TENDER SPECIFICATION

BHEL:PSSR:SCT:1223

FOR

Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, integral piping, pumps and other auxiliaries connected with the system including supply and application of final painting for Unit 7 of 1 x 500 MW Set

at

VIJAYAWADA THERMAL POWER PROJECT
(for M/s. APGENCO),
Ibrahimpatnam, Vijayawada,
Andhra Pradesh.

PART – I TECHNICAL BID

BOOK NO :

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector – Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

INDEX SCT : 1223

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

Tender Specification No. BHEL:PSSR:SCT: 1223

Messrs Date:

Dear Sir,

SUB: Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, integral piping, pumps and other auxiliaries connected with the system including supply and application of final painting for Unit 7 of 1 x 500 MW Set at VIJAYAWADA THERMAL POWER PROJECT (for M/s. APGENCO), Ibrahimpatnam, Vijayawada, Andhra Pradesh.

Please find enclosed one set of non-transferable tender documents containing - 151 - pages along with general conditions of contract Booklet and for the above work.

You are requested to go through the tender documents, GCC Booklet and offer your most competetitive rate and submit the tender documents duly filled in as per procedure indicated in the tender specification along with requisite EMD of Rs.2,00,000/- (Rupees Two lakhs only) in the form Demand Draft drawn in favour of M/s.Bharat Heavy Electrical Limited Chennai - 35. Bids with Deviations from the tender conditions will be rejected.

A SEPARATE LETTER SHALL BE FURNISHED INDICATING THAT THERE ARE NO DEVIATIONS FROM THE TENDER CONDITIONS (As in Page 8.)

The completed quotations shall reach the office of the under signed on or before 26.03.2007 at 15.00 Hrs. The Technical bids will be opened on the same day at 15.30 hrs. We shall separately intimate the date for opening the price bids only to those parties who are technically qualified. You are requested to depute your authorized representative at the time of opening.

ANY REVISION OF RATES / PRICES WHATSOEVER AFTER THE TIME AND DATE MENTIONED IN TENDER SPECIFICATION FOR SUBMISSION OF COMPLETED QUOTATIONS SHALL NOT BE ENTERTAINED UNLESS CALLED FOR SPECIFICALLY BY BHEL.

Kindly acknowledge the receipt of the tender documents and confirm your participation.

Kindly note that BHEL reserves the right to reject any or all tenders without assigning any reason.

Thanking you,

Yours faithfully,
For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED

SENIOR DEPUTY GENERAL MANAGER / CONTRACTS

This Tender document is not transferable.

Place : Chennai -35

Encl: One set of Tender documents along with GCC Booklet.

BHARAT HEAVY ELECTRICALS LIMITED
(A government of India undertaking)
Power Sector : Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

SPECIAL INSTRUCTIONS TO BIDDERS

The Bidder must submit their bids as requested in a sealed cover prominently superscribing the Tender Specification number, due date and time of submission as mentioned in the TENDER NOTICE.

The following information shall be furnished by the Bidder along with their offer (Technical Bid cover)

01. Details of previous experience during the last seven years indicating contract value, duration, completion period and present engagement as per G.C.C.

02. Organisation structure of the Company as per GCC.

03. Financial status of the firm enclosing balance sheet and profit and loss account for the past 3 years and certificate from the Company's Banker as per G.C.C

04. Turnover of the Company in last 3 financial years pertaining to this scope of work only.

05. Latest Income Tax clearance certificate.

06. BIO DATA of key personnel presently in the Rolls of the company and proposed site organization for carrying out the work including deployment of Engineers and Supervisors.

07. Declaration sheets as per Appendix of Tender Specification.

08. Checklist and Schedule of General particulars as per Appendix in GCC.

09. T & P owned/deployment details as per G.C.C.

10. Technical manpower deployment details as per G.C.C

11. Other relevant details as per GCC and checklist.

12. These terms and conditions will be read and construed along with General Conditions of contract and incase of any conflict or inconsistency between the General conditions and the Terms and conditions of the tender specification, the provisions contained in the Term and conditions (NIT, Rate Schedule, Common conditions, Special Conditions including Appendices) shall prevail.

13. THE BIDDERS ARE REQUESTED TO FURNISH THE DOCUMENTS LIKE COPIES OF LOI'S, WORK ORDER'S ETC PERTAINING TO THE EXPERIENCE INDICATED IN QUALIFYING REQUIREMENTS, AS GIVEN BELOW.

14. QUALIFICATION REQUIREMENT

a) The bidders should possess the experience of having completed erection, testing work in minimum one unit of capacity 210 MW or above Steam turbine and generator in the last seven years.

b) The bidders should have a minimum average financial turn over of Rs.93 Lakhs in last three financial years ending on 31st March 2006.

The bidder must have earned profit in any one of the last three financial years ending on 31.03.2006 and should have positive networth as on 31.03.2006.

Bidder should submit audited balance sheet and profit & loss account of the company for last three years ending on 31.03.2006 in support of above requirement.

c) Notwithstanding the above, BHEL reserves the right to reject any Tender or all the Tenders for the reasons whatsoever beyond our control and the decision of BHEL is final.

LD / Penalty shall be leviable as per the applicable clauses of GCC.

15. TENDERERS HAVE TO FURNISH A DECLARATION SHEET INDICATING THAT THERE IS NO DEVIATION IN TENDER DOCUMENTS (AS IN PAGE 8) TENDERERS MAY FURTHER NOTE THAT THIS DECLARATION IS A PREREQUISITE FOR BHEL TO CONSIDER THEIR BIDS. BIDS SUBMITTED WITHOUT "NO DEVIATION DECLARATION" WILL BE REJECTED BY BHEL.

16. SAFETY PLAN

Bidder may further note that the submission of safety plan is a prerequisite for BHEL to consider their bids.

BHARAT HEAVY ELECTRICALS LIMITED
(A government of India undertaking)
Power Sector : Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

PROCEDURE FOR SUBMISSION OF SEALED BIDS

The Tenderers must submit their bids as required in two parts in separate sealed covers prominently superscribed as Part I "Technical Bid" and Part II "Price Bid" and also indicating on each of the covers the tender specification number and due date and time as mentioned in the Tender Notice.

Part I (Technical Bid) Cover I

Excepting Rate Schedule, all other schedules, data sheets and details called for in the specification shall be enclosed, in part I Technical Bid only.

Part II (Price Bid) Cover II

All indications of price shall be given in this part II Price Bid.

Tenderers are requested to quote their rates, only in the price bid (part II) provided by BHEL. Quoting of rates in any other form / formats will not be entertained.

These two separate cover I & II (Part I and Part II) shall together be enclosed in a third envelope (Cover III) along with requisite EMD as indicated and this sealed cover shall be superscribed and submitted to Senior Deputy General Manager/Contracts at the above mentioned address before the due date as indicated. The Tenderers will be intimated separately in case any clarifications are required.

NOTE:

Tenderers are issued with 2 Nos. of Technical Bids, 2 Nos. of Price Bids and 2 Nos. of GCC booklet., out of which one set of each document shall be retained by them for their reference. Balance one set shall be submitted along with their offer as per procedure indicated above.

EMD amount for this Tender is Rs.2,00,000/- (Rupees Two Lakhs only). This EMD amount shall be submitted in the form of either pay order or demand draft only drawn in favour of M/s. Bharat Heavy Electricals Limited, Chennai – 35.

EMD amount in the form of Bank Guarantee / fixed deposit receipt or in any other form will not be Accepted.

ANY REVISION OF RATES / PRICES WHATSOEVER AFTER THE TIME AND DATE MENTIONED IN TENDER SPECIFICATION FOR SUBMISSION OF COMPLETED QUOTATIONS SHALL NOT BE ENTERTAINED UNLESS CALLED FOR SPECIFICALLY BY BHEL.

Sr. Deputy General Manager/Contracts.

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

TENDER NOTICE

Sealed Tenders are invited from reputed contractors with sufficient previous experience in the under mentioned similar nature of work:

Tender Specification No. BHEL:PSSR:SCT: 1223

Description	EMD
Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, integral piping, pumps and other auxiliaries connected with the system including supply and application of final painting for Unit 7 of 1 x 500 MW Set at VIJAYAWADA THERMAL POWER PROJECT (for M/s. APGENCO), Ibrahimpatnam, Vijayawada, Andhra Pradesh.	Rs.2,00,000/- (Rupees Two Lakhs only)

Cost of Tender Documents (Including all Taxes)	:	Rs.1040/	
Sale Starts on	:	6.03.2007	
Sale closes on	:	24.03.2007	
Due date and Time for Submission	:	26.03.2007	15.00 Hrs.
Date and time for opening Of Technical Bids	:	26.03.2007	15.30 Hrs.

QUALIFICATION REQUIREMENT

a) The bidders should possess the experience of having completed erection, testing work in minimum one unit of capacity 210 MW or above Steam turbine and generator in the last seven years.

b) The bidders should have a minimum average financial turn over of Rs.93 Lakhs in last three financial years ending on 31st March 2006.

   The bidder must have earned profit in any one of the last three financial years ending on 31.03.2006 and should have positive networth as on 31.03.2006.

   Bidder should submit audited balance sheet and profit & loss account of the company for last three years ending on 31.03.2006 in support of above requirement.

c) Notwithstanding the above, BHEL reserves the right to reject any Tender or all the Tenders for the reasons whatsoever beyond our control and the decision of BHEL is final.

   LD / Penalty shall be leviable as per the applicable clauses of GCC.

Interested parties can get the Tender documents from the office of the Senior Deputy General Manager / Contracts on all working days by remitting the cost of tender documents either by Cash or A/c Payee Demand Draft drawn in favour of M/s. Bharat Heavy Electricals Limited, Chennai – 600 035. Money order, Cheques and Postal Orders will not be accepted.

The Bharat Heavy Electricals Limited takes no responsibility for any delay, loss or non-receipt of tender documents sent by post and also reserves the right to reject any or all the tender without assigning any reason therefor. TENDER NOT ACCOMPANIED BY THE PRESCRIBED EARNEST MONEY DEPOSIT ARE LIABLE TO BE SUMMARILY REJECTED.

BHEL shall operate the purchase preference clause for PSE's as per Government of India guide lines as applicable on date of Bid opening.

SENIOR DEPUTY GENERAL MANAGER/CONTRACTS

TENDER SPECIFICATION : BHEL:PSSR:SCT:1223

CERTIFICATE FOR NO DEVIATION

I, Of M/s.

hereby certify that there is no deviation from the Tender conditions either technical or commercial and I am agreeing to all the terms and conditions mentioned in the Tender Specification.

SIGNATURE OF THE TENDERER

OFFER OF CONTRACTOR

Senior Deputy General Manager/Contracts
Bharat Heavy Electricals Limited,
Power Sector : Southern Region
690, Anna Salai,
Nandanam,
Chennai – 600 035.

Sir,

I/We hereby offer to carry out the work detailed in Tender Specification No.BHEL:PSSR:SCT:1223 issued by Bharat Heavy Electricals Limited, Power Sector : Southern Region, in accordance with the terms and conditions thereof.

I/We have carefully perused the following documents connected with the above work and agree to abide by the same.

1. Instructions to Tenderer
2. General Conditions of Contract

3. Special conditions of Contract
4. Other Section, Appendices and Schedules

I/We have deposited/forwarded herewith the Earnest Money Deposit/a sum of Rs.2,00,000/- (Rupees Two Lakhs only) vide DD.No. .
Dt. which shall be refunded should our offer not be accepted. Should our offer be accepted, I/We further agree to deposit such additional sum which along with the sum of Rs.2,00,000/- (Rupees Two Lakhs only) mentioned above, to make up the Security Deposit for the work as provided for in the Tender Specification within the stipulated time as may be indicated by BHEL, Power Sector : Southern Region, Chennai – 600 035.

I/We further agree to execute all the works referred to in the said documents upon the terms and conditions obtained or referred to therein and as detailed in the appendices annexed thereto.

DATE: CONTRACTOR:

PLACE: ADDRESS:

Witness with their address

Signature Name Address

PROJECT INFORMATION

1 x 500 MW - VIJAYAWADA – STAGE IV

1.	**Owner**	**:**	**APGENCO, Hyderabad**
2.	**Consultant**	**:**	**DESEIN, New Delhi**
3.	**Project Title**	**:**	**1 x 500 MW VIJAYAWADA TPS, Unit 7, Stage – IV**
4.	**Location**	**:**	**Ibrahimpatnam, Vijayawada, Krishna Dist, AP State, India**

5. Latitude and Longitude : 13 Deg North latitude
82 Deg East longitude

6. Elevation above mean sea level : 26.5 meters

7. Climatic Conditions

a) Temperature (monthly basis)

I. Annual average maximum temperature : 47.6º C

II. Annual average minimum temperature : 13º C

b) Relative Humidity : Varies between 43% and 82%

c) Rainfall

Annual average rain : 998 mm most of which occurs during June to October

d) Wind Speed

i. Annual mean wind speed : 16.5 km / hr

ii. Maximum mean wind speed : 55 m / sec

8. Wind Load

Calculations for wind effect shall be in accordance with IS:875-1987 (Part 3) taking into account the following:

9. Seismic Data (as per IS: 1893 latest issue)

a. Zone : Zone III

b. Importance Factor (I) : 1.5

10. Response reduction factor : 5.0

SECTION III

COMMON CONDITIONS OF CONTRACT

3.1 SCOPE OF CONTRACT

3.1.1 The Intent of this specification is to provide erection and commissioning services for execution of projects according to most modern and proven techniques and codes. The omission of specific reference to any method and 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 project or portion of project awarded to him. The quoted rate shall deem to be inclusive of all such contingencies.

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

3.1.3 Provision of all types of labour, Supervisors, Engineers watch and ward as required tools and tackles as required, consumables as required under various clauses of tender specification for handling transportation, erection, testing and commissioning. Tenderer is liable to arrange all necessary T & P except those being supplied by BHEL for use.

3.1.4 Proper out-turn as per BHEL plan and commitment.

3.1.5 Completion of work in time as per monthly erection plan which will be worked out to adhere to project completion schedule.

3.1.6 Good quality and accurate workmanship for proper performance of equipment. BHEL Site Engineer shall be the deciding authority with reference to quality requirement.

3.1.7 Preservation of all components at all stages of pre-assembly/erection /testing as per clause 3.15.

3.2.0 FACILITIES TO BE PROVIDED BY BHEL:

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

3.2.1 WATER:

For construction purpose water will be provided at one single point free of charge and further distribution to be done by contractor at his cost.

3.2.2 ELECTRICITY:

3.2.2.1 For construction purpose electricity will be provided at one single point free of charge within a radius of 200 meters from T.G.Building. Further distribution shall be arranged by the contractor for his office & stores shed and for construction at their cost.

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

3.2.3 CONSUMABLES:

Such of those consumables as indicated as "Consumables provided by BHEL" shall alone be provided to the contractor by BHEL free of charge. Other consumables, filler wires, electrodes, gas etc. are to be arranged by the contractor at his cost.

3.3 FACILITIES TO BE PROVIDED AND DEVELOPED BY THE TENDERER AT HIS COST.

3.3.1 CIVIL CONSTRUCTION:

It shall be the responsibility of the contractor to construct his own office shed, stores shed, with all facilities like electricity, water supply, sanitary arrangements in the area allotted to him for the purpose.

3.3.2 WATER DISTRIBUTION

Distribution of water for construction purpose as well as drinking purpose from the single point provided by BHEL to various work-fronts shall be contractor's responsibility and at his cost.

3.3.3 ELECTRICITY DISTRIBUTION:

Any duty deposit involved in getting the Electricity shall be borne by the bidder. As regards contractor's office shed also all such expenditure shall be borne by the contractor.

3.3.4 Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

3.3.5 Necessary meters for recording consumption of water and power for cost calculation purpose and maintenance of the same during execution period shall be contractor's responsibility.

3.3.6 POSSESSION OF GENERATORS:

As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction site due to inherent power shortage in state on this account, suitable extension of time, if found necessary only be given and Contractor is not entitled for any compensation. It shall be the responsibility of the tenderer / contractor to provide, maintain the complete installation on the loadside of the supply

with due regard to safety requirements at site. It shall be the responsibility of the contractor to have atleast (2 to 4) diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by tenderers. This may also be noted while quoting.

3.3.7 LIGHTING FACILITIES

Adequate lighting facilities such as flood lamps, low volt hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc. at his cost.

3.3.8 POWER DISTRIBUTION

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

3.3.9 CONTRACTOR'S OBLIGATION ON COMPLETION

On completion of work all the temporary buildings, structures, pipelines, cables etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the Contractor at his cost. In the event of his failure to do so BHEL will undertake such work and the cost of the same will be recovered from the Contractor including overhead charges. The decision of BHEL Engineer in this regard is final.

3.3.10 Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work.

3.4.0 GASES :

3.4.1 All required gases like Oxygen/ acetylene/ argon/ Nitrogen required for work shall be supplied by the Contractor at his cost. It shall be the

responsibility of the contractor to plan the activities and store sufficient quantity of those gases. Non-availability of gases cannot be considered as reasons for not attaining the required progress of erection.

3.4.2 In case of improper arrangement of above gases, BHEL reserves the right to procure the same from any source and for issues made, recover the cost from the contractor's bill at the market value plus BHEL departmental charges. Postponement of recoveries is not permissible.

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

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

3.4.5 Monthly gas consumption reports are to be furnished by the Tenderer to BHEL for statistical purposes, every month.

3.5 ELECTRODES

3.5.1 Filler wire for TIG Welding as received from the respective manufacturing units along with the components / equipments only shall be supplied by BHEL free of cost. However, indigenous alloy steel, stainless steel, & carbon steel filler wires and all electrodes are to be arranged by the contractor at his cost.

3.5.2 All the required electrodes, filler wires as above are to be approved by BHEL. It shall be the responsibility of the contractor to obtain prior approval of BHEL before procurement regarding suppliers, type of electrodes etc. On receipt of the electrodes at site it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes batch No. date of expiry etc.

3.5.3 Storage of electrodes shall be done by the contractor in an air conditioned / controlled humidity room as per requirement.

3.5.4 All electrodes shall be dried in the electrode drying oven to the temperature and period specified by the BHEL Engineer before they are used in erection work and each HP Welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by the contractor.

3.5.5 All filler wires and electrodes shall be preserved by the contractor carefully to prevent deterioration of their properties. Special care shall be taken to preserve alloy steel and other special electrodes/filler wires. Contractor shall exercise maximum care in using these electrodes/filler wires to minimise wastage by maintaining a record of all usages.

3.5.6 In case of improper arrangement of procurement of above electrodes BHEL reserve the right to procure the same from any source and recover the cost from the contractor's first, subsequent bill at market value plus departmental charges of BHEL. Postponement of such recovery is not permissible.

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

3.6 TOOLS & TACKLES

3.6.1 BHEL will provide the tools and plants indicated in (Appendix V for "T & P provided by BHEL" in the Tender Specification) on common sharing basis (i.e. not exclusively) free of hire charges. It may be noted that distribution of these equipment will be done by BHEL Engineers and the decision of the Engineer shall be final in this regard.

3.6.2 The Contractor shall be responsible for the safe and proper use of the above equipments issued to him. Day-to-day maintenance and operation of the equipment shall be the contractor's responsibility and shall be as per instructions/standard practice of BHEL Engineer. Any

consumables / lubricants required for operation and application of the same shall be done by the contractor with his skilled labour at his cost.

3.6.3 Any loss/damage to any or part of the above equipment shall be to contractor's account and the expenditures on these account will be recovered from contractor's bills in case contractor fails to make good the loss.

3.6.4 Necessary electrical/water/air connection required for operation of any of the above equipment shall be to Contractor's account.

3.6.5 Regular utilization report of the above equipment shall be furnished by the contractor for cost analysis purpose.

3.6.6 The contractor shall return the T & P issued to him by BHEL in good working condition as and when so desired by BHEL (Completion or reduction in work load) for diversion for other work. If such return is delayed by contractor due to his fault without written consent of BHEL, hire charges as applicable according to BHEL policy will be levied from such time it was requisitioned by BHEL to the time of actual return and the amount so decided and arrived at will be recovered from the contractor's bill.

3.6.7 Excepting those indicated as BHEL supply, all the other T & P and instruments required for proper and safe handling, transportation, erection, testing and commissioning shall be arranged by the contractor and quoted rates shall deem to include the same.

3.6.8 In the event of failure of contractor to bring necessary and sufficient T & P, BHEL may arrange for the same at risk and cost of contractor including transportation of the same from any of BHEL's other site and hire charges as applicable shall be deducted from the bidder's bill. Decision of BHEL in this regard is final.

3.6.9 All the T & P arranged by contractor including electrical connections wherein required shall be reliable / proven / tested and necessary test certificates to be submitted as per statutory rules of the State/Central Government in force from time to time.

3.6.10 Contractor shall have at all times experienced operators and technicians/ for routine and breakdown maintenance of the equipment. Any delay in rectification of defects will warrant to BHEL rectifying the defect and charging the cost to the contractor.

3.6.11 If at any time it is noticed that contractor is not using any of the T & P or equipment properly according to the instructions of BHEL, BHEL will have the right to withdraw any and all such equipment and any cost due to this shall be contractor's account.

3.6.12 The T & P would be issued only at stores and it shall be the responsibility of contractor to take the delivery from stores, transport the same to site and return the same in good condition after use.

3.6.13 All the T & P, lifting tackles including wire ropes, slings shackles and electrically operated equipment shall be got approved by BHEL Engineer before they are actually put on use.

3.7 CRANES

3.7.1 EOT crane of customer as per availability without operating personnel shall be made available in the T.G. Hall free of charge for erection purposes.

3.7.2 The contractor has to arrange for trained operators for EOT Cranes round the clock within the quoted lumpsum value. The operators engaged by the contractor shall be tested by BHEL before he is allowed to operate the crane.

3.7.3 As the above crane is likely to be deployed sometimes for various contractors the decision of BHEL engineers will be final with regard to allotment of crane.

3.7.4 The availability of crane is likely to be hampered from time to time due to routine preventive maintenance or breakdown maintenance. Contractor has to make alternative arrangement or plan / modify / alter his activities to suit the above conditions and the contractor will not be liable for any compensation or extension of time due to this non availability, for maintaining the schedule.

3.7.5 In the event of the crane not available for longer duration due to major breakdown or any other reasons, BHEL will reschedule the work in consultation with Tenderer and direct the tenderer to concentrate on other areas till such time the cranes are made available.

3.7.6 It shall be the responsibility of the contractor to arrange for all other lifting equipments / plant and machineries other tools and tackles required for satisfactory completion of work. The contractor shall indicate the list of T & P he proposes to use in the work along with his offer.

3.7.7 For the movement of cranes & trailor etc. of contractor during material handling it may become necessary to lay sleeper bed for obtaining safe approach for usage of equipment. It shall be the contractor's responsibility to lay necessary sleepers. Necessary sleepers shall be arranged by the contractor at his cost.

3.7.8 BHEL shall provide 100 – 135 T Range Crane without operator free of charge / cost only for lifting and placement at required height of FST and Deaerator. Required Operator, Fuel & Lubricants are to be arranged by the contractor at their cost.

3.7.9 BHEL shall provide Portal Gantry Crane – 360 T for lifting of Generator stator, free of charge, as indicated in Appendix – V. Erection and putting to service with operator to be arranged by the contractor at their cost. The contractor has to receive the materials for erection from BHEL specified location within plant, erect, commission the same for lifting stator under BHEL supervision and dismantle and hand over the crane parts to BHEL stores afterwards at the direction of BHEL Engineer.

3.8 SUPERVISORY STAFF AND WORKMEN

3.8.1 The Contractor shall deploy experienced Engineers, Supervisors all the skilled workmen like High Pressure Welders (gas, TIG and arc) Carbon, alloy steel welders, Gas cutters, electricians, Riggers, Serangs, Erectors, carpenters, fitters etc. in addition to other skilled, semi-skilled and unskilled workmen required for all the works of handling and transportation from site storage to erection site, transportation, erection, testing and commissioning comtemplated under this specification. Only fully trained and competent men with previous experience of 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 employed by the contractor, BHEL reserves right to insist on removal of any employee of the contractor at any time, if they find him unsuitable and the contractor shall forthwith remove him.

3.8.2 The supervisory staff employed by the contractor shall be qualified (Engineers – Graduates in Engineering and Supervisors – Diploma Holders) and experienced in the area of work. They shall ensure proper out-turn of work and discipline on the part of labour put on the job by the contractor and in general see that the works are carried out in safe and proper manner and in coordination with other labour and staff employed directly by BHEL or BHEL's client.

3.8.3 The Tenderer shall also furnish DAILY & MONTHLY report showing the number of employees engaged in various categories of work and a progress report of work as required by BHEL Engineer.

3.8.4 The work shall be executed under the usual conditions existing in major power plant construction and in conjunction with numerous other operations at site. The bidder and his personnel shall co-operate with other personnel other contractor coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

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

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

3.8.7 It is the responsibility of the bidder to carryout the work for achieving the target set by BHEL by working for 12 hours a day including holiday during erection and 24 hours continuously in shifts during commissioning and testing periods.

3.8.8 If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road, kerb, fence, enclosure, water pipes, cables, drains, electric or telephone posts or wires, trees or any other property or to any part of erected components etc. The contractor shall make the same good at his own expense or in default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor.

3.9.0 CIVIL WORKS

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

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

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

3.9.4 Contractor has to carryout the grouting as per the work instructions for grouting available at site.

3.10.0 SCOPE OF MATERIAL HANDLING

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

3.10.2 The contractor shall identify necessary supervisor/labour for the above work in sufficient quantity as may be needed by BHEL for areas covering their scope.

3.10.3 It shall be contractor's responsibility to arrange necessary cranes/tractors, trailor or trucks/slings/tools and tackles/labour including operators and on to transport equipment, move it to erection site/pre-assembly yard and unload the same at pre-assembly yard/ erection site and the quoted rate shall include the same.

3.10.4 In the event of Contractor's inability to arrange in time any of the above equipment / T & P etc. BHEL shall provide the same on specific written request from contractor subject to availability of equipment of the normal hire charges of BHEL / Customer applicable from time to time and recoverable from contractor's subsequent months running bills.

3.10.5 All equipment so used by contractor shall be of proven quality and safe in operation as approved by the statutory authorities as per the law in force.

3.10.6 Any loss/damage to materials issued to contractor shall be made good by him or BHEL will arrange for replacement at cost recovery basis and decision of BHEL shall be final. Any loss/damage must be intimated to SITE in charge of BHEL in writing within 24 hours of the occurrence.

3.10.7 All the surplus damaged, unused materials, package materials / containers/special transporting frames, gunny bags etc. supplied by

BHEL shall be returned to the BHEL Stores by the contractor immediately.

3.10.8 The contractor shall take delivery of the components and equipments and special consumables from the storage area after getting the approval of the BHEL Engineer on standard indent forms to be specified by BHEL. At periodic/intervals of work, complete and detailed account of the equipment so erected and electrodes used shall be submitted to the BHEL Engineer.

3.11 OTHER RESPONSIBILITIES OF THE CONTRACTOR

3.11.1 BHEL Engineers shall make out a plan for erection and the contractor shall arrange for labour force and tools and plants and consumables to suit the above plan and execute the work accordingly.

3.11.2 The contractor shall have total responsibility for all equipment and materials in his custody, stores, loose, semi-assembled, assembled or erected by him at site.

3.11.3 The contractor shall make suitable security arrangement including employment of security personnel to ensure the protection of all materials/equipments and works from theft, fire, pilferage and any other damage and loss.

3.11.4 The contractor shall ensure that the packing materials and protection devices used for the various equipments during transit and storage are removed before these equipments are installed.

3.11.5 All equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc. shall be used for unloading and/or handling of the equipments without the specific written permission of the Engineer. The equipments from the storage yard shall be moved to the actual site of erection/location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage for such equipments at site.

3.11.6 The work covered under this scope of work is of highly sophisticated nature requiring best quality, proven workmanship engineering and construction management. It should also ensure successful and timely commercial operation of equipment installed. The contractor must have adequate quantity of precision tools, construction aids in possession. Contractor must also have adequate trained qualified and experienced supervisory staff and skilled personnel.

3.11.7 All the necessary certificates and licences required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.

3.11.8 The Contractor shall take all reasonable care to protect the materials and work till such time the erected equipment has been taken over by BHEL/their client. Necessary suitable temporary fencing and lighting shall be to be provided by the contractor as a safety measure against accident and damage of property of BHEL. Suitable caution notices shall be displayed where access to any part may be deemed to be unsafe and hazardous.

3.11.9 The contractor shall be responsible for taking all safety precautions during the construction and leaving the site safe at all items. When the work is temporarily suspended he shall protect all construction materials, equipments and facilities from causing damage to existing property interfering with the operation of the station when it goes into service. The contractor shall comply with all applicable provisions of the safety regulations clean-up programme and other precautionary measures which the BHEL has in effect at the site.

3.11.10 The contractor shall be responsible for good house-keeping, neat stacking and arrangement of materials on the floors. The contractor shall also be responsible for periodic regreasing, preservation of components like bearings and machined surfaces etc.

3.11.11 Contractor shall provide at his cost watch and ward staff round the clock for the safety of the equipment under erection/in his stores at site.

3.11.12 All lifting tackles including wire ropes, slings, shackles etc. used by the contractor shall be got approved by BHEL Engineer at site before they are actually put on the work. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due

precautions to avoid any accidents and damage to other equipments and personnel. All piping shall be adequately supported and protected to prevent damage during handling and erection.

3.11.13 The contractor shall take delivery of equipment from storage yard / stores sheds. He shall also make arrangements for verification of equipment maintain records and keep safe custody watch and ward of equipment after it has been handedover to him till these are fully erected, tested and commissioned and taken over by BHEL's client. The stolen/lost/ damaged goods shall have to be made good by the contractor at his own cost. Contractor should assist in claiming from the insurance to minimise his liability for the above.

3.11.14 The contractor shall carry out scrapping wherever required and matching of all the matching parts of Turbine, Generator and other equipments. The chipping of concrete surface to achieve the true contact as per specification between packers and the concrete is also covered in this scope of work. While on job care is essential to avoid too much of chipping and lowering of level.

3.11.15 All hangers, supports and anchors (Including concreting or welding) shall be installed as per drawing to obtain safe reliable and complete pipe installation as per instructions of BHEL Engineers.

3.12.0 DRAWINGS AND DOCUMENTS

3.12.1 The detailed drawings specifications available with BHEL Engineer will form part of this tender specification. These documents will be made available to the contractor during execution of work at site.

3.12.2 One set of 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's personnel shall take care of these documents given to them.

3.12.3 The data furnished in various appendices with this Tender Specification, describes the equipment to be installed, tested and commissioned under this specification briefly. However, the changes in the design and in the quantity may be expected to occur as is usual in any such large scales of work.

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

3.13.0 SITE CLEANLINES AND SAFETY REUIREMENTS

3.13.1 Contractor shall strictly follow all safety regulations/conditions as per clause 2.15 and its subclauses of general conditions of contract booklet enclosed with this tender.

3.13.2 Non-confirmity of safety rules and safety appliances will be viewed seriously and the BHEL has right to impose fines on the contractors as under:

Sl.No.	Safety	Fine (Rs.)
01	Not wearing safety helmet	50/-
02	Not wearing safety belt	100/-
03	Grinding without goggles	50/-
04	Not using 24V supply for internal work	500/-
05	Electrical plugs not used for hand machines	100/-
06	Not slinging properly	200/-
07	Using damaged sling	200/-
08	Lifting cylinders without cage	500/-
09	Not using proper welding cable with lot of joints and not insulated properly	200/-
10	Not removing small scrap from platforms	200/-
11	Gas cutting without taking proper precaution or not using sheet below gas cutting	200/-
12	Not maintaining elec. Winches which are being operated dangerously	500/-
13	Improper earthing of electrical T & Ps	500/-

3.13.3 Contractor shall necessarily fill up the safety plan format available in general conditions of contract booklet enclosed with this tender and submit along with their offer.

3.13.4 CONTRACTOR SHALL DEPLOY A SAFETY OFFICER EXCLUSIVELY TO HANDLE SAFETY REQUIREMENT.

3.14.0 PROGRESS OF WORK

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

3.14.2 The progress reports shall indicate the progress achieved against planned with reasons indicating delays if any and shall give remedial action which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original programme and the slippage do not accumulate and affect the overall programme.

3.14.3 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, material reports, consumables reports and other reports considered necessary by the BHEL Engineer.

3.14.4 The manpower reports shall clearly indicate the manpower deployed category wise daily specifying also the activities in which they are engaged. The periodicity of the reports will be decided by BHEL Engineer at site.

3.14.5 The contractor shall arrange for weekly progress review meeting with the "Engineers" at site during which actual progress during the week vis-a-vis scheduled programme shall be discussed for action to be taken for achieving targets. The programme for subsequent work shall also be presented by contractor for discussion. The contractor shall constantly update/revise his work programme to meet the overall requirements and suit the material availability.

3.14.6 The contractor shall submit detailed advance monthly plan and the same has to forwarded by the first week of each month for discussion and finalisation by 15th of the month which shall be basic document to be followed for the next month erection plan.

3.15.0 PRESERVATION OF COMPONENTS

3.15.1 It shall be the responsibility of the contractor to apply touch up painting on all equipments before erection. It shall be contractor's responsibility to arrange for required labour, brush etc. for carrying out touch up painting. The quoted rates shall be inclusive of above work including supply of paints.

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

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

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

SPECIFIC REQUIREMENTS FOR ISO 9001 - 2000

3.16.0 IMPORTANT NOTE

Contractors shall ensure that all their Staff/Employees are exposed to periodical training programme conducted by qualified agencies/ personnel on ISO 9001 - 2000 Standards.

Contractors shall ensure that the Quality is maintained in all the works connected with this contract at all stages of the requirement of BHEL.

Contractor shall ensure that all Inspection, Measuring and Testing equipment that are used, whether owned by the contractors or used on loan, are calibrated by the authorized agencies and the valid calibration certificate will be available with them for verification by BHEL. A list of such instruments possessed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control.

Contractors shall arrange for the inspection of the works at various stages as required by BHEL. Immediate corrective action shall be taken by the contractors for the non-conformances if any, observed and pointed out by BHEL.

3.17.0 INSPECTION / QUALITY ASSURANCE / QUALITY CONTROL STATUSTORY INSPECTION

Various Inspection / quality control / quality assurance procedures/methods at various stages of erection and commissioning will be as per BHEL / Customer quality control procedure/codes/IBR and other statutory provisions and as per BHEL Engineer's instructions. Preparation of quality assurance log sheets and protocols with customer's Engineers, welding logs and other quality control and quality assurance documentation as per BHEL Engineer's Instructions, is within the scope of work / specification.

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

A Daily log Book should be maintained by every supervisor/Engineer of contractor on the job in Duplicate (One for BHEL and one for Contractor) for detailing and incorporating Alignment/clearance/centering/Levelling Readings and Inspection details.

High pressure welding details like number of joints, Welder's Name, Date of welding, Details of Repair, Heat Treatment, Etc. will be documented in welding Logs as per BHEL Engineer's Instructions.

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

Heat Treatment details of HP Welds indicating minimum, Temperature Recorded, Heating Rate, Cooling Rate, soaking Time, Etc., shall also be Recorded and Documented by Contractor as per BHEL Engineer's Instructions. High pressure Welder's Performance Record shall be furnished every month. The performance Report of Welders shall indicate the percentage of Repair for each welder.

All the Electrical/Technical Measuring and Testing Instruments/Guages, Feeler Guages, Highest Guages Dial Guages, Micrometers, Levels Spirit Levels, Surface plates, straight Edges, vernier calipers and all measuring instruments shall be provided by the contractor for checking, leveling, Alignment, Centering etc of Erected Equipments at various stages. The Instruments / gauges / Tools etc. provided should be of Brand, Quality and Accuracy, Specified by BHEL Engineer and should have necessary Calibration and other Certificates as per the Requirements BHEL Engineer.

In the course of erection it may be necessary to recheck or counter check or finally check the work with instruments recently calibrated recalibrated or of inspection grade guage / tools or special measuring instruments such instruments whenever necessary will be provided by BHEL on specific authorization by BHEL Engineer.

The instrument mentioned above shall be drawn by the contractor from BHEL Stores on the specific authorization and use the same on the specific job for the purpose of inspection / rechecking / counter checking / finally checking of the work and shall be returned to BHEL Stores immediately on completion of the inspection.

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

Total Quality is the Watch Ward of the work and standards, Procedures laid down by BHEL. We shall follow all the Instructions as per BHEL Drawings and Quality / Standards. Contractor shall provide for the services of quality Assurance Engineer.

The welders performance will be reviewed from time to time as per the BHEL / IBR standards and any welder not performing the standards set by BHEL / IBR standards will be removed from working, Contractor shall arrange for the alternate welders immediately.

All the welders including the HP welders shall carry identity cards as per the proforma prescribed by BHEL. Only Welders duly authorised by BHEL / Boiler Inspector / Consultant shall be engaged on the work.

Contractor shall ensure speedy alignment and welding of all equipment erected by him after placement. Also all alignments, welding, NDT Tests required for stage Inspection shall be completed as per Quality Assurance procedures.

All the Quality Assurance Procedures have to be compiled with before effecting column erection, ceiling beams erection, Ceiling Beams erection, drum lifting, further structural work, Hydraulic Test, Trial run of Equipment, Pre-commissioning and post commissioning any other tests required to be conducted for completing erection and commissioning.

STAGE INSPECTION BY FES / QA ENGINEERS:

Apart from Day-to-Day Inspection by BHEL Engineers Stationed at site and also by Customer's Engineers, Stage Inspection of Equipment under Erection and commissioning at various stages of Erection and commissioning by TEAMS of Engineers from Field Engineering Services of BHEL's Manufacturing units and Quality Assurance Teams from Field Quality Assurance Unit/ Factory Quality Assurance and commissioning Engineers. Contract shall arrange all labour, Tools and Tackles, etc. for such stage inspections free of cost.

Any modifications suggested by FES and QA Engineers Team shall be carried out. Claims of Contractor, if any shall be dealt as applicable.

Any minor rectifications of minor repairs of defective work found out during stage Inspection shall be rectified free of cost, by the contractor.

Any major rectification or major repairs of defective work found out during stage inspection verification / checking but not attributable to contractor shall also be carried out. Claims of contractor, if any, shall be dealt as applicable.

HSE SPECIFIC REQUIREMENT

OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM

SUB CONTRACTOR TO ENSURE COMPLIANCE OF THE FOLLOWING **HEALTH** RELATED POINTS

01. Sub-contractor to identify nearest hospital for Health check up of his staff and workers and intimate BHEL site office & PSSR HQ.

02. To arrange for occupational health check up / screening of contractor's staff and workers engaged in sub contracting activities. In this, category of workmen such as welders, gas cutters, grinders, radiographers, crane operators are to be given exclusive attention in respect of health screening.

03. Sub-contractor to arrange an ambulance vehicle or emergency vehicle on a continous basis to meet any emergency situation arising at site work in which his staff and workers are engaged.

04. To provide appropriate facilities for prompt first aid treatment of injuries and illness at work. One first Aider for each sub contractor to be provided. First Aider should undergo training on first aid.

05. To provide filtered drinking water at selected place in a clean container.

SUB CONTRACTOR TO ENSURE COMPLIANCE OF THE FOLLOWING **SAFETY** RELATED POINTS

01. Personnel protective equipment (PPES): Required number of following PPES (Confirming to Relevant is Standards) to be made available to workmen at site and ensured that they are used .

- Helmet
- Safety goggles
- Welding face shields
- Safety belts for working at heights
- Safety shoes
- Ear plugs
- Rubber gloves and mats for low tension (I.T) electrical works
- Gum boots & aprons
- Other items as required by BHEL site

02. Sub contractor to liase with nearest fire station and inform contact telephone number and contact person to meet any emergency.

03. To provide appropriate fire fighting equipment at designated work place and to provide fire fighting training to selected persons in his group of workmen to meet emergencies.

04. To provide adequate number of 24 V power supply points to work in a constrained and enclosed space.

05 . All power tapping points / switch boards /power & control cabling should fulfill required electrical safety aspects as per relevant is standard.

06. ELCH's (Earth leak circuit breakers) at all electrical distribution points to be provided.

07. Red and white caution tape of proper width (1.5 to 2 inch) to be used for cordoning unsafe area such as open trench, excavated area, etc.

08. To provide sub-contractors company logo or clothing to all staff and workers for identification including identity cards with photographs approved by BHEL.

09. High pressure and structural welders to be identified with colour clothing and to display copy of welders certificate with photographs of welder at the work place. They also should be in possossion of valid welding procedure.

10. To display safe handling procedure for all chemicals such as lube oil, grease, sealing compound, kerosene, diesel etc. At stores & respective work place.

11. Contractor should authorise a person at site to stop work if there is a unsafe work noticed as per his knowledge.

12. Fitness for use of erected scaffolding to be certified by the contractors approved scaffolder and the certificate should be displayed on the scaffolding itself. If the scaffolding is unsafe , the same will not be used. the certificate to be updated daily. The scaffolding to be made as per the relevant is standard.

13. For making platform on the scaffolding , proper thickness and size of the plank of required quality wood to be used. The safe working load of the platform to be displayed on the scaffolding itself. Proper use of platform to be explained to the user.

14. All plant equipment should have inspection report before put in to use.

15. All T&Ps should be of reputed brand and having quality certificates.

16. All imtes should have valid calibration certificate from recommended institution / testing lab and these should be in place.

17. All lifting tackle and plant equipment should have safe working load certificate.

18. The right worker should be deployed for right job and the resume of site incharge, supervisors, and key workers to be submitted before commencement of work..

19. Sub-contractor should submit inspection / testing matrix of all T&Ps and to be approved by BHEL.

20. Sub-contractor to display safety slogan, safety board, caution boards wherever required in consultation with BHEL.

21. Sub-contractor to provide gas detectors of reputed make at desired locations.

22. Sub-contractor to conduct emergency mock drills. one drill per 6 month and submit report to BHEL.

23. Safe handling and storing of all equipment with adequate space to be ensured.

24. Sub contractor to deploy safety supervisor till the completion of the project.

25. Sub contractor to comply the safety reporting procedure of BHEL as practiced at present and also additional requirements that may arise out of future improvements in the safety management system. This includes computation of safety indices such as frequency rate, severity rate & incident rate.

26. Sub contractor to identify probable emergency situations such as elcetric shocks to workmen , caving in of shored earth , fall from height, collapse of scaffolding fire etc., and should have clear action plan to overcome them. Sub contractor to take required guidance from BHEL in this regard.

27. Sub contractor to identify hazardous activities which he may carryout and should train his workmen in those activities with the relevant operation control procedures. Sub contractor to take required guidance from BHEL in this regard.

28. Safe work permit system to be followed while working in confined space / near electric systems.

SUB CONTRACTOR TO ENSURE COMPLIANCE OF THE FOLLOWING **ENVIRONMENT** RELATED POINTS

1. HOUSE KEEPING : Sub contractor to carry out daily house keeping of work areas / stores through a check list prepared in consultation with BHEL.

2. Sub contractor shall adopt pollution prevention / reduce /control approach in all his site activities. this shall include:

    a. Transporting of oil / chemicals from stores to site safely without causing spillage. in case of any spillage, the area shall be cleaned and the remanant spilled oil disposed off to a safe place, identified for such disposal.

    b. To use required containers / cans / safety gadgets /appliances for transporting and for usage of oil / chemicals at site.

3. Sub contractor shall arrange for segregation / collection of scraps and dispose off to the identified place meant for scrap collection.

4. Sub contractor to adopt good erection practices / procedures with the objective of reduction of waste generation / rework

OTHER HSE REQUIREMENTS TO BE COMPLIED BY SUB CONTRACTOR

1. Sub contractor to clearly understand and accept the HCE policy of PSSR with a commitment to comply the requirements of the policy.

2. Sub contractors to arrange for daily meeting of their supervisors and work force before they disperse for their daily planned activities where in the relevant health , safety and environment aspects of the job and use of PPES are explained

3. Sub contractor to conduct monthly HSE meeting (internal) and submit the report to BHEL.

4. HSE slogans to be displayed in a proper board – hoarding at designated places in consultation with BHEL.

5. Sub contractor to submit a structured programme for training & occupational Health Screening of their work force at site after the Award of LOI.

SECTION – VI

SPECIAL CONDITIONS OF THE CONTRACT

6.0.0 The scope of work under this specification covers, but not limited to the following:

6.1.0 Handling at stores transporting to site, inspection, preparation of foundation, erection, leveling, centering, alignment, grouting & final alignment of Steam turbine, Turbo generator and auxiliaries, pre-assembly, erection, alignment welding, NDT, fixing hangers & supports, chemical cleaning/pickling, oil flushing, water flushing, hydro testing, & steam blowing of integral piping/oil piping, H_2/CO_2/Water cooling system, Pre assembly, erection welding, NDT of water cooled Condenser, feed water storage tank, de-aerator, LP/HP heaters, GSC & other coolers, flash tanks etc., CW piping near condenser, erection and commissioning of Motor Driven & Turbo Driven Boiler feed pumps, Motor driven Condensate Extraction Pumps, surface finish, supply & application of primer & finish paints / Anti corrosive epoxy resin based

/ chlorinated rubber based / Glass Fiber Reinforced epoxy film / steam wash paints including labeling, on equipments, & piping, pre-commissioning, commissioning, trial operation & handing over of **Unit VII** of 1x500 MW Vijayawada TPP Stage IV - Steam Turbine & Generator Auxiliaries.

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

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

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

6.2.0 TRANSPORTATION FROM STORES/ STORAGE YARD

6.2.1 Loading at storage yard, transport to site, unloading at site/working area of equipment placement on respective foundation/location, fabrication yard, pre-assembly bay or at working area are in the scope

of work. **Required cranes for loading & unloading of materials will be in the scope of contractor. The contractor shall provide any fixtures, concrete blocks & wooden sleepers, which are required for temporary supporting of the components at site.**

6.2.2 Contractor shall take delivery of the components and equipments from the storage area after getting the approval of BHEL Engineer on standard indent forms to be specified by BHEL. Complete and detailed account of the equipments erected as well as the progress shall be submitted to the Engineer as directed.

6.2.3 All the equipments shall be handled very carefully to prevent any damage or loss. *No bare wire ropes, slings etc., shall be used for unloading and/or handling of equipments with out the specific permission of BHEL Engineer.* The equipment from the storage yard shall be moved to the actual site of erection /location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage/loss of such equipment at site.

6.2.4 Contractor shall plan and transport equipments, components from storage yard to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the contractor's shed/work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area/site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.

6.3.0 ERECTION

6.3.1 Preparation of foundation: Providing necessary skilled and other labour to BHEL/Customer for checking of dimensional accuracy, axis, elevation, levels etc., with reference to bench marks of foundations and anchor bolts pits. Also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments, **up to 40mm depth**, as per BHEL Engineers instructions, should be done by the contractor as a part of work. Contractor should log before taking over the foundations for erection.

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

6.3.3 BHEL will provide only shims and packer plates (either machined or plain), which will go as permanent parts of the equipment at free of cost. Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates/sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting or chiseling, grinding and filing for de-burring the packers. However machining of the packers, wherever necessary, will be arranged by BHEL at free of cost.

6.3.4 Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces contact surface between the packers and foundation frame etc., shall also be blue matched by Prussian Blue

match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions.

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

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

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

6.3.8 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general

engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work with in the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.

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

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

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

6.3.12 All rotating machineries and equipments shall be cleaned, lubricated checked for their smooth rotation, if necessary by dismantling and re-

fitting before erection by the contractor. If, in the opinion of the BHEL engineer, the equipment is to be further checked at any stage of the work, necessary skilled manpower, complete facilities like T&Ps etc., for dismantling, cleaning & refitting, consumable, shall be provided by the contractor at no extra cost.

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

6.3.14 All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints assemble and other components as per instruction of BHEL Engineer during erection at the quoted rate. The Contractor has to arrange necessary paints at free of cost.

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

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

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

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

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

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

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

6.3.22 All the lubricant oil for flushing and during trial run of the equipment including first fill up, chemicals for detergent flushing, EDTA/acid pickling/cleaning/trail run etc., will be arranged by BHEL at free of cost. Required manpower shall be provided by the contractor for handling, filling, emptying and re-filling etc., as part of the work without any extra cost, till the unit is handed over. Transportation of all the above shall be arranged by the contractor from BHEL store/yard to work site and returning of the empty barrels/drums to stores at their cost. Care should be taken to avoid any spillage/wastage.

6.3.23 The contractor shall also carry out erection, testing, and commissioning of the oil centrifuge with in their quoted rate.

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

6.3.25 **Generator Stator Lifting:** Generator stator will be transported from Haridwar works to site on special wagon/Trailer. This will be received at site nearer to the lifting point of Portal Gantry Crane. The erection of Portal Gantry Crane, lifting of stator and shifting it to its foundation using portal gantry crane is the scope of this specification. Portal Gantry crane will be issued by BHEL on free of hire charges and operator has to be arranged by contractor at his cost. It will be in

parts/ components and the same shall be transported from BHEL store, assembled, erected, and commissioned by the contractor as per the instructions of BHEL. The crane will be dismantled once the lifting of stator is over and return to BHEL stores. The following will also be provided by BHEL on free of hire charges for this operation.

i. Suitable Slings for Stator lifting
ii. Suitable Mobile Crane for Erection & Dismantling of portal gantry. Operator, fuel and lubricants are to be arranged by the contractor at his cost for mobile crane.
iii. Lubricants for Drives.

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

6.3.27 Suction filter of BFPs, CEPs, and TG bearing filters are to be cleaned, as and when required during flushing / commissioning till the unit is handed over to customer by the contractor at his cost.

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

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

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

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

6.3.32 The condenser main tube plates will be dispatched to site from works with surface protection only for water box side. The same shall be removed suitably by sand blasting or with steam mixed with caustic soda as per the instructions of the BHEL Engineer before erecting the same.

6.3.33 All the weld seams shall be properly ground and subjected to 100% radiographic examination. If any paint or rust (other than steam washable paints) noted in the steam side of the condenser parts, these are to be removed either by sand blasting or buffing method.

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

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

6.3.36 The tube shall insert such that it shall project 2 to 3 mm beyond the tube plate outer surface. The tube shall be expanded using an automatic electronic torque control tube expanding unit or pneumatic tube expander so as to get 4 % thinning of the tube walls and elongation of tube ends should be 0.4 to 0.6 mm. The expansion in no case shall exceed a length of 70 to 80% of the tube plate thickness. Finally, proper trimming of the excess length tube shall be carried out and flare – up / bell mounting has to be done by the contractor at his cost.

6.3.37 The contractor shall carry out the condenser neck welding with LP casing. It shall be ensured that all spring supports are evenly loaded and the gap between the condenser and the different spring supports is with in 1.0 mm. The clearance between the condenser neck and the

LP exhaust hood should be with in 3 mm by suitably lifting the condenser. Machined packers of suitable thickness are to be used under the spring supports and condenser load is to be gradually transferred on these packers. The neck welding shall be subjected to non-destructive testing.

6.3.38 The hydrostatic testing of steam space with the condenser vacuum system and hydraulic testing of water space with the circulating water lines after assembly of water boxes are also included in the scope of the contractor. Dummies are to be provided by the contractor at inlet and outlet for Hydraulic Test. Required MS plates shall be supplied by BHEL free of cost. Fabrication of dummies shall be done by the contractor at his cost.

6.3.39 Water boxes inside surfaces are to be sand blasted before hydraulic testing. After hydraulic testing of CW side the water boxes and the water chambers are to be thoroughly cleaned for removal of all traces of dirt, grease, oil, rust etc., It shall be dry and free from burns and shall have a metallic surface. The Sand Blasting machine and accessories and also the required consumables shall be arranged by the contractor with in the quoted rate.

6.3.40 Condenser handling equipment & Structures shall be erected by the contractor with in the quoted rate

6.3.41 The condenser steam space shall be surface protected at least two coats of suitable steam washable paint. Before the painting is taken up the contractor shall clean the surfaces thoroughly by sand blasting or

with steam mixed with caustic soda. Painting should be carried out by the contractor before tube insertion.

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

6.3.43 Floating of TG, Pumps decks & Condenser and readjusting of spring is covered in this scope of work.

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

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

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

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

6.3.48 The foundation decks of TG, BFP's are supported with Imported Vibration Isolation Springs, which will be erected by the Civil contractor. The final adjustments of springs and floating of springs to be done by the contractor at the quoted rate by providing required man power, T & P's etc.,

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

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

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

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

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

6.3.54 Carrying out piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall with in the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, welding, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate. IBR/ statutory requirements, if any, shall be in the scope of contractor and necessary drawing/details only will be given by BHEL.

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

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

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

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

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

6.3.60 Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to

the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., and not by hammer. Any burrs left on the equipments/piping, after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.

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

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

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

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

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

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

6.3.67 Flow nozzles, orifice, spray nozzles of de-super neater shall be mounted / erected after chemical and / or steam blowing at site.

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

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

6.3.70 All drains/ vents/ relief/ escape/ safety valve piping to various tanks/ sewage/ drain canal/ flash box/ flash tank/ condenser/ sump/ atmosphere etc. from the stubs on the piping and

equipments erected by the contractor is completely covered in the scope of work.

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

6.3.72 Fixing / fitting / welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc. on different lines / equipments (which will be supplied by BHEL) is within the scope of work. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system is the scope of this specification.

6.3.73 The contractor shall conduct non destructive tests like radiography ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test etc. on weld joints, castings, valve bodies and other equipments etc. as per BHEL Engineer's instructions.

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

6.3.75 Contractor shall arrange the necessary clearance from the statutory authorities (IBR, Electrical Inspectorate etc.,) as required for

installation of the plant and equipment and render all assistance, service required in this regard. Inspection fee, will be paid by BHEL.

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

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

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

6.4.0 PRESERVATION / TOUCH UP PAINTING

6.4.1 Contractor shall carryout cleaning and preservation/ touch up painting as a part of erection work for the materials / equipments under this tender specification right from erection site, during erection and after erection till handing over to customer wherever deficiency in painting /

rusting in noticed at his cost all inclusive.(Supply of paints by the contractor will match the existing finished coat of the supplied component and the color/make will be got cleared by BHEL Engineer before application by the contractor)

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

6.4.3 Any failure on the par to contractor to carry out work according to above clauses will entitle BHEL to carryout the job though any other party and recover the cost from contractor.

6.4.4 Where the insulation materials are stacked nearer to the work spot, it is the contractor's responsibility to preserve / protect from the action of weather and from damage.

6.5.0 HYDRAULIC TEST, PRE – COMMISSIONING & COMMISSIONING

6.5.1 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The servicing, installation, electrical connection, erection, testing and dismantling and returning to BHEL Stores, etc., shall be carried out by the contractor as part of this work without any extra charges. For LP lines contractor has to arrange Hydraulic Test pump / Hand Pump for HT at his cost.

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

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

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

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

6.5.6 Lube oil, seal oil, governing oil, pipelines to ST, STG Pumps, etc. shall be all flushed. Contractor will have to lay temporary piping to connects the entire system irrespective of whether the equipment/system connected has been erected by the contractor or not. Decisions of

BHEL Engineer in this regard will be final and binding on the contractor.

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

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

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

6.5.11 Contractor shall lay the temporary pipelines with fittings, accessories and erection/commission pumps, tanks and other installations as instructed by BHEL, Engineer for the purpose of chemical cleaning/alkali flushing/steam blowing/ steam washing/ steam flushing/water flushing/ water washing/oil flushing etc., of piping and other equipments which are within the scope of work and also other pipipings/lines which are integral to the chemical cleaning/HT/Steam Blowing System/circuit erected by other agencies. Necessary materials for this will be provided by BHEL. Overhauling / cleaning / revisioning /servicing of valves, fittings in temporary system and acid cleaning tanks for recommissioning activities / operation like water flushing /

steam blowing / washing / flushing / passivation and normalization as applicable is in the scope of the contract.

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

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

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

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

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

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

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

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

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

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

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

6.5.23 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration / venting / draining points with valves as per BHEL Engineer’s instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL. Contractor shall cut steel blanks from steel provided without charging extra. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL Engineer’s instructions.

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

6.5.25 Main Steam Line & Hot Reheat Line Strainers bodies are erected first before steam blowing of the lines. After Hydraulic Test, the strainer elements are fixed. During trial operation, if required the strainers are removed for inspection of derbies & cleaning. Contractor has to carry out the work as part of his work out any extra cost.

6.5.26 For conducting Hydro test of MSL, HRH LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH NRV internals are removed and Hydro Test devices are fixed by the contractor. After Hydro Test the internals are to re assembled as instructed by BHEL with out any additional cost.

6.5.27 For steam blowing of MSL, HRH, LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH NRV internals are removed and Hydro Test devices are fixed by the contractor. After Hydro Test the internals are to re assembled as instructed by BHEL with out any additional cost.

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

6.5.30 The contractor shall assist to carryout the following tests in generator within the quoted value:

a. high voltage test of bushings
b. Measurement of DC resistance of rotor and stator.
c. Impedance test of rotor.

d. Measurement of IR values of stator – rotor – RTD Thermocouples etc.

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

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

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

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

6.5.35 During the stages of pre-commissioning / commissioning / post commissioning, if any part of the ST, STG, and auxiliaries need,

repair/rectification / rework / replacement, the same shall be done expeditiously and promptly by the contractor.

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

6.5.37 Contractor shall cut/open works if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning opening of valves changing of gaskets attending to leakages minor modification rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower in all the three shifts. In case any rework is required because of contractor’s faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.

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

6.5.39 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower

including necessary consumables, hand tools and supervision as part commissioning assistance for a period of six months or till handing over of sets to customer, which ever is earlier.

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

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

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

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

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

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

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

6.6.0 FINAL PAINTING

6.6.1 The scope of work shall include supply and application of final painting as required and specified for the components of TG and its auxiliaries and piping.

6.6.2 For details of painting refer Painting refer Painting scheme/schedule enclosed.

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

6.6.4 The interior surfaces of water boxes & water side surface of water chambers excluding tube plates are to be painted with High Build Black Coal Tar Epoxide Paint, with suitable corrosion resistance primer of 0.25 mm minimum thickness as per this procedure given by BHEL Engineer.

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

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

6.6.7 All the exposed metal parts of the equipments including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer, which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL Engineers for painting. Afterwards the above parts shall be finished with intermittent and finish coating as specified in the Painting Specification

Section VII, Appendix VI and as per the instructions of BHEL / Customer official. If needed and insisted either by BHEL engineer or the BHEL client, in certain cases, spray painting has to be done wherever brush painting is not accessible, by the contractor, within the quoted rates. Contractor has to carryout painting as per the procedure lay down by the customer.

6.6.8 Before applying the subsequent coats the thickness of each coat shall be measured and recorded with BHEL/customer. The instrument for checking the thickness of coat is to be procured by the contractor and should be calibrated at periodical intervals.

6.6.9 The quality of the finish paint shall be as per the standards of ISI or equivalent and the colors as approved by BHEL/customer. Supply and application of paints and required consumables etc., are in the scope of the contractor and is to be within the quoted rate.

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

6.6.11 Primer & finish coat shall be of reputed paint supplier approved by BHEL/customer.

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

6.6.13 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and un coated spots. Each coat (Primer, intermediate, finish) shall have a minimum thickness of 70, 70 & 60 microns respectively and total thickness of 200 microns unless otherwise specified. No paint shall be applied when the surface temp is above 55 deg. Cen or below 10 deg. Cen, and when the humidity is greater than 90%.

6.7.0 TIME SCHEDULE

6.7.1 The Contractor has to mobilise in all respects with in 15 days from the date of issue of fax letter of intent.

6.7.2 The entire work of erection, testing and commissioning of Steam Turbine & Generator with associated auxiliaries, turbine integral piping as detailed under this tender specifications for unit shall be carried out and completed with in 20 months from the date of actual commencement of erection work at site.

6.7.3 For the above purpose, the erection work shall be commenced as may be stipulated in the letter of intent and shall deemed to have been completed in all respect only when the unit is operated successfully under full load condition and completion of trail operation. The decision of BHEL in this regard shall be final and binding of the contractor.

6.7.4 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of mile stone events given below.

S.NO	Mile stone	Dates
01	Condenser Erection Start	1/4/07
02	Turbine Erection Start	1/4/07
03	Turbine Box- up	4/5/08
04	Completion of Oil Flushing	24/6/08
05	Barring Gear	1/7/08
06	Rolling & Synchronisation	4/8/08
07	Trail Operation & Handing over	4/11/08

6.7.5 BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule. Contractor shall plan his activities and mobilize additional resources accordingly to the satisfaction of BHEL Engineer within the quoted rates.

6.8.0 TERMS OF PAYMENT

6.8.1 CONDENSER(12%)

6.8.1.1 Preparation of foundation for condenser erection	0.5%
6.8.1.2 Assembly welding and placement of bottom plates sole plates hot well and spring elements	1.5%
6.8.1.3 Assembly and welding of side plates water chambers And water boxes	1.5%
6.8.1.4 Installation and welding of tube support plates air evacuation piping and internals	1.5%
6.8.1.5 Assembly and welding of Dome walls and stiffening structure & Placement of LPH 1	1.5%
6.8.1.6 Installation, expansion and end milling and flaring of	

	condenser tubes	3.0%
6.8.1.7	UV Lamp test of steam space and hydraulic testing	1.0%
6.8.1.8	Floating of condenser and welding of condenser with Turbine exhaust hood	1.5%
	Total percentage for Condenser	**12%**

6.8.2 TURBINE (15%)

6.8.2.1	Matching leveling alignment of base plates and bearing pedestal and longitudinal girders and grouting	2.0%
6.8.2.2	Assembly of bottom half of LP cylinder leveling and alignment	2.0%
6.8.2.3	Placing of LP rotor leveling and centering	2.0%
6.8.2.4	Placing of HP & IP modules centering and leveling	1.0%
6.8.2.5	Alignment of HP/IP/LP rotors honing and coupling	2.0%
6.8.2.6	Assembly welding of LP outer casing	2.0%
6.8.2.7	Erection of ESV, IV, LP & HP Bypass valves and assembly of regulation system	2.0%

6.8.2.8	Fixing of permanent keys revision of main oil pump and alignment box up of front bearing pedestal	2.0%
	Total percentage for Turbine	**15%**

6.8.3.0 TURBOGENERATOR (12%)

6.8.3.1	Preparation of foundation and frames for stator	0.5%
6.8.3.2	Erection of Portal Gantry, Lifting	1.0%
6.8.3.3	Positioning and centering of stator on Foundation	1.0%
6.8.3.4	Dismantling & Returning of Portal Gantry	1.0%
6.8.3.5	Threading of rotor after completion of all electrical and other tests	2.0%
6.8.3.6	Grouting of Generator Bearing pedestal and Exciter	1.0%
6.8.3.7	Final alignment Reaming honing and coupling of generator with turbine rotor	2.0%
6.8.3.8	Boxing up of Generator	2.0%
6.8.3.9	Gas tightness test of stator with total system	1.0%
6.8.3.10	Completion of Generator Testing	0.5%

	Total percentage of Generator	**12%**

6.8.4.0 HEATERS & DEAERATOR (10%)

6.8.4.1	Erection, Alignment, Welding & NDT of FST & Deaeraotor	2.5%
6.8.4.2	Erection & Welding of Internals & Hyd.Test	2.5%
6.8.4.3	Main Oil Tank Oil coolers & CF Coolers	1.0%
6.8.4.4.	Erection of HP heaters	1.0%
6.8.4.5	Erection of LP Heaters	1.0%
6.8.4.6	Erection of GSC & Drain Cooler	1.0%
6.8.4.7	Generator Cooling System Coolers	1.0%
	Total Percentage for Heaters & Deaerator	**10.0%**

6.8.5 PUMPS (12%)

6.8.5.1	Erection of One No. Boiler feed pump, bydraulic couplings, motor and booster pumps along with Lube oil and other systems	2.0%
6.8.5.2	Erection of Condensate pumps and Motors along with it accessories	3.0%

6.8.5.3	Erection of Two Turbo Drives and BFP with complete system (pro rata 3% for 1 pump complete)	6.0%
6.8.5.4	Erection of JOP, AOP, EOP & Other Pumps	1.0%
	Total percentage for Pumps	**12%**

6.8.6 PIPING (21%)

6.8.6.1	Air evacuation and vaccum system piping	1.5%
6.8.6.2	MS&HRH Line Strainer Erection and Fixing Internal after steam blowing	2.0%
6.8.6.3	Extraction inside condenser and Steam Throw Device	1.0%
6.8.6.4	Aux steam Gland seals	1.0%
6.8.6.5	All Drain Lines and vent lines	2.0%
6.8.6.6	Turbine Lube oil piping & supports	2.0%
6.8.6.7	Seal steam system	2.0%
6.8.6.8	Turbine water drainage piping	1.0%

6.8.6.9	Control oil piping	2.0%
6.8.6.10	Cross around piping	2.0%
6.8.6.11	Generator seal oil piping	1.0%
6.8.6.12	Generator Gas system	1.0%
6.8.6.13	Balance Misc Piping	1.5%
6.8.6.14	Fixing of Pick-Ups, probes & accessories for verification Monitoring etc., & Thermowell Etc.	1.0%
	Total percentage for piping	**21%**

6.8.7 MISCELLANEOUS WORKS (6%)

6.8.7.1	Flash tanks, steam traps, overhead storage tanks AT, nozzles, Debris filters, RE Joints etc. and other miscellaneous items	1.0%
6.8.7.2	Turbine Enclosures / Cladding	1.0%
6.8.7.3	CO2 & H2 Cylinder Racks & Cylinders	1.0%
6.8.7.4	Supply and Application of Final paint	3.0%
	Total percentage for misc. works	**6%**

6.8.8 COMMISSIONING (5%)

6.8.8.1	Oil flushing	1.0%
6.8.8.2	Barring gear	1.0%
6.8.8.3	Rolling & Dumping	1.0%
6.8.8.4	Synchronization	1.0%
6.8.8.4	Full load & Trial Operation	1.0%
	Total Percentage for commissioning	**5%**

6.8.9 Return of surplus material, Reconciliation with BHEL stores, clearance of site and Final bill Submission and acceptance **2.0%**

6.8.10 The balance amount of 5% of the contract value arrived at by actual quantity erected multiplied by unit rate accepted shall be paid after the guarantee period of 12 months. The guarantee period will commence from the date of handing over of the set to customer or 6 months from the date of first synchronization of the set whichever is earlier. However, this 5% amount can be released against submission of matching Bank Guarantee from a nationalized / scheduled bank in the prescribed proforma of BHEL valid for twelve months from the date of commencement of guarantee period.

6.8.11 No levy or payment or charge made or imposed shall be impeached by reasons for any clerical error or demanded or charged.

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

6.8.13 The contractor shall note that the final bill shall be released only on production of a certificate issued by Site Incharge that the contractor has fulfilled all the contractual/statutory requirements.

6.8.14 **Field Quality Assurance Formats:**

It is the responsibility of the contractor to collect and fill up the relevant FQA logsheets/welding logs and heat treatment charts and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtainging the signature of BHEL/customer in token of their acceptance. Monthly running bill payment to the contractor will be linked to the submission of these log sheets.

6.9.0 EXTRA CHARGES FOR MODIFICATION AND RECTIFICATION WORK

a) BHEL may consider payment for extra works on man day basis for such of those works which require major revamping / rework/rectification/modification which is totally unusual to normal erection or commissioning work which are not due to contractor's faulty erection.

b) The decision of BHEL in this regard shall be final and binding on the contractor. The contractor may submit his work claim bills (Specifically agreed by BHEL Engineer) along with the labour sheet duly certified by BHEL Engineer at site. But BHEL also got

the option to get these work done through other agencies if they so desire.

6.9.1 All the extra work, if any, carried out should be done by a separate gang which should be identified prior to start of work for certification, of man hours. Daily labour sheets should be maintained and should be signed by contractor's representative and BHEL Engineer. Signing of the labour sheets does not necessarily mean the acceptance of extra works. Only those works which are identified as not usual to normal erection and certified so by the Project Manager, and accepted by designer/supplier or competent authority only will be considered for payment.

6.9.2 The decision of BHEL in this regard shall be final and binding on the contractor.

6.9.3 The following man hour rates will be applicable for modification/rectification work.

6.9.4 Average single man hour rate including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, including consumables for carrying out any rework, re-vamping as may arise during the course of erection Rs.40/- man hour.

6.9.5 Average single man hour rate including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals excluding consumables for carrying out any rework/revamping as may arise during the course of erection Rs.25/- per man hour.

6.10.0 EXTRA WORK DOES NOT INCLUDE

6.10.1 Nominal dressing of foundations, holes, bases, nuts and bolts, in case of abnormal conditions, this can be mutually discussed before starting of such work.

6.11.0 Extra works are broadly defined as below:

Design changes which will be intimated to the contractor after the start of erection and same refers to dismantling of erected components rectification of components which have been received in damaged conditions during transit, rectification of components wrongly manufactured at work, any other works which do not fall in the scope of this contract.

6.11.1 The decision of BHEL in this regard shall be final and binding on the contractor.

6.12.0 OVER RUN CHARGES

6.12.1 Incase due to reasons not attributable to the contractor, the work gets delayed and completion time gets extended beyond **Twenty (20) months** from the date of commencement of the work, the contractor shall not be entitled for any over run compensation (ORC) for a period

of first **Three (3) months** after the expiry of **Twenty (20) months**. Incase of ORC arise the same will apply at **Rs.45,000/- (Rupees Forty Five Thousand only)** per month for extension to the completion period beyond **23(20+3) months** as stated above duly taking into account the balance work at the end of that period.

6.12.2 The period of overrun will have to be ascertained before the commencement of grace period.

6.12.3 During the period of over run targets will be fixed on month to month basis, which have to be adhered. In case of any shortfall due to the reasons attributable to the contractor, ORC amount will be proportionately reduced.

6.12.4 The payment of overrun charges for extended stay for reasons not attributable to contractor will be subject to achieving the monthly programme of work as mutually agreed upon during the extended stay.

6.13.0 PRICE ESCALATION

6.13.1 The quoted / accepted rate have to be kept firm for the entire contractual period including total extended period if any and no claim for revision of rates is allowed under any circumstances.

6.13.2 However the contractor shall maintain sufficient work force and other resources required for completion of the job expeditiously for the entire contractual period including total extended period.

6.14.0 TAXES

6.14.1 Not withstanding the fact that this is only an erection service contract not involving any transfer of materials whatsoever and not attracting any sales tax liability, being labour oriented job work, for the purpose of Sales Tax the contractor has to maintain the complete data relating to the expenditure incurred towards wages etc. in respect of the staff/workers employed for this work as also details of purchase of materials like consumables, spares etc., interalia indicating the name of the supplier, address and ST Registration No. and ST paid and should furnish to BHEL at the year end.

6.14.2 The contractor has to register under local Sales Tax-Law and get assessed. The contractor has to give a certificate each year that the returns and submitted regularly and the turnover on this contract is included in his sales tax return. The sales tax registration number and certificate is to be furnished at site soon after the award of contract. However in case delay is anticipated in obtaining S.T. Regn.No. a copy of application for registration filed with ST authorities shall be submitted along with first running bills and the ST Regn.No. will be submitted within a reasonable time.

6.14.3 The final bill amount would be paid only after submission of proof of inclusion of the turnover of this contract in the ST Returns or ST Clearance certificate. The ST deduction at source will be made from running bills, unless necessary exemption is produced.

6.15.0 IMPORTANT CONDITIONS FOR PAYMENT

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

i. PF Regn. No.
ii. Labour Licence No.
iii. Workmen Insurance Policy No.
iv. Un Qualified Acceptance for Detuiled L.O.I.
v. Initial 50% Security Deposit.
vi. Rs. 100/- Stamp Paper for Preparation of contract agreement

6.16.0 PROVIDENT FUND & MINIMUM WAGES

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

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

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

6.17.0 OTHER STATUTORY REQUIREMENTS

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

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

3) The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of

Wages. Incase of "Non-compliance of Sec 21 or non-payment of wages" to the workmen before the expiry of wage period by the contactor, BHEL will reserve its right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.

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

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

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

6.18.0 SERVICE TAX

Service Tax as applicable for this Contract will be borne by BHEL.

The contractor may claim the Service Tax in their R.A.bill and the same will be paid by BHEL, on production of copy of registration certificate. Proof of remittance of service tax by the contractor to the service tax authorities, relating to previous RA bill, has to be produced from the second running bill onwards.

6.18.1 TAXES, DUTIES, LEVIES

Refer to clause 2.8.4 of general conditions of contract in this regard.

New Levies / Taxes

In case the government imposes any new levy / Tax after award of the work, BHEL shall reimburse the same at actuals on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / Tax is applicable to this contract. No reimbursement on account of increase in the rate of existing levies shall be made.

6.19.0 WELDING, HEAT TREATMENT & RADIOGRAPHY

6.19.1 The pressure parts shall be erected in conformity with the provisions of Indian Boiler Regulations and as may be directed, as per other standard/specification in practice in BHEL. The method of welding (viz) ARC, TIG or other methods as indicated in the detailed drawing or as instructed by BHEL Engineer shall be followed. BHEL Engineer will have the option to change the method to suit site conditions. All the

prepared/patched edges will have to be suitably protected to prevent rusting or foreign material ingression.

6.19.2 Welding of high tensile structural steel and pressure parts shall be done by using certified welders who possess requisite certificate and who are approved by BHEL Engineer.

6.19.3 All Welders shall be tested and approved by BHEL Engineer before they are actually engaged on the work even though they may possess the requisite certificate. BHEL reserves the right to reject any welder without assigning any reason. The welder identification code as approved by the BHEL Engineer shall be stamped by the welder on each joint done by them. The contractor will be responsible for the periodic renewal, retesting of the welders as demanded by BHEL statutory requirements.

6.19.4. BHEL Engineer is entitled to stop any contractor's welders from his work if his work is unsatisfactory for any technical reasons or there is a high percentage of rejection of joints welded by him in the opinion of BHEL Engineer, will adversely affect the quality of welding. Even though the welders has earlier passed the tests it does not relieve the contractor from his contractual obligations, to check the performance of the welders.

6.19.5 All charges for testing of welders (pre production test) including destructive and non-destructive tests at site shall have to be borne by the contractor. Necessary pipe material will be arranged by BHEL and all testing facility will be made available by the contractor.

6.19.6 All welded joints shall be subjected to acceptance by BHEL Engineer.

6.19.7 Pre-heating/post heating and stress relieving after welding are part of erection work and shall be performed by the contractor in accordance with the instructions of BHEL Engineer. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for the labour, all heating elements, thermocouples, compensating cables, insulation materials like mineral wool, asbestos cloth, ceramic beeds, asbestos rope, etc required for the heat treatment and stress relieving works. During the heat/stress relieving operations, the temperature shall be measured at one or more points as required by attaching thermocouples and recorded on a continuous printing type recorders. All the recorded graphs for the heat treatment works carried out shall be got signed by BHEL Engineer prior to the commencement of each cycle and handed over to BHEL on completion. The graphs will be the property of BHEL. The contractor has to provide thermo chalks, temperature recorders, thermocouple attachment units, graph sheets, etc required for the job and maintain them in good condition.

6.19.8 All electrodes shall be baked and dried in an electric electrode drying oven to the required temperature and for the period specified by the Engineer before they are used in Erection work, and all welders including high pressure welders shall have a portable electrode drying oven at the work spot.

6.19.9 All butt joints of high pressure piping shall be carried out by TIG root run and subsequent runs by Arc welding. Full TIG welding, wherever necessary shall be carried out within the quoted rates. For oil system

piping root run of all the butt joints shall be carried out by TIG welding only.

6.19.10 The technical particulars, specifications and other general details of works shall be in accordance with BHEL welding, Heat treatment and NDE manuals or equivalent as decided by the BHEL Engineer.

6.19.11 Contractor shall carryout Radiography as per Welding Manual Booklet applicable as per IBR. However, percentage radiography shown in the respective drawings shall be final and binding on the contractors.

The percentage given above are tentative, which may be increased depending upon the quality of joints at the discretion of BHEL.

6.19.12 Low speed high contrast fine grain films (D7 or equivalent) in 10cm width only should be used for weld joint radiography. Film density shall be between 1.5 to 2.00.

6.19.13 All radiographs shall be free from mechanical, chemical or process marks to the extent they shall not confuse the radiographic image and noticed.

6.19.14 Penetrometer as per ASME/ISO, shall be used for all exposures.

6.19.15 Lead numbers and letters (generally or 6 mm size) are to be used for identification of radiographic contract No., joints identification, sources used welders identification, SFD used are to be noted down in the paper cover of radiography. Load identifying screens for front and back of the film shall be used as per the instruction of BHEL Engineer.

6.19.16 The weld 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 stream side of the weld. For the multiple exposures on pipes, an overlap of about 25mm of film shall be provided.

6.19.17 The contractor shall be fully equipped with radiography equipments, films, chemicals and other dark room facilities. There must be a number of radiographic personnel with sufficient experience and certified by BARC for field radiographic inspection. Further the contractor must follow strictly the safety rules laid down by the BARC, from time to time; contractor's radiographers shall also be registered with BARC for film badge service.

6.19.18 Contractor shall provide all skilled, unskilled workmen required for the job, which will include Engineers, supervisors, operators, as required for timely and satisfactory execution of radiography work.

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

6.19.20 All the radiographs shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.

6.19.21 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 high pressure welders. If the performance of the welder is unsatisfactory, he shall be replaced immediately.

6.19.22 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of the Engineer and Re- radio graphed. The decision of the Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor.

6.19.23 Wherever radiographs are not accepted on account of poor exposure, joints shall be re-radio graphed and new film submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defect persists after the first repair as per radiograph, carrying out radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable the same shall be cut, re-welded and re-radio graphed at contractor's cost.

6.19.24 The contractor shall also be equipped for carrying out other NDT like liquid penetrant inspection, magnetic particle inspection etc., as and when required in the interest of work, within the quoted rates.

6.19.25 For carrying out ultrasonic testing of welded joints of large size tubes and pipes, it will be necessary to prepare the surface by grinding to a smooth finish and contour as described by BHEL Engineer. The contractor's scope of work include such preparation and no extra charges are payable for this.

6.19.26 The contractor has to make his own arrangements for air-conditioned dark room to process the radiographs.

6.19.27 It may also be necessary to adopt inter layer radiography / MPT / UT depending upon the site / technical requirements necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The contractor shall take all this in to account and quote the price inclusive of all such work and radiography.

6.19.28 The welded surface irrespective of place of welding shall be cleaned of slag and painted at the center with primer paint to prevent corrosion

at no extra cost towards this. Paint for this purpose shall be provided by BHEL.

SCOPE AT A GLANCE
SECTION VII – APPENDIX I
SITE FACILITIES

PROJECT : VIJAYAWADA RATING: 1 X 500 MW Unit- VII

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.1.0	**ESTABLISHMENT**			
1.1.1	**FOR CONSTRUCTION PURPOSE:**			
A	Open space for office	Yes		
B	Open space for storage	Yes		
C	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
D	Bidder's all office equipments, office / store / canteen consumables		Yes	
E	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
F	Fire fighting equipments like buckets, extinguishers etc		Yes	
G	Fencing of storage area, office, canteen etc of the bidder		Yes	
1.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
A	Open space	Yes		
B	Living accommodation		Yes	
1.2.0	**ELECTRICITY**			
1.2.1	Electricity For construction purposes (to be specified whether chargeable or free)			
1.2.1.1	Single point source	Yes	-	
1.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:		-	
1.2.2.1	Distribution from single point including supply of matreials and service		Yes	
1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	
1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	
1.2.2.4	Living facilities for office use including charges		Yes	
1.2.2.5	Demobilization of the facilities after completion of works		Yes	
1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
1.3.0	**WATER SUPPLY**			
1.3.1	**For construction purposes:**			
1.3.1.1	Making the water available at single point	Yes		
1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.3.2	**Water supply for bidder's office, stores, canteen etc**			
1.3.2.1	Making the water available at single point	Yes		
1.3.2.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.4.0	**TRANSPORTATION**			
1.4.1	For construction purposes:		Yes	
1.4.1.1	For the site personnel of the bidder		Yes	
1.4.1.2	For the bidder's euipments and consumables (T&P, consumables etc)		Yes	
1.5.0	**LIGHTING**			
1.5.1	For construction work (supply of all the necessary materials) 1. At office storage area 2. At the preassembly area 3. At the construction site /area		Yes	
1.5.2	For construction work (execution of the lighting work/ arrangements) 1. At office storage area 2. At the preassembly area 3 At the construction site /area		Yes	
1.5.3	Providing the necessary consumables like bulbs, switches, etc during the course of construction		Yes	
1.5.4	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
1.6.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
1.6.1	Telephone, fax, internet, intranet, e-mail etc		Yes	
1.7.0	**COMPRESSED AIR SUPPLY**			

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.7.1	Supply of Compressor and all other equipments required for compressor and compressed air system including pipes, valves, storage systems etc		Yes	
1.7.2	Installation of the above system and operation and maintenance of the same .		Yes	
1.7.3	Supply of the all the consumables for the above system during the contract period		Yes	

SCOPE AT A GLANCE

PROJECT : VIJAYAWADA RATING: 1 X 500 MW Unit- VII

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.1.0	Engineering works for construction :			
2.1.1	Providing the erection drawings for all the equipments covered under this scope	Yes		
2.1.2	Drawings for construction methods	Yes		
2.1.3	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	
2.1.4	Shipping lists etc for reference and planning the activities	Yes		
2.1.5	Preparation of site erection schedules and other input requirements		Yes	
2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	
2.1.7	Weekly erection schedules based on Sl No 2.1.5	Yes	Yes	
2.1.8	Daily erection / work plan based on Sl No 2.1.7	Yes	Yes	
2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.	-	Yes	

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.1.10	Preparation of preassembly bay	-	Yes	
2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself	-	Yes	
2.1.12	Arranging the materials required for preassembly	-	Yes	
2.2.0	SUGGESTED LIST OF TOOLS AND PLANTS (BHEL should indicate the proposed number of items considered as free issue)			
2.2.1	250 T crawler crane		As required for work to be arranged by bidder	
2.2.2	250 T tyre mounted crane			
2.2.3	100 -135 T crawler crane ONE (1)	Yes		*
2.2.4	150T tyre mounted crane			
2.2.5	100 T crawler crane			
2.2.6	100T tyre mounted crane			
2.2.7	75 T crawler crane			
2.2.8	75 T tyre mounted crane			
2.2.9	60T Kroll tower crane			
2.2.10	18 T crawler crane			
2.2.11	18/20 T tyre mounted crane one			
2.2.11 A	8T Escort crane One No (1)			
2.2.12	30T gantry crane			
2.2.13	15 T gantry crane			
2.2.14	10T gantry crane			
2.2.15	30T tractor trailer			
2.2.16	20T trailer			
2.2.17	10 T trailer / truck			
2.2.18	Electrical winches 15 T with / wire ropes Drum lifting (2 Nos)			
2.2.19	Electrical winches 10T with / without wire ropes			
2.2.20	Electrical winches 5 T with / without wire ropes			
2.2.21	Electrical winch 3 T with or without wire rope			
2.2.22	Electrical winches with/without wire ropes			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.23	Pneumatic winches 1 T with / without wire rope			
2.2.24	Welding generators			
2.2.25	Welding rectifiers			
2.2.26	Welding transformers air cooled			
2.2.27	Welding transformers oil cooled			
2.2.28	Chain pulley block 10T		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.29	Chain pulley block 5 T			
2.2.30	Chain pulley block 3T			
2.2.31	Chain pulley block 1T /2T			
2.2.32	Pulling & lifting machines 5T			
2.2.33	Pulling & lifting machine 3T			
2.2.34	Pulling and lifting machine 2T / 1T			
2.2.35	Multi sheave pulley block 200 T (4) Drum Lifting			
2.2.36	Multi sheave pulley block 100 T (As Required)			
2.2.37	Multi sheave pulley block 50T			
2.2.38	Multi sheave pulley block 30T			
2.2.39	Multi sheave pulley block 20T			
2.2.40	Multi sheave pulley block 5T			
2.2.41	Single sheave shackle pulley block 20T			
2.2.42	Single heave shackle pulley block 10T			
2.2.43	Single sheave shackle pulley block 5 T			
2.2.44	25 V transformer with sufficient spare bulbs			
2.2.45	Gas cutting torches with regulators			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.46	Torque wrench			
2.2.47	Pipe vice			
2.2.48	Bench vice			
2.2.49	Anvil			
2.2.50	Baking oven for welding electrodes			
2.2.51	Portable drying oven for baked welding electrodes			
2.2.52	GQA grinding machine		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.53	FF2 grinding machine			
2.2.54	Angle grinders AG7			
2.2.55	Tig welding sets			
2.2.56	Air conditioners 1.5 T			
2.2.57	Sheet bending machine			
2.2.58	Sheet rolling m/c			
2.2.59	Sheet grooving m/c			
2.2.60	Pedestal drilling m/c			
2.2.61	Drilling m/c 31 mm			
2.2.62	Drilling m/c 20mm			
2.2.63	Drilling m/c 10 mm			
2.2.64	Hand drilling m/c 6 mm			
2.2.65	D shackles 30 T			
2.2.66	D shackles 20T			
2.2.67	D shackles 15 T Drum lifting			
2.2.68	D shackles 10T			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.69	D shackles 5T/3T			
2.2.70	Wire rope sling 6x36 12mmx6m			
2.2.71	Wire rope slings 12mmx10m			
2.2.72	Wire rope slings 16mmx4m			
2.2.73	Wire rope slings 16mmx6m			
2.2.74	Wire rope slings 16mmx10m			
2.2.75	Wire rope sling 19mmx15 m			
2.2.76	Loose wire rope 16mm			
2.2.77	Loose wire rope 19 mm			
2.2.78	Loose wire rope 25mm			
2.2.79	Loose wire rope 32mm		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.80	Wire rope clamps for the above sizes sufficient quantity			
2.2.81	Manila ropes of sufficient quantity in different sizes			
2.2.82	Hydraulic jacks 250/200T			
2.2.83	Hydraulic jacks 100T			
2.2.84	Hydraulic jacks 50T			
2.2.85	Hydraulic jacks 25 T			
2.2.86	Hydraulic jacks 10T			
2.2.87	Tower crane 50T			
2.2.88	Derricks 30T with 70 M high with all necessary accessories 2 nos			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.89	EOT cranes in TG hall ♦ Main hook - 105 MT ♦ Aux hook - 15 MT	Yes		
2.2.90	Sleepers both wooden and concrete for movement of cranes at site			
2.2.91	Concrete blocks for pre assembly works at site			
2.2.92	15 T snatch pulley blocks Drum lifting			
2.2.93	Hydro test pump 600 bar/400 bar (ONE No.)	Yes		
2.2.94	Hydro test pump 250 bar -			
2.2.95	Hand operated hdro test pump			
2.2.96	Boiler filling pump 100m head with ~ 15 LPSec			
2.2.97	Pressure gauges 400 bar			
2.2.98	Pressure gauges 600 bar		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.99	Pressure gauges 100 bar			
2.2.100	Acid cleaning pumps with all accessories including switch gears			
2.2.101	Stress relieving / preheating equipments including transformers, controllers, heating pads and insulating materials and consumables			
2.2.102	Hydrauli pipe bending machines to suit up to 80mm dia and 11 mm thick			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.103	Electric driven pipe chamfering machines up to 100 mm dia tubes with necessary cutting tools and other consumables			
2.2.104	Electric driven pipe chamfering m/c to suit pipes from dia 100 mm to 500/600 mm			
2.2.105	Theodolite 1 min accuracy			
2.2.106	Dumpy level			
2.2.107	6 point temp. recorder			
2.2.108	Radiographic equipments with suitable isotopes/ x ray machines			
2.2.109	MPI test kit			
2.2.110	Ultrasonic flaw detector			
2.2.111	Dye penetrant test kits (as required)			
2.2.112	Moving platforms Sky Claimber			
2.2.113	Passenger cum goods lift (1)			
2.2.114	Dip lorries			
2.2.115	Rails and sleepers for dip lorries, both supply and installation		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.116	Calibrated steel tapes of different sizes			
2.2.117	Plumb bobs			
2.2.118	Micro meters of different sizes both inside and out side			
2.2.119	Vernier calipers of different sizes			
2.2.120	Surface plate			
2.2.121	Straight edges of different lengths			
2.2.122	Feeler gauges of different lengths			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.123	Inside and out side calipers			
2.2.124	Bolt heating equipments including thermo couples			
2.2.125	Dial gauges with magnetic base			
2.2.126	Magnifying glass			
2.2.127	Piano wires			
2.2.128	Precision water level micrometer			
2.2.129	Parallel blocks			
2.2.130	Taper wedges			
2.2.131	Micro jacks			
2.2.132	Lead wires			
2.2.133	Dial bore micro meter			
2.2.134	Thermo meters of different ranges			
2.2.135	Depth gauges			
2.2.136	"GO & "NO GO" gauges			
2.2.137	Drill sets			
2.2.138	Taps and die sets		To be arranged by the bidder as required for work	
2.2.139	Spirit levels			
2.2.140	Master spirit level			
2.2.141	Spring balance			
2.2.142	Hg manometer			
2.2.143	Vibro meter			
2.2.144	Noise level meter			
2.2.145	Litmus paper			
2.2.146	Portable gas purity meter			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.147	Dead weight tester			
2.2.148	Temp bath for calibration			
2.2.149	250V/500V megger			
2.2.150	½.5/5.0 KV motorised megger			
2.2.151	Ammeter and voltmeters			
2.2.152	HV test kit			
2.2.153	Double kelvin Bridge			
2.2.154	DC bridge			
2.2.155	Mano meters			
2.2.156	Auto transformers			
2.2.157	CT(100/5A)			
2.2.158	Purge test kits			
2.2.159	Multi meters			
2.2.160	Variac 3phase 10 A			
2.2.161	Phase sequence meter			
2.2.162	Dual beam osciiloscope continuity tester			
2.2.163	Rheostats			
2.2.164	Milli seconds syn timer			
2.2.165	Ultra violet recorder		To be arranged by the bidder as required for the work	
2.2.166	Tong tester			
2.2.167	Hardness tester			
2.2.168	Bolt stretching device			
2.2.169	Reamers of various sizes			
2.2.170	Vacuam cleaner			
2.2.171	Sand blasting machine with accessories			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.172	Spray painting equipments			
2.2.173	Oil filtration units			
2.2.174	Bearing pullers of different sizes			
2.2.175	Bearing scrappers			
2.2.176	Slip gauges			
2.2.177	Elko meter to measure paint thickness			
2.2.178	MIG welding machines			
2.2.179	Files of different sizes			
2.2.180	Socket wrenches			
2.2.181	Spanner and pipe wrenches sets			
2.2.182	Hammers of different sizes (soft &hard)			
2.2.183	Allen keys sets			
2.2.184	Fire proof tarpaulins			
2.2.185	Steel scaffolding materials			
2.2.186	Pipe cutters			
2.2.187	Magnetic base for drilling machines			
2.2.188	Vibrator for grouting			
2.2.189	Mixing m/c (grouting and concreting)			
2.2.190	Tube expanding machine ie drives – hydraulic or pneumatic ( )			
2.2.191	Tube expanders(expansion and flaring)			
2.2.192	Mercury plumb bob			
2.2.193	Band saw machines		Yes	
2.2.194	Copper rods			
2.2.195	Needle vibrators			
2.3.0	All consumables including :			
	Ordinary cement		Yes	
	Grouting cement		Yes	
	Any special cement		Yes	

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	Sand, bricks etc		-	
	TIG wires		Yes	
	Electrodes		Yes	
	Brazing rod, flux etc		Yes	
	Soldering		Yes	
	DA, oxygen, argon		Yes	
	Nitrogen required for chemical cleaning	Yes	-	
	Nitrogen required for construction		Yes	
	Paints along with thinner, brushes, cleaning materials etc for preservation of components			
	Paints including thinner, brushes, cleaning materials etc for final painting , as per specifications	-	Yes	
2.4.0	**WELDING**			
2.4.1	All welding works		Yes	
2.4.2	All radiography and other testing works like DPI, MPI, UT,		Yes	
2.4.3	All connected works like preheating, post heating, stress relieving,		Yes	
2.4.4	Providing certified either IBR or as per other relevant welders for the works. BHEL will not provide materials, test certificates etc for the above purpose unless specifically stated .		Yes	
2.4.5	To submit the welders to BHEL/client's approval (preproduction test) before putting them on regular work. Required materials for preproduction test to be arranged by BHEL.	Yes	-	
2.4.6	The accessories required for the welders to be arranged by the bidder		Yes	
2.5.0	**CHEMICAL CLEANING**			
2.5.1	Supply of pumps, motor, starters, cables, piping and other materials required for the operation	Yes	-	If required

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.5.2	Servicing the required equipments and commissioning		Yes	
2.5.3	Chemicals required for the operation including Nitrogen gas	Yes		
2.5.4	Handling equipments / consumables for the chemical cleaning works		Yes	
2.5.5	Effluent disposal system		Yes	
2.5.6	Services for the effluent disposal		Yes	

Note : * All the tools and plants required for this scope of work, except the Tools & Plants provided by BHEL are to be arranged by the contractor within the quoted rates. The list is suggestive in nature. Any additional T & P required to be arranged by the contractor.

Sl.No	PART III ERECTION TESTING & COMMISSIONING	taken care by		Remarks
		BHEL	Bidder	
3.1.0	**SCOPE OF WORK**			
3.1.0.1	Handling at site stores/ storage yard		Yes	
3.1.0.2	Transportation within the site		Yes	
3.1.0.3	Erection testing & commissioning		Yes	
3.1.0.4	Final painting of erected materials including supply of paints, thinners etc		Yes	
3.1.0.5	Carrying out P.G.test	-	-	
3.1.1.0	**HANDLING & TRANSPORTATION**			
3.1.1.1	Stores/storage yard to preassy area/ erection site		Yes	
3.1.1.2	Pre assembly area to site of installation		Yes	
3.1.1.3	Erection site to pre assembly area / stores/ storage area if required		Yes	
3.1.1.4	Touch up painting wherever required till final painting.(please refer the relevant clause for supply of paints, thinners etc)		Yes	
3.1.1.5	Preparation storage at site for proper stacking of materials		Yes	

Sl.No	Description **PART III** **ERECTION TESTING & COMMISSIONING**	Scope / to be taken care by		Remarks
		BHEL	**Bidder**	
3.1.2	ERECTION TESTING & COMMISSIONING			
3.1.2.1	Erection drawings/documents/working instructions etc	Yes	**-**	
3.1.2.2	Welding schedules	Yes	**-**	
3.1.2.3	Engineering drawings for construction methods	Yes	-	
3.1.2.4	Organising the resources required for erection, testing &commissioning of the materials covered under the scope and executing the work as per instruction of BHEL engineer	**-**	Yes	
3.1.2.5	Final painting of all the materials erected	**-**	Yes	
3.1.2.6	Demobilization of the erection site		Yes	
3.1.2.7	Cleaning of / upkeep of erection / preassembly /storage areas		Yes	
3.1.2.8	Return of excess materials drawn to BHEL stores/ customer		Yes	
3.1.2.9	Reconciliation of all the consumables, T&P drawn from BHEL / customer ` s store		Yes	
3.1.2.10	Filling up quality log sheets		Yes	
3.1.2.11	Providing all temporary arrangements like platforms, scaffoldings etc for execution		Yes	
3.1.2.12	Assistance for P.G test	**-**	**-**	
3.1.3	**CIVIL WORKS**			
3.1.3.1	Taking over of foundations		Yes	
3.1.3.2	Checking, chipping and correcting final dimensins of the foundations if required		Yes	
3.1.3.3	Placement, erection of embedded parts integral for the scope of work and coordination with customer's civil/other agencies for embedments		Yes	

Sl.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1.3.4	Bolt grouting with grout as specified		Yes	
3.1.3.5	Final grouting of all the equipments covered under this scope		Yes	
3.1.4	**STATUTORY CLEARANCES**			
3.1.4.1	Labour license		Yes	
3.1.4.2	Provident fund		Yes	
3.1.4.3	Insurance what ever comes under bidder's scope		Yes	
3.1.4.4	Workmen compensation		Yes	
3.1.4.5	Minimum wages		Yes	
3.1.4.6	Sales tax		Yes	
3.1.4.7	Local laws governing the works like electrical inspectorate, factory inspectorate, etc		Yes	
3.1.4.8	Professional tax		Yes	
3.1.4.9	Safety rules and regulations		Yes	
3.1.4.10	Approval from competent authority for installation like IBR etc		Yes	
3.1.5	**SUBMISSION OF REPORTS**			
3.1.5.1	Man power deployment category wise and area wise		Yes	
3.1.5.2	Deployment of tools and plant , area wise		Yes	
3.1.5.3	Consumables used		Yes	
3.1.5.4	Erection log		Yes	
3.1.5.5	Erection data PGMADU wise		Yes	
3.1.5.6	Data on joints welded as per log sheet/ welding schedule		Yes	
3.1.5.7	Materials management reports as per instruction of BHEL		Yes	
3.1.5.8	Meeting between BHEL and bidder at BHEL office every day for monitoring the progress	Yes	Yes	

SECTION – VII APPENDIX – II

BRIFE LIST OF EQUIPMENTS/COMPONENTS TO BE ERECTED IN EACH UNIT

1. STEAM TURBINE

- Steam Turbine Consisting of 3 cylinders (HP/IP/LP) including the following
- Sole /Base plates & Foundation Holding Bolts
- Bearing Pedestals
- ESV&CV, IV&CV, LPBP Valves with servomotors & Suspensions
- LP BP water injection Valves
- Steam Strainer Housing & Strainer Elements for Main Steam & Re-Heat Steam Lines
- Hydraulic Turning Gear
- Electro-Hydraulic Governing System backed-up with mechanical System
- Governing Rack, LP By-Pass racks and solenoid, test Valve racks & Pr transducers rack.
- Cross around Piping between IP&LP Casing
- Turbine integral piping
- Blanking Device/Fixtures for ESVs, IVs LPBP, CRH NRVs etc., for hydraulic testing and steam blowing
- HP BP Valves, Oil Supply Units & Oil piping(Trichy Supply Under PG 22)
- Lube Oil System consists of oil tanks, injector assy, centrifuge, AOP, JOP, EOP with starter panels, Leak & Dirty oil tank with pumps, Duplex Filter, vapour fans and auxiliaries, clean oil tank, oil unloading tank, connected oil piping, valves, H&S etc.,
- Control Fluid tank, Oil equipment, piping, Valves, H&S etc.,
- Lifting Beam

2. TURBO GENERATOR

- Hydrogen Cooled Main Generator Consisting of the following
    - Stator

- Rotor
- End Shields & Bearing
- Exciter
- Seal Oil System
- Primary Water System
- H_2 Cooling System
- CO_2 System
- Seal Oil Tank
- PW Tank & Alkaliser Unit
- Generator package piping
- Other Accessories

3. HEAT EXCHANGERS

- Condenser mainly comprising of the following parts
  - Bottom Plate
  - Hot Well
  - Turbine & generator End side plate
  - Dome Walls
  - Front & Rear Water Chambers with Tube Plates
  - Support Plates
  - Springs
  - Steam Through device
  - Air Extraction Pipe & Baffle
  - Stiffening/Support Pipes/Rods, Bars etc.,
  - Misc Fittings & Loose items
  - Instruments

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

4. PUMPS & MOTORS

- Boiler Feed Pumps (1 Motor Driven & 2 Turbo Driven)
- 2 Drive Turbine for TD BFP Consists of

- Turbine Assembly
- Governing Valve Assembly
- Oil Pumps
- Lube Oil Console
- Gear Box
- Connecting Couplings
- Oil Coolers etc.,

- Motor for MD BFP
- Booster Pumps for BFP
- Lube Oil Piping, Cooling Systems & other Accessories for BFP, Drive Turbine & Motor
- Condensate Extraction Pump
- Motors for CEP
- Main cooling water pump with motor and accessories – 4 sets

5. BOUGHT OUT ITEMS

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

- Condenser Tubes
- Vacuum Pumps & Air evacuation System
- Condenser Water Box Handling Equipment
- Handling Equipments for the system under this scope
- Oil Centrifuge & Associated System
- CF Purification Unit with pumps, Vapour exhauster etc.,
- 3 Way Control Valves
- Drain Valves
- Hangers & Supports
- Pumps with Accessories (JOP, AOP, EOP)
- Springs
- Dampers(Vacuum Breaking Device)
- H2 & CO2 Cylinders, N2 Cylinders

- Fixing of Pick-Ups, Probes & Accessories for Vibration Monitoring System
- Dynamic Shaft Grounding Device
- Bearing Vapour Exhauster
- Coupling Covers
- RE Joints & Stretching Bolt Assembly
- Flash Tanks
- Butterfly Valves
- ME Bellows
- Self Cleaning Filter
- Portable Lube Oil Purification Unit
- Condenser On Load Tube Cleaning System(COLT)
- Turbine enclosure & cladding

Note :

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

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

SECTION VII

APPEDIX –III

WEIGHT SCHEDULE FOR ONE UNIT

SNo	EQUIPMENT/PACKAGE	APPROX. WT (in MT)
01	Steam Turbine & Aux.	**911.0**
02	Turbo Generator & Aux	**530.0**
03	Condenser & Aux	**559.0**
04	BOI Items	**490.0**
05	Heat Exchangers	**373.0**
06	BFP Turbine	**116.0**
07	Pumps & Aux	**177.0**
	TOTAL	**3156.00**

Note :

1. The weight indicated above is approximate and there may be a variation in weight of equipment/Package. However the total weight so erected by the contractor will be with in + or - 10% of the total weight indicated above.

SECTION VII APPENDIX - IV

LIST OF PACKAGES WEIGHING MORE THAN 20 TONNES

SL. NO.	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN MT
1.	HP TURBINE	5660 x 3100 x 2880	86.5
2.	IP ROTOR	6650 x 2700 x 2600	27.4
3.	IP OUTER CASING U/H	3610 x 5400 x 2600	26
4.	IP OUTER CASING L/H	3610 x 5400 x 2600	26
5.	LP ROTOR	8735 x 3800 x 41700	89.8
6.	LONGITUDINAL GIRDER RIGHT	8200 x 1680 x 1950	21.4
7.	LONGITUDINAL GIRDER LEFT	8200 x 1680 x 1950	21.4
8.	LPC INNER – OUTER UPPER HALF	8640 x 3630 x 2500	42
9.	LPC INNER CASING ASSY (LH)	9100 x 3890 x 3180	53
10.	IV & CV CASING WITH VALVE	5040 x 4690 x 2770	33.2
11.	ESV & CV CASING WITH VALVE	3600 x 3190 x 2500	23
12.	STATOR	8830 x 4100 x 4120	28
13.	ROTOR WITH TOOLS & TACKLES	1400 x 1850 x 1750	73.1
14.	END SHIELD LOWER HALF (TE)	6200 x 2350 x 2670	31.1
15.	END SHIELD UPPER HALF (TE)	6165 x 2050 x 2650	28.3

16.	B'LESS EXCITER SET	5750 x 2350 x 3400	32.9
C. HEAT EXCHANGERS **i) CONDENSER**			
17.	FRONT WATER – BOX (GEN. SIDE)	7645 x 4460 x 2640	32.6
18.	FRONT WATER – BOX (TUR. SIDE)	7645 x 4460 x 2495	32.6
19.	REAR WATER –BOX (GEN. SIDE)	6655 x 4460 x 2495	21.5
20.	REAR WATER –BOX (TUR. SIDE)	6655 x 4460 x 2495	21.5
ii) HEATERS & DEAREATER			
21.	HP HEATER 5A		45
22.	HP HEATER 5B		45
23.	HP HEATER 6A		58
24.	HP HEATER 6B		58
25.	LP HEATER 2		26
26.	LP HEATER 3		21
iii) FST & DEAERATOR			
27.	FST - LEFT HAND SECTION		29.9
28.	- MIDDLE HAND SECTION		24.6
29.	- RIGHT HAND SECTION		29.9
30.	DEAERATOR HEADER		34.2
PUMPS & MOTORS			
31.	BFP Drive turbine (each)		56
32.	BFP Motor		25

NOTE TO ODC DETAILS:

1. The above list contains only the Packages of major items, its ODC and unit weights to be handled at site. For total weight to be erected please refer weight schedule Section – VII & Appendix – IV.

2. The list is tentative and is given to enable the contractor to study the nature of work to be done in this contractor. There may be variation in size, weight etc of an individual item but the total tonnage to be erected will be within +or –10% of total weight given in the weight schedule.

3. Some of the packages may be sent in parts to suit the site condition / transportations, the same is to be assembled site without any extra cost. Like wise, the package may be assembled together and send as a single assy. contractor may have to dismantle and erect (or) erect as single assy as per the instruction of BHEL Engineers without any extra cost.

SECTION VII

APPENDIX - V

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

S.No	Description	Qty
01	EOT Cranes at TG Hall	01
02	Portal Gantry Crane 360T(For Generator Stator Placement)	01*
03	100T - 135T Range Crane for FST & Deaerator	01**
04	Slings for Stator Lifting	Set
05	Hydro Test pumps(400/600Kg/Cm^2 for HP lines)	01

* - Ref Note No 5

** - For Lifting FST/De-aerator and other heavy items out side TG Hall

Note –

1. All the above T&Ps shall be issued on free of hire charges on need basis for erection/pr-commissioning activities only and to be shared with other contractors. Allotment will be made by BHEL Site I/c depending on the requirement

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

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

4. For 100T - 135T Range crane, the required operator, fuel & lubricants shall be arranged by the contractor at their cost.

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

    a) A suitable mobile crane for erection & dismantling of the portal crane on free of hire charges(Operator, Fuel & lubricants for the crane are to be arranged by the contractor at his cost)
    b) Lubricants for drives & wire rope.
    c) Supervision for servicing / assy/commissioning
    d) Required Loads for testing

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

7. Any Loss/Damage of tools by the contractor shall have to replace or other wise cost thereof shall be recovered from the contractor.

8. Apart from the above mentioned tools, any other tools and plants required for satisfactory completion of the work has to be arranged by the contractor.

SECTION VII

APPENDIX - VI

PAINTING REQUIREMENTS CONDENSER & HEAT EXCHANGER COMPONENTS

Following painting scheme is selected based on NTPC specification :

Paint (Coat)	Paint Type	No. of coat	DFT*
Primer Paint	: Epoxy base Zinc rich Primer Paint	2 Coats	70
Intermediate Paint	: Epoxy TiO_2 Pigmented Polyamide Cured Paint	1 Coat	70
Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	60
		Total DFT 180 microns min.	

* DFT – Dry Film Thickness (final) in microns.

A. **Details of Color Scheme (Outside Surfaces):**
(**Legend** : **W**-at BHEL works; **V**- at vendor's works; **S**-at site; **NA**-Not applicable)

		Assembly	Shade	Primer	Int. Paint	Final Paint	Touch-up	Re-marks
01		Condenser	Blue RAL 5012	W	W	S	NA	
		L.P.Heater No.1,Gland Steam Condenser, Turbine oil coolers, Seal oil coolers.	-- Do --	W	W	W	S	
		Control fluid coolers & Stator water coolers (water boxes only as shell matl. being SS is not painted).	-- Do --	W	W	W	S	
		Hydrogen Coolers & Exciter Air Coolers.	Grey RAL 9002	W	W	W	S	

		Water Box Handling Arrangement	Golden Yellow RAL 1004	V	V	V	S	
		Air Exhauster for Gland Steam Condenser	Grey RAL 9002	V	V	V	S	

Following Item is imported. Sea worthy packing & painting is done as per standard practice of vendor:

Condenser Air Evacuation Equipment.

		-			**Paint**		**up**	
01		**Condenser** # Cooling water side surfaces (water boxes inside) # Tube plate surface towards water box side. # Shell side inside surfaces (steam side)	**Black** **-do-**	**W** (DFT 70 microns **S@**	--	S (High Build Black Coal Tar Epoxide Paint,Total DFT 0.25mm **-do-**	**NA** **-do-**	After tubing.
			Shell side inside surfaces are supplied coated with Steam Washable Paint at Works. This paint is to be washed before commissioning.					
02		L.P.Heater No.1 & Gland Steam Condenser	Shell side & Water box inside surfaces are supplied coated with Steam Washable Paint at Works. This paint is to be washed before commissioning.					
03		Turbine Oil Coolers & Seal Oil Coolers. # Shell inside # Water Box inside.	Supplied sprayed with oil. No painting required at site.					
			Black	W	---	**W** (High Build Black Coal Tar Epoxide Paint)	NA	
04		Control Fluid Coolers & Stator Water	No painting as material is SS.					

		Coolers # Shell inside # Water Box inside.	**Black**	**W**	---	**W** (High Build Black Coal Tar Epoxide Paint)	NA	

@ Tube plate surface is supplied painted with steam washable paint which is to be cleared before applying Primer on water box side surface.

PAINTING REQUIREMENTS FOR GENERATOR,

EXCITER AND AUXILIARIES

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

No	**Assembly**	**Ground Colour**	**Primer**	**Int. Paint**	**Final Paint**	**Touch-up**	
A	**Turbogenerator (Stator, end-shield, Terminal box etc.)**	Blue RAL 5012	W	S	S	NA	
B	**Exciter & exciter cover**	Blue RAL 5012	W	S	S	NA	
C	**Generator Gas System consisting of :**						
	Gas Unit	Grey RAL 9002	W	W	W	S	
	Duplex Gas Dryer	Grey RAL 9002	W	W	W	S	
	H2 Distributor	Grey RAL 9002	W	W	W	S	

		CO2 Distributor	Grey RAL 9002	W	W	W	S		
		N2 Distributor	Grey RAL 9002	W	W	W	S		
		CO2 Vapouriser	Grey RAL 9002	W	W	W	S		
		Piping and impulse piping in H2 line	Grey RAL 9002	V/W	S	S	NA		
		Piping and impulse piping in CO2 line	Grey RAL 9002	V/W	S	S	NA		
		Piping and impulse piping in N2 line	Grey RAL 9002	V/W	S	S	NA	Canary yellow ISC 309	5C/24	Legend-N
		Pipe supports	Black RAL 9011	V/W	S	S	NA		15/7	
		Valves	Grey RAL 9002	V	V	V	S		8/6	
		Bearing Vapor exhauster	Grey RAL 9002	V	V	V	S		5C/23	
	d	**Generator Seal Oil System consisting of :**								
		S.O. Motors	Blue RAL 5012	V	NA	V	S		71/16	Enamel paint to be used with matching primer and intermediate paint (alkyd based)
		S.O. Pump Unit	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Unit	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Valve Rack	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Instrument Rack	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Storage Tank	Grey RAL 9002	W	W	W	S		60/13	

		S.O. Piping & impulse piping	Grey RAL 9002	V / W	S	S	NA	Light Brown ISC 410	6C/ 24	Legend-SO
		Valves	Grey RAL 9002	V	V	V	S		8/6	
		Pipe Supports	Black RAL 9011	V / W	S	S	NA		15/7	
	e	**PW System consisting of :**								
		PW Motors	Blue RAL 5012	V	N A	V	S		71/1 6	Enamel paint to be used with matching primer and intermediate paint (alkyd based)
		PW pump & filter unit	Grey RAL 9002	W	W	W	S		60/1 3	
		PW coolers	Grey RAL 9002	W	W	W	S		60/1 3	Inform HXE
		Alkaliser Unit	Grey RAL 9002	W	W	W	S		60/1 3	
		PW Piping & impulse piping	Grey RAL 9002	V / W	S	S	NA	Sea Green ISC 217	1b/2 1	Legend - DMW
		Valves	Grey RAL 9002	V	V	V	S		8/6	
		Pipe Supports	Black RAL 9011	V / W	S	S	NA		15/7	
		PW tank	Grey RAL 9002	W	W	W	S		60/1 3	
	f	**Generator System consisting of :**								
		ACW piping for H2 coolers and impulse piping	Grey RAL 9002	V / W	S	S	NA	Sea Green ISC 217	1b/2 1	Legend ACW

		Valves	Grey RAL 9002	V	V	V	S	White RAL 9010	8/6	
		Pipe Supports	Black RAL-9011	V / W	S	S	NA		15/7	
		Drain / Vent Pipes	Grey RAL 9002	V / W	S	S	NA		1b/21	

	g	**Control Cabinets – Interior**	White Glossy Enamel	W / V	W / V	W/ V	NA			
	h	**Control Cabinets – Exterior**	Blue Ral 5012 Grey RAL 9002	W / V	W / V	W/ V	S		77/17	Front & Rear panels in Grey. End panel sides in Blue

PAINTING REQUIREMENTS FOR STEAM TURBINE COMPONENTS

Painting Scheme

Paint (Coat)	Paint Type	No. of coat DFT*
Primer Paint	: Epoxy base Zinc rich primer paint	2 Coats 70
Intermediate Paint	: Epoxy TiO_2 Pigmented Polyamide Cured Paint	1 Coat 70
Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats 60
	Total DFT	180

* DFT – Dry Film Thickness (final) in microns.

Details of Color Scheme :

(**Legend** : **W**-at BHEL works; **V**- at vendor's works; **S**-at site; **NA-**Not applicable)

No	Assembly	Shade	Primer	Int. Paint	Final Paint	Touch-up	Remarks

a	Bearing pedestals with assembled parts (outer unmachined surfaces)	Blue RAL 5012	W	W	W/S	NA	
b	ESV/IV& CV servomotors and LP bypass control & stop valve servo motors (outer unmachined)	Canary Yellow	W	W	W/S	NA	
c	Longitudinal girder and front walls of LPT. (Outer unmachined)	Blue RAL 5012	W	W	W/S	NA	
d	LP upper parts (outer unmachined)	Blue RAL 5012	W	W	W/S	NA	
e	Suspension arrangement for ESV & IV (unmachined).	Black RAL 9011	W	W	W/S	NA	
f	Shaft lifting & clearance measuring device. (unmachined)	Blue RAL 5012	W	W	W/S	NA	
g	Assy fixture for HPT (unmachined)	Blue RAL 5012	W	W	W/S	S	
h	Turning over device for HPT (unmachined)	Blue RAL 5012	W	W	S	NA	

i	Tools and tackles for Govenning equipments (Unmachined)	Blue RAL 5012	W	W	W/S	NA	
j	Transportation device for HPT (Unmachined	Blue RAL 5012	W	W	W/S	NA	
k	Pressure transducers racks (outer surface)	Blue RAL 5012	W	W	W/S	S	
l	Piping of Governing & LP bypass control rack & supply unit for valves.	As per schematics of governing system	W	W	W	S	
m	Oil pipe line outside the governing equipment (outer)	AS PER RESPECTIVE SYSTEM	W	-	S	NA	
n	Oil tank (MOT), Dirty oil tank , waste oil tank (outer unmachined)	Grey RAL 9002	W	W	W/S	NA	
0	Lifting Beam	Blue RAL 5012	V	V	V	S	
p	Spring Cages	Black RAL 9011	V	-	S	NA	
q	Hangers and supports for turbine integral piping	Black RAL 9011	V	-	S	NA	

r	Oil Vapour Exhauster(including Motor)	Grey RAL 9002	V	V	V	S	
s	3-way Temperature Control Valve Actuator	Grey RAL 900	V	V	V	S	
t	C.F. Temp. Control Valve Actuator	Grey RAL 9002	V	V	V	S	
u	Waste Oil Pump (including motor)	Grey RAL 9002	V	V	V	S	
v	Oil Purifier Control Panel	Grey RAL 9002	V	V	V	S	
w	Oil Purifier	Grey RAL 9002	V	V	V	S	
x	Dampers	Black RAL 9011	V	V	V	S	
y	AOP,EOP, JOP Motors	Blue RAL 5012	-	-	-	S	Red Oxide Primer & Enamel Paint as specified by NTPC
z	Hydraulic Accumulators	Brown	V	V	V	S	

Following Items are imported. Sea worthy packing and painting is done as per standard practice of vender . Suitable Finish paint shall be applied at site.

- CF Pump Motor
- CF Purification Unit
- CF Exhauster
- Vacuum Breaker Valve
- Gear Pump & return Pump
- Duplex Filter (Lub oil)
- Duplex Filter (Jacking Oil)

PAINITNG SCHEME NO	TYPE OF PAINT	COMPONENTS
2.	Heat resistant Aluminum paint Two Coats with a total DFT of 35 to 40 microns.	1. Casing and covers of valves (outside) 2. HPT &IPT outer casing (Outer Unmachined) 3. HP exhaust elbow (outer unmachined) 4. Main steam and reheat strainer body (outer unmachined) 5. Shaft seal covers 6. Cross around pipes

Above components are exposed to steam from inside and are covered with insulation

SECTION – VII

APPENDIX – VII

PAINTING SCHEDULE FOR STEAM TURBINE COMPONENTS

PAINTING SCHEME NO	PRIMING PAINT COAT.	INTERMEDIATE PAINT COAT	FINISH PAINT COAT	COMPONENTS TO BE COVERED
1.	Epoxy base zinc rich primer (2 Coat 70)	Epoxy based T102 pigmented polyamide cured paint. (1 Coat -70DFT)	Aliphatic Acrylic 2 Pack Polyurethane. (2 Coat - 60DFT)	1. Bearing pedestals with assembled parts (outer un-machined surfaces) 2. ESV/IV & CV servomotors and LP/HP bypass control & stop valve servo motors (outer unmachined) 3. Longitudinal girder and front walls of LPT. (Outer un-machined) 4. LP upper parts (outer un-machined) 5. Suspension arrangement for ESV & IV (unmachined) 6. Shaft lifting & clearance measuring device. (unmachined) 7. Assy fixture for HPT (unmachined) 8. Turning over device for HPT (unmachined) 9. Tools and tackles for Governing equipments (unmachined) 10. Transportation device for HPT (unmachined)

				11. Pressure transducers racks (outer surface) 12. Piping of Governing & HP/LP bypass control rack & supply unit for valves. 13. Oil pipe line outside the governing equipment (outer) 14. Oil tanks (MOT), Dirty oil tank, waste oil tank (outer unmachined) 15. Lifting Beam 16. Spring Cages 17. Hangers & Supports for Turbine Integral Piping 18. Oil Vapour Exhauster with Motor 19. 3 Way Control Valve with actuator 20. CF Control Valve actuator 21. Waste Pump with motor 22. Oil Purifier control Panel 23. Oil Purifier 24. Dampers 25. AOP, EOP, JOP Motors 26. Hydraulic Accumulators 27. Frame for governing rack, supply unit and LP bypass rack, all equipments mounted on rack transportation devices etc., Drip tray base (Outer).

PAINTING SCHEME NO	PRIMING PAINT COAT	INTERMEDIATE PAINT COAT	FINISH PAINT COAT	COMPONENTS TO BE COVERED
2.			Heat resistant Aluminum paint Two Coats with a total DFT of 35 to 40 microns.	1. Casing and covers of valves (outside) 2. HPT & IPT outer casing (Outer unmachined) 3. HP exhaust elbow (outer unmachined) 4. Main steam and reheat strainer body (outer unmachined) 5. Shaft Seal Covers 6. Cross Around Pipes Above components are exposed to steam from inside & are covered with insulation

The following items are imported and painted with sea worthy paints. Suitable finish paint shall be applied at site

1. CF Pump with Motor
2. CF Purification Unit
3. CF Exhauster
4. Vacuum Breaker Valve
5. Gear Pump & Return pump
6. Duplex Filter (Lube Oil)
7. Duplex Filter (Jacking Oil)

PAINTING SCHEDULE FOR TURBO GENERATOR

PAINTING SCHEME NO	PRIMING PAINT COAT	INTERMEDIATE PAINT COAT	FINISH PAINT COAT	COMPONENTS TO BE COVERED
1.	Epoxy based zinc rich primer (2Coats– 70 DFT)	Epoxy T102 pigmented polyamide cured paint. (1Coat – 70DFT)	Aliphatic Acrylic 2 Pack Polyurethane Finish Paints (2Coats-60DFT)	Turbogenerator:- 1. Stator (outer unmachined) 2. End shield (outer unmachined) 3. Terminal Box (outer unmachined) 4. Oil catchers (outer) – PGMA 13912 (outer unmachined) 5. Foundation plates (outer unmachined) Exciter 1. Main stator (outer and inner unmachined) 2. PMG stator (outer and inner unmachined) 3. Bearing Pedestal (outer unmachined) 4. Exciter covers (outer and inner unmachined) 5. Bed plates accessories (outer and inner unmachined) 6. Sealing wall (outer and inner unmachined)

				Gas System 1. Gas Unit 2. Duplex Gas Dryer 3. H2/CO2/N2 Distributors 4. CO2 Vapouriser 5. H2/CO2/N2 - Piping & Impulse Piping 6. Piping Supports 7. Valves 8. Bearing Vapour Exhauster Control Cabinets 1. Interior 2. Exterior

PAINTING SCHEME NO	PRIMING PAINT COAT	INTERMEDIATE PAINT COAT	FINISH PAINT COAT	COMPONENTS TO BE COVERED
2.	Alkyd based Zinc rich primer 70 micron DFT.	Alkyd based TIO2 pigmented intermediate paint 70 micron DFT.	Enamal finish paint 60 micron DFT	Seal Oil System 1. Seal oil Pump unit & Motors 2. SO Unit 3. SO Valve & Instrument Rack 4. SO Storage Tank 5. SO Piping, Impulse Piping, Valves & Pipe Supports PW System 1. PW Pumps &Motors 2. PW Filter Unit 3. PW Coolers 4. Alkaliser Unit 5. Piping, Impulse Piping, Valves & Supports 6. PW Tank ACW System 1. ACW Piping for H2 Coolers, Impluse Piping, Valves & Supports, Drain & Vent Piping

CONDENSER AND HEAT EXHANGER

PAINTING SCHEME NO	PRIMING PAINT COAT	INTERMEDIATE PAINT COAT	FINISH PAINT COAT	COMPONENTS TO BE COVERED
01	Epoxy based zinc rich primer (2Coats– 70 DFT)	Epoxy T102 pigmented polyamide cured paint. (1Coat – 70DFT)	Aliphatic Acrylic 2 Pack Polyurethane Finish Paints (2Coats-60DFT)	OUTER SURFACES 1. Condenser 2. LP Heater 1 3. GSC 4. Turbine Oil Cooler 5. Seal Oil Cooler 6. CF Coolers 7. Stator Water Cooler 8. Hydrogen cooler 9. Exciter Air Cooler 10. Water Box Handling Arrangement 11. Air Exhauster for Gland Steam Condenser 12. Condenser Air Evacuation Equipment
02	Epoxy based zinc rich primer (2Coats– 70 DFT)	Epoxy T102 pigmented polyamide cured paint. (1Coat – 70DFT)	High Build Black Coal Tar Epoxide Paint (DFT – 0.25mm)	INSIDE SURFACE 1. Condenser Water side (Water Box inside) 2. Tube Plate Surface towards water box side

PAINTING SCHEME NO	FINISH PAINT COAT	COMPONENTS TO BE COVERED
3.	Steam washable paint as per AA 55151	Support tube plates, shell internals, Dome internals, LP Heater support, sole plate & packers, Steam throw off device (steam side), air extraction piping (inside the condenser)
4.	Mobil grease with Wax paper	Machined surfaces of water box and water chamber flanges of condenser.

SECTION VII

APPENDIX – VIII

DECLARATION SHEET

I, hereby certify that, all the information and data furnished by me with regard to this Tender Specification No.BHEL:PSSR:SCT:1223 are true and complete to the best of my knowledge. I have gone through the specifications, conditions, stipulations in detail and agree to comply which the requirements and intent specifications.

I further certify that I am duly authorized representative of the under mentioned tenderer and a valid power of Attorney to this effect is also enclosed.

TENDERER'S NAME & ADDRESS

AUTHORISED REPRESENTATIVE'S
SIGNATURE WITH NAME & ADDRESS

SECTION VII

APPENDIX – IX

TENDER SPECIFICATION NO BHEL:PSSR:SCT:1223

CERTIFICATE OF DECLARATION FOR CONFIRMING KNOWLEDGE ON SITE CONDITIONS

We,

hereby declare and confirm that we have visited the project site under subject, namely and acquired full knowledge and information about the site conditions. 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 conditions.

TENDERER'S NAME AND ADDRESS

Place:

Date :

SIGNATURE OF AUTHORISED
REPRESENTATIVE WITH NAME & ADDRESS:

OFFICE SEAL

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector: Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

SECTION - VII

APPENDIX - X

CHECK LIST

TENDER SPECTFICATION NO, BHEL: PSSR : SCT : 1223

Tenderers are required to fill in the following details:

1.	a)	Name of the Tenderer with address	:	YES/NO
	b)	Telegraphic/Telex address	:	YES/NO
	c)	Phone (Office/Residence)	:	YES/NO
	d)	Management Structure of firm (Pvt. Ltd/Public Ltd./Partnership/Sole Proprietorship) Documentary proof For the same enclosed)	:	YES/NO
2.		Whether EMD submitted as per Tender specifications terms and Conditions	:	YES/NO
3.		Validity of offer (offer shall be kept open for acceptance for minimum six months)	:	YES/NO
4.		Whether tenderer visited the erection site and acquainted with the site conditions before quoting	:	YES/NO

SIGNATURE OF THE TENDERER

5.	Whether the following details are furnished		:	YES/NO
	a)	Previous Experience	:	YES/NO
	b)	Present assignments	:	YES/NO
	c)	organization chart of the company	:	YES/NO
	d)	Company financial statue	:	YES/NO
	e)	Incase of company, proof of Registration of the company	:	YES/NO
	f)	Memorandum & Articles of Association of company/copy of Partnership deed	:	YES/NO
	g)	Profit & Loss account for the Last 3 years	:	YES/NO
	h)	Audited Balance sheet for the Last 3 years	:	YES/NO
	i)	Income Tax clearance certificate (latest)	:	YES/NO
	j)	Solvency Certificate from a Nationalised Bank	:	YES/NO
	k)	Power of Attorney of the person Signing the tender duly attested By a Notary Public	:	YES/NO
	l)	Manpower organization chart With deployment plan at site For posting of Engineers/super Visitors and workers/labourers For satisfactory completion of Work under this specification	:	YES/NO

SIGNATURE OF THE TENDERER

6.	Whether the Tenderer is conversant with local labour laws & conditions	:	YES/NO
7.	Whether the tenderer is aware of all safety rules and codes	:	YES/NO
8.	Whether the Declaration sheet (as per appendix enclosed	:	YES/NO
9.	Time required for mobilization of of site organization and start of work	:	YES/NO
10.	Whether list of tools and Plants available with the contractor and proposed to be deployed for this work enclosed	:	YES/NO
11.	Whether all the Pages are read understood and signed.	:	YES/NO
12.	Deviations, if any Pointed out	:	
13.	Whether PF exemption No. is allotted by RPFC of your area if so, indicate number	:	YES/NO

SIGNATURE OF THE TENDERER

TENDER SPECIFICATION

BHEL:PSSR:SCT: 1223

FOR

Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, integral piping, pumps and other auxiliaries connected with the system including supply and application of final painting for Unit 7 of 1 x 500 MW Set

at

VIJAYAWADA THERMAL POWER PROJECT
(for M/s. APGENCO),
Ibrahimpatnam, Vijayawada,
Andhra Pradesh.

PART – II PRICE BID

BOOK NO :

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
Power Sector – Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

TENDER SPECIFICATION NO:BHEL:PSSR:SCT:1223

NAME OF WORK

Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Steam Turbine, Generator, integral piping, pumps and other auxiliaries connected with the system including supply and application of final painting for Unit 7 of 1 x 500 MW Set at VIJAYAWADA THERMAL POWER PROJECT (for M/s. APGENCO), Ibrahimpatnam, Vijayawada, Andhra Pradesh.

(PRICE BID)

PART II

Issued to
M/s.

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED

Senior Deputy General Manager/Contracts

(This tender document is not transferable)

Place: Chennai-600 035.
Date:

SECTION VII – APPENDIX – XI

RATE SCHEDULE BHEL :PS:SCT:1223

SL NO	Description of work	Lumpsum Amount in Rupees (In Figures Words)
01	Supply of labour, all consumables and tools and tackles (except those specificatlly indicated as BHEL supply in the Tender specification) required for erection, testing and commissioning of Turbo Generator Set, associated auxiliaries, Piping material etc. and Supply & Application of Final Painting of 500 MW set, at Vijayawada as per detailed description and nature of work enumerated in the Tender specification including all handling and other incidental works and modification and rectification works of TG Set and auxiliaries, piping works required prior to and during pre-assembly, erection, testing and commissioning of the entire system. This shall also include handling and transportation of the materials and equipments from storage yard to pre-assembly yard and equipments from storage yard to pre-assembly yard and place of erection. **Approximate Weight 3156 MT**	Rs. …….. (Lumpsum)

Note:

The lumpsum accepted value includes for the variation of + 10% (Ten Percent) in quantity.

SIGNATURE OF THE TENDERER

Note :

1. The total weight indicated in rate schedule is only approximate and is liable for variation / alteration at the discretion of BHEL.

2. The total lumpsum value includes all charges towards pre-heating, welding, post heating, heat treatment and NDT all joints involved in this work including that of all joints of site routed piping, condenser and any other joints.

3. Radiography and other NDT testing such as LPT, UT and MPI will have to be arranged by contractor at their cost.

4. The lumpsum quoted rate shall include for the variation of PLUS 10% in quantity, for Erection Works.

5. Incase of variation in weight beyond +10% ie beyond 3471(3156 + 315) MT the quantity exceeding +10% of the tendered quantity will be paid at the average tonnage rate arrived at by dividing the Lumpsum Quoted / accepted value by 3471.

6. Tenderers are required to quoted their rates, only in the price bid (part II) provided by BHEL. Quoting of rates in any other form / formats will not be entertained.

SIGNATURE OF THE TENDERER