Items	-----	3	710	2130
19		Suction Strainer at BP Suction DD)	900 x 800 x 1400	3	800	2400
20		BFP Recirculation valve (DD)	1800 x 550 x 1400	3	350	1050
21		Loose Items	-----	3	2449	7347
22		CEP Assembly	ϕ 1100 x 3250	3	2100	6300
23		Canister	ϕ900 x 3100	3	510	1530
24		CEP Motor + Accessories		3	5000	15000
25		CEP Foundation Ring	1100 x 1100 x 150	3	185	555
26		CEP Suction Strainer	900 x 800 x 1400	3	800	2400
27		Loose Items	-----	3	210	630
28		DMCW PUMPS		5	2500	12500
29		LUB OIL PUMPS **		4	500	2000
						197656

ANNEXURE - IV (A,B,C &D)

TENTATIVE WEIGHT SCHEDULE

SUMMARY OF WEIGHTS (PER UNIT)

		WEIGHT PER UNIT	
A	**INTEGRAL AND POWER CYCLE PIPING**	**258**	**MT**
B	**LP PIPING**	**100**	**MT**
C	**PLATFORMS / STRUCTURES**	**5**	**MT**
D	**INSULATION (ON PPG & EQP)**	**87.5**	**MT**

FOR DETAILS OF WEIGHTS OF ABOVE SYSTEM REFER ANNEXURE IVA ..

WEIGHTS OF PIPING SYSTEMS INCLUDING SUPPORTS, VALVES,BELLOWS AND FITTINGS.

NOTES:

Weights of piping systems include supports, valves and fittings.

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

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

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

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

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

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

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

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

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
A	**POWER CYCLE AND INTEGRAL PIPING**					
1		LUB OIL PIPING		1	10000	10000
2		CONTROL OIL PIPING		1	6000	6000
3		CONDENSATE SPRAY		1	2000	2000
4		TURBINE DRAINS		1	6000	6000
5		SEAL STEAM		1	8000	8000
6		SEAL OIL		1	5000	5000
7		GAS SYSTEM		1	5000	5000
8		WASTER GAS SYSTEM		1	3000	3000
9		DRAINS AND VENTS		1	10015	10015
10		BFP / CEP INTEGRAL PIPING		1	4734	4734
11	80-312	LPBP VALVE UPSTREAM AND DOWNSTREAM		1	28,900	28900
12	80-322	CRH PIPING TO DEAERATING HEATER		1	5,000	5000
13	80-330	EXTRACTION STEAM TO LP HEATER-1		1	6,800	6800
14	80-331	EXTRACTION STEAM TO LP HEATER-2		1	3,400	3400
15	80-332	EXTRACTION STEAM TO LP HEATER-3		1	4,600	4600
16	80-335	EXTRACTION STEAM TO DEAERATING HEATER		1	12,900	12900
17	80-336	EXTRACTION STEAM TO HP HEATER NO.1		1	2,900	2900
18	80-337	EXTRACTION STEAM TO HP HEATER-2		1	1,600	1600
19	80-371	UNLISTED SV EXHAUSTS - TG SCOPE		1	4,600	4600
20	80-381	HP HEATER VENTS - TG SCOPE		1	900	900
21	80-382	LP HEATER VENTS		1	1,500	1500
22	80-385	VENT FROM UNLISTED PPG/EQPT TO COND		1	2,300	2300
23	80-387	CONDENSATE PUMP VENT		1	1,100	1100
24	80-388	CONDENSER AIR EVACUATION PIPING		1	3,300	3300
25	80-398	TURBINE WASHING STEAM		1	3,700	3700
26	80-400	CONDENSATE SUCTION		1	3,200	3200
27	80-401	CD FROM PUMP TO LPH1/DC INLET TEE AND		1	10,000	10000
28	80-402	CD FROM LPH1/DC INLET TEE TO TG TP		1	6,300	6300
29	80-407	CONDENSATE FOR SEALING OF VACUUM		1	1,300	1300
30	80-408	CONDENSATE DUMP FROM HEADER		1	2,200	2200
31	80-411	CONDENSATE/MAKE-UP TO CONDENSER		1	2,000	2000
32	80-413	UNLISTED CONDENSATE		1	1,100	1100
33	80-420	BOILER FEED PUMP SUCTION		1	8,500	8500
34	80-440	CONDENSER DRAINS		1	200	200
35	80-442	GLAND STEAM COOLER DRAINS		1	300	300
36	80-443	LP HEATER-1 TO CONDENSER		1	1,500	1500

SNO	PKG NO	DESCRIPTION	PKG SIZE (mm)	QTY : SET/ NOS	NET WT (KG)	TOTAL WEIGHT
37	80-444	LP HEATER-2/3/4/5 DRAINS AND DRIP PUMP I		1	3,000	3000
38	80-446	DEAERATING HEATER OVER FLOW AND DRAIN		1	2,900	2900
39	80-447	HP HEATER DRAINS		1	9,200	9200
40	80-449	TG CYCLE PIPING DRAINS AND VENTS		1	7,300	7300
41	80-601	LOW PRESSURE DOSING PIPING		1	1,000	1000
42	80-673	LUBE OIL PIPING SYSTEM		1	4,300	4300
43	80-921	H AND S FOR LIGHT UP STEAM LINE		1	8000	8000
44	80-922	H AND S FOR LIGHT UP - NON STEAM LINES		1	4500	4500
45	80-923	H AND S FOR STEAM BLOWING		1	35000	35000
46	80-924	H AND S FOR SYNCHRONISATION-STEAM LINES		1	1250	1250
47	80-925	H AND S FOR SYNCHRONISATION-NON STEAM		1	2000	2000
48	80-992	IMPORTED ELECTRODES		1	63	63
49	80-415	TEST THERMOWELLS		1	100	100
50	80-416	PERFORMANCE GUARANTEE TEST MATERIALS		1	150	150
					258,612	
B	**L P PIPING**					
1	80-468	TG AUX COOLING WATER		1	44,000	44000
2	80-464	MAIN CIRCULATION WATER PIPING		1	20,000	20000
3	80-612	SERVICE AIR FOR INDIVIDUAL UNITS		1	6,000	6000
4	80-616	INSTRUMENT AIR FOR INDIVIDUAL UNIT		1	8,000	8000
5	80-933	H AND S FOR LP PIPING		1	22000	22000
					100,000	
C	**PLATFORMS AND STRUCTURES**					
1		PLATFORMS AND STRUCTURES		1	5000	5000
D	**INSULATION**					
1		INSULATION FOR PIPING / EQUIPMENTS		1	67500	67500
2		ALUMINIUM SHEET AND ANCILLARY MATERIALS		1	20000	20000
					87500	

ANNEXURE-V

LIST OF T&P and IMTEs being provided by BHEL for use of contractor free of hire charges on sharing basis.			
S.NO.	**EQUIPMENT**	**CAPACITY**	**QTY**
T&Ps			
1.	EOT Crane (in T.G. hall)	125T / 25T	2 Nos.
2.	Crawler crane (for lifting of FST & De-aerator)	200 / 250 T	1 No.
3.	Crawler crane FOR SPECIAL PACKAGES	75 T/ 100 T / SUITABLE	1 No.
4.	Motorised hydraulic test pump		One Set
5.	Bolt stretching device		One Set
6.	Chemical Cleaning Arrangement ###	By BHEL agency	1 set
SPECIAL T&Ps			
7	Slings for lifting turbine rotors with lifting beam		One Set
8	Slings for lifting generator stator with lifting beam		One Set

Notes:

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

2. Other terms and conditions regarding above items shall be as per clause no. 38 (T&P/IMTEs)

3. **The Cranes at Sl No 2 , 3 will be provided as per requirement and for special package handling only at the discretion of the BHEL Engineer**

4. # # # Please refer to Clause No 46.4

ANNEXURE-VI

INDICATIVE LIST OF MAJOR T&P TO BE PROVIDED BY CONTRACTOR AT HIS OWN COST.			
S.NO.	**EQUIPMENT**	**CAPACITY**	**QTY**
1.	Welding Generators, Transformers, Rectifiers And Tig Welding Machine		Adequate numbers.
2.	Mobile crane	18 / 20 T	APR
3.	Low Bed Trailer	60 MT	APR
4.	Trailer with Pulling Unit	10 / 20 MT	APR
5.	Hydra	10 / 15 MT	2 nos
6.	Hydraulic Jack (Low Height)	25/50/100T	Adequate numbers.
7.	Screw Jacks	5/10/25/50T	Adequate numbers.
8.	Hydraulic Pipe Bending Machine (Manual and Motorised)		1 number each .
9.	Stress Relieving Sets, including oil cooled transformers, heating coils, panels Recorders Etc.		Adequate numbers.
10.	Vacuum Cleaner (Industrial)		1 number.
11.	Surface Grinder and other Workshop Equipment		1 set.
12.	Electric Winches		Adequate numbers.
13.	Torque Tension Meter/ Wrench Upto 1000ft Lbs Range		1 number.
14.	Electronic / Electrical Tube Expander (With Tools)		3 number.
15.	Air Compressor	140/210 CFM	1 number.
NOTES:			
1.	The above list specifies only major T&P (may not be complete to be deployed by the contractor. All additional / other tools and plants which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate / price.		
2.	Other terms and conditions regarding above items please also refer clause 38 (T&P/ IMTEs).		
3.	**Adequate Crane and Trailors for material shifting from outside Plant Stores to be arranged by the Contractor**		

ANNEXURE-VII

TENTATIVE LIST OF MAJOR TESTING INSTRUMENTS / EQUIPMENT TO BE ARRANGED BY CONTRACTOR AT HIS OWN COST.				
SL. No.	**DESCRIPTION**	**RANGE**	**ACCURACY**	**QTY**
1.	Hand operated Megger	Up to 200 M ohms 500V/ 1000V	±5% at center scale ±10% at end of scale	2 No.
2.	Digital Multimeter 3½ digit	Voltage 200 mV to 1000V	±1%+1 digit	2 No.
		Current 200 mA to 10A DC	±0.8%+1 digit	
		Current 20 mA to 20A AC	±0.8%+1 digit	
		Resist 200 ohms to 20M ohms	±0.5%+1 digit	
3.	Dumpy level	0 to 350 mm	LC-0.01	1 No.
4.	Surface plate	Up to 1.0 Sq. Mtr	Grade 1,2,3	1 No
5.	Straight Edge	Up to 2 Mtr long	Grade 1,2,3	1 No.
6.	Temperature recorder for 0-1000C 6/12 points with thermo couples / rods and compensating cable			2 Sets
7.	Master pressure gauge	0 – 4 Kg/cm2	0.02	1 No.
NOTES:				
1.	The above list of testing instruments/equipment required for testing / commissioning is only for guidance to contractor and not complete. Any other / additional testing instruments / equipment required for timely and satisfactory completion of job will also be arranged by contractor at his own cost.			
2.	Contractor must re-ascertain / recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration / deployment.			
3.	Other terms and conditions regarding above items shall be as per clause no. 38 (tools & plants / testing & measuring instruments).			

ANNEXURE-VIII

CERTIFICATE OF DECLARATION FOR CONFIRMING THE KNOWLEDGE OF SITE CONDITIONS

We,…… …… Hereby declare and confirm that we have visited the project site under the subject namely, ……and acquired full knowledge and information about the ***site conditions, wage structure, Industrial climate and total work involved***. We further confirm that the above information is true and correct and we will not raise any claim of any nature due to lack of knowledge of site condition.

Tenderers Name and Address

Place: (Signature of the Tenderer with stamp)

Date:

ANNEXURE-IX

NON DISCLOSURE AGREEMENT

Memorandum of Understanding

BHEL PSNR is committed to Information Security Management System as per Information Security Policy.

M/s……, providing……..service to BHEL PSNR, Noida hereby undertake to comply with the following in line with Information Security Policy of BHEL PSNR;

- To maintain confidentiality of documents & information which shall be used during the execution of the Contract.
- The documents & information shall not be revealed to or shared with third party which shall not be in the business interest of BHEL PSNR.

( )	( )
M/s. BHEL, PSNR	M/s……..

ANNEXURE-X

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this enquiry for the subject item/ system with detailed scope of supply as per our tender specification, BHEL-PSNR, NOIDA may resort to "REVERSE AUCTION PROCEDURE" i.e. **ONLINE BIDDING on INTERNET.**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. BHEL will inform the vendor in writing in case reverse auction, the details of service provider to enable them to contact and get trained.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. BHEL will provide the calculation sheet (e.g.: EXCEL sheet) which will help to arrive at "Total Cost to BHEL" 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 fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider within 24 hours of auction without fail.
10. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
11. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.

ANNEXURE - XI

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

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

ANNEXURE - XII

FORMAT OF UNDERTAKING

(To be submitted in the bidder's letter head)

REF: **Dt.**

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

Sub.: **Tender for "ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF TG SETS AT 2X250 MW HARDUAGANJ UNITS 8 & 9, ALIGARH , UP."**

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited Harduaganj site before submission of our offer and noted the job content & site conditions etc.

We also confirm that we have not changed / modified the tender documents as appeared in the website and in case of observance at any stage, it shall be treated as null and void. We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT and confirm our acceptance to reverse auctioning process and we hereby convey our unqualified acceptance to all terms and conditions as stipulated in the tender and NIT. In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted offer strictly in accordance with tender instructions.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized
representative of the bidder)

RATE SCHEDULE

TENDER NO. BHEL/NR/SCT/HARDUAGANJ/TG/631

SL.NO.	DESCRIPTION	RATE IN RUPEES	AMOUNT IN RUPEES
1	**Lumpsum price for complete scope of work as per tender specification for items indicated under Annexure-III for 2x250 MW TG sets including auxiliaries & common system equipments. (Items as per Annexure- III.)**	N A	
2	**Rate in Rs. / MT for complete scope of work as per tender specification for piping systems indicated under Annexure- IV item-A.**		
2A	**Carbon steel piping system (Approximately 490 MT)**		
2B	**Alloy steel piping system (Approx 20 MT)**		
2C	**Stainless Steel Piping system (Approximately 6 MT)**		
3	**Rate in Rs / MT for complete scope of work as per tender specification for LP piping systems indicated under Annexure-IV-Item B. (Approximately 200 MT)**		
4	**Rate in Rs/MT for fabrication and installation of additional platforms, structures, ladders and H&S as per site requirement and which are not indicated in the drawing indicated under Annexure-IV-Item-C. (Approximately 10 MT)**		

5	**Rate in Rs / MT for complete work as per tender specification for application of insulation of equipments, auxiliaries and piping etc indicated under Annexure-IV-Item-D.** **(Approximately 175 MT)**		
6	**Lumpsum price each TG Stator of 250 MW for dragging / shifting from near Unloading Bay to under Crane Hook.** **(Qty. 2 Nos).**		

NOTES:

1. The piping system includes pipe, bends, fitting etc. To make the system complete in all respect & payment will be released for above items as per applicable rates against rates for Item No 2 or 3 of Rate schedule , as applicable. The structure, platforms & auxiliaries required for completion of piping systems will be payable as per rates against item No. 4 of Rate schedule.

2. Evaluation shall be done considering all the items and respective quantities mentioned.

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

4. The contractor while quoting the above rates, categorically confirms having understood the fullest implications of price escalation provisions contained in clause no of tender. Accordingly taking into consideration all aspects thereof quoted above rates. Further contractor confirms that he will not come with any other claim/compensation on account of any increase whatsoever during the entire period of execution including extended period if any.

5. The rate shall be entered in figures as well as in words. In case of difference in rates between words and figures, the lesser of the two will be treated as valid rate.

6. In case of omission in quoting any rate, the evaluation will be done considering the highest quoted rate obtained against that item. But the work, if awarded, will be on the lowest quoted rate obtained against that item.

(Seal and Signature of Tenderer)