

TENDER SPECIFICATION

BHEL:PSSR:SCT: 1299

FOR

Handling at Stores / Storage yard,
Transportation to Site of work , Erection,
Testing, Commissioning of Steam Turbine ,
Generator , Integral Piping, Pumps and other
Auxiliaries connected with the system
including supply and application of final
painting for unit 8- of 250 MW set , Stage -
III

at

Raichur Thermal Power Project

Stage – III , 1 x 250 MW, Unit No 8

Raichur , Karnataka

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.

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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: 1299

Messrs

Date:

Dear Sir,

Sub: Handling at Stores / Storage yard, Transportation to Site of work , Erection, Testing, Commissioning of Steam Turbine, Generator, Integral Piping, Pumps and other Auxiliaries connected with the system including Supply and application of final painting for Unit – 8 of 1x 250 MW Stage – III at Raichur Thermal Power Station, Raichur, Karnataka.

Please find enclosed one set of non-transferable tender documents containing **168** Pages alongwith General Conditions of Contract and Rate schedule for the above work.

You are requested to go through the tender documents, and offer your most competitive 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 08.)

The completed quotations shall reach the office of the under signed on or before **10.06.2008 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 WHAT SO EVER 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

Additional General Manager / Contracts

This Tender document is not transferable.

Place : Chennai -35.

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. 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.

13. QUALIFICATION REQUIREMENT

- a) The bidders should have executed erection and commissioning of STG and associated auxiliaries and equipments of minimum one unit of capacity 60 MW or above in a thermal power plant during last seven years.
- b) The bidders should have a minimum average financial turn over of Rs. **150 Lakhs** per year in the preceding three financial years ending 31st March 2007.

The Bidder must have earned profit in any one of the last three financial years ending 31.03.2007 and should have positive net worth as on 31.03.2007.

Bidder should submit audited balance sheet and profit & loss account of the company for last three years ending 31.03.2007 in support of above requirement.

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

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

14. TENDERERS HAVE TO FURNISH A DECLARATION SHEET INDICATING THAT THERE IS NO DEVIATION FROM THE TENDER DOCUMENTS (AS IN PAGE 08). 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.

15.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 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 WHAT SO EVER AFTER THE TIME AND DATE MENTIONED IN TENDER SPECIFICATION FOR SUBMISSION OF COMPLETED QUOTATIONS SHALL NOT BE ENTERTAINED UNLESS CALLED FOR SPECIFICALLY BY BHEL.

Additional General Manager/Contracts.

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

TENDER NOTICE

Tender Specification No. BHEL:PSSR:SCT:1299

Description	EMD
Handling at Stores / Storage yard, Transportation to Site of work , Erection, Testing, Commissioning of Steam Turbine, Generator, Integral Piping, Pumps and other Auxiliaries connected with the system including Supply and application of final painting for Unit – 8 of 1x 250 MW Stage – III at Raichur Thermal Power Station, Raichur, Karnataka	Rs. 2,00,000/- (Rupees Two Lakh only)

Cost of Tender Documents (Including all Taxes)	:	Rs.1040 /-
Sale Starts on	:	21.05.2008
Sale closes on	:	09.06.2008
Due date and Time for Submission	:	10.06.2008 at 15.00 Hrs
Date and time for opening Of Technical Bids	:	10.06.2008 at 15.30 Hrs

QUALIFICATION REQUIREMENT

a) The bidders should have executed erection and commissioning of STG and associated auxiliaries and equipments of minimum one unit of capacity 60 MW or above in a thermal power plant during last seven years .

b)The bidders should have a minimum average financial turn over of **Rs. 150 Lakhs** per year in the preceding three years ending 31st March 2007.

The Bidder must have earned profit in any one of the last three financial years ending 31.03.2007 and should have positive net worth as on 31.03.2007.

Bidder should submit audited balance sheet and profit & loss account of the company for last three years ending 31.03.2007 in support of above requirement.

c) Notwithstanding the above, BHEL reserves the right to reject any Tender or all the Tenders for 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.

ADDITIONAL GENERAL MANAGER/CONTRACTS

TENDER SPECIFICATION : BHEL:PSSR;SCT:1299

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

Additional 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:1299** 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

**RAICHUR STAGE – III 1 X 250 MW UNIT – 8
PROJECT INFORMATION - GENERAL**

01	Project Title	RAICHUR THERMAL POWER PROJECT STAGE – III 1 X 250 MW UNIT NO. 8
02	Owner/Purchaser	Karnataka Power corporation Limited " Sudharsan Complex" , II Floor, No. 22/23, Seshadri Road, Bangalore – 560 009
03	Location	Raichur Thermal Power station is 18 Kms away from Raichur on Raichur – Hyderabad State Highway . It is situated 2.5 Kms away on the right bank of river Krishna.
04	Nearest Railway	Krishna, Raichur TPS siding for full wagon and Raichur railway station for smalls. Both the Railway stations are coming in South Central Railway - Broad Gauge .
05	Nearest Airport	Hyderabad
06	Site Elevation	351 Metres, AMSL
07	Ambient Air Temp	
	a) Maximum	45 °C
	b) Minimum	6 °C
	c) Design dry bulb temp	35 °C
	d) Design wet bulb temp	27 °C
	e) Design ambient temp for electrical/air compressor equipment	50 °C

08	Relative Humidity	
	a) Maximum during monsoon	85%
	b) Minimum	20%
	c) Average	65%
	Note : For the purpose of guaranteed efficiency of steam generator , the ambient air temperature shall be taken as 31 °C and relative humidity as 60% based on design coal firing with coal analysis.	
09	Rainfall	
	a) Annual average	720 mm
	b) Max. for one day	115 mm
	c) Maximum intensity	38 mm/hr
	d) Period	June to September
10	Seismic Data	
	a) Zone as per IS 1893	Zone - 1
	b) Coefficient (including importance factor and foundation factor)	0.015
11	Wind Data	
	Basic wind pressure as per IS : 875	100 Kg/sq.m
	Wind Velocity	a) Maximum 70 Kmph b) Prevailing wind direction c) North - East, South - West South- East, West
12	Barometric Pressure	734 mm of Hg
13	Transport	
	a) Name of the highway near which plant is located	Raichur - Hyderabad State Highway
	b) Railway (Gauge)	Broad Gauge
14	Construction Power	415 V (+10% - 10%) , 3 Phase by customer free of cost
15	Construction water	By customer free of cost

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:

3.2.1 Open space

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

3.2.2 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.

3.2.3 ELECTRICITY:

3.2.3.1 For construction purpose electricity of 415 V – 3 Phase supply 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.

3.2.3.2 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.

3.2.4 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 Contractor. 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 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 load side of the supply with due regard to safety requirements at site. It shall be the responsibility of the contractor to have at least 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 (month wise) 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 All Filler wires, Electrodes for welding including TIG Welding for all types and sizes of pipes- Alloy steel, Carbon steel, etc are to be arranged by the contractor at his cost.

However filler wires for TIG welding as received from respective manufacturing units alongwith the equipments / components only shall be provided by BHEL free of 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 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 this 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 Contractor'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 to the 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.
- 3.6.14 Non-availability of any of the above equipment either due to breakdown/routine maintenance or due to distribution pattern of BHEL shall not be quoted as reason for delay of work.
- 3.6.15 All the T & P arranged by contractor including electrical connections wherein required shall be reliable / proven / tested with necessary test certificate.
- 3.6.16 All instruments, measuring tools etc. are to be calibrated periodically as per the requirement of BHEL and necessary calibration certificates are to be submitted to BHEL before use.
- 3.6.17 The contractor has to return the T & P in good working condition and cost of any replacement required has to be borne by the contractor.
- 3.6.18 The list of major T & P required to be deployed by the contractor is indicated in APPENDIX – I The list is minimum and not exhaustive but anything required over and above

these to suit the site condition / rate of progress / nature of work shall be arranged by contractor at his own cost.

- 3.6.19 Contractor shall take into consideration the above clause and quote the rates as called for in the Rate Schedule.

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 lump sum 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 Contractor and direct the contractor 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 & trailer 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 135 T Range Crane with 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 his cost.

3.7.9 EOT crane will be supplemented in addition to the one which has already been provided for erection at the time of Generator stator lifting and placement. Generator stator lifting is by tandem operation. The required operator will be arranged by the contractor at his cost.

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 contemplated 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 Contractor 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.
- 3.8.7 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.
- 3.8.8 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.
- 3.8.9 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.
- 3.8.10 The Tenderer has to furnish the information on the details and deployment of manpower as per Appendix III of GCC booklet.

3.9.1 CIVIL WORKS

- 3.9.2 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.
- 3.9.3 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.
- 3.9.4 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.
- 3.9.5 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, trailer 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.
- 3.10.7 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.
- 3.10.8 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.

3.10.9 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. The contractor shall provide at his cost uniformed watch & ward round the clock for the safety of equipment under erection at site and in his stores.

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 re greasing, 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 handed over 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. 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.

3.11.0 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 sub clauses of general conditions of contract booklet enclosed with this tender.

3.13.2 Non-conformity 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.)
1	Not wearing safety helmet	50/-
2	Not wearing safety belt	100/-
3	Grinding without goggles	50/-
4	Not using 24V supply for internal work	500/-
5	Electrical plugs not used for hand machines	100/-
6	Not slinging properly	200/-
7	Using damaged sling	200/-
8	Lifting cylinders without cage	500/-
9	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 TECHNICALLY QUALIFIED SAFETY OFFICER (DIPLOMA IN INDUSTRIAL SAFETY) 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.

- 3.14.4 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.
- 3.14.5 The contractor shall submit detailed advance monthly plan and the same has to be 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

- 3.15.2 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.
- 3.15.3 The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts, then and there for their protection.
- 3.15.4 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.
- 3.15.5 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 STATUTORY 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 re shots 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/Gauges, Feeler Gauges, Highest Gauges Dial Gauges, 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 gauge / 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 erection, Hydraulic Test, Trial run of Equipment, Pre-commissioning and post commissioning AND any other tests required to be conducted for completing erection and commissioning.

I

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 continuous 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. ELCB'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 possession 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 in charge, 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 electric 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 remnant 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, H₂ / CO₂ / 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 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 **RAICHUR TPS UNIT – 8 , Stage – III, 1 X 250 MW** - 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 inputs 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. Also a person with operation knowledge of Computer and a documentation assistant are to be associated with BHEL Engineer.

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.

6.3.1 **ERECTION**

6.3.2 **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 25mm 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.

6.3.3 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.

6.3.4 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.

- 6.3.5 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.
- 6.3.6 Bolt stretching fixtures for TG anchor bolts are to be arranged by the contractor.
- 6.3.7** 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.**
- 6.3.7.1 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 work.
- 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 Manometer 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, acid pickling/cleaning/trial 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:

The Generator stator likely to reach site by trailer (Road) and will be made available near the service bay .The unloading of generator stator is in contractors' scope .

The Generator stator has to be lifted to foundation level by a special lifting beam and special slings with the help of the EOT cranes.

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 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.

- 6.3.30 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.
- 6.3.31 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.
- 6.3.32 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.
- 6.3.33 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.

6.3.34 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.

6.3.35 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(The necessary Tube expansion equipment along with tools and accessories are to be brought by the contractor at his cost.) 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. The tube expander machine with all accessories and spares shall be arranged by the contractor at his cost.

- 6.3.36 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 within 1.0 mm. The clearance between the condenser neck and the LP exhaust hood should be within 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.
- 6.3.37 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.
- 6.3.38 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 within the quoted rate.

- 6.3.39 Condenser handling equipment & Structures for condenser and associated equipment and auxiliaries shall be erected by the contractor within the quoted rate.
- 6.3.40 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.
- 6.3.41 Supply & application of paints & required consumables etc., are in the scope of contractor and is to be within the quoted rate.
- 6.3.42 Floating of TG, Pumps decks & Condenser and readjusting of spring is covered in this scope of work.
- 6.3.43 The contractor shall carry out the erection of rubber expansion bellows, stretching bolt assembly and connected joints within the quoted rate.
- 6.3.44 The feed water storage tank may be supplied in two or three sections with feed pipe, heating steam header, spray nozzles, supports etc., in loose components. These are to be erected, aligned & welded in position. Welding, NDT & heat treatment if required shall be carried out by the contractor within quoted rate. IBR / statutory requirements, if any, shall be in the scope

of contractor and necessary drawing/ details only will be given by BHEL.

6.3.45 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.

6.3.46 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.

6.3.47 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.

6.3.48 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.

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

6.3.50 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.

6.3.51 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.

6.3.52 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 is required, then the same shall be carried out by the contractor, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, within 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.

6.3.53 Contractor shall fabricate bends of ≤ 2 " diameter size from running meters of pipe.

6.3.54 Certain adjustments in length may be necessary while erecting pipelines of STG & Auxiliaries. The contractor shall remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh, adopting specified heat treatment procedure, within the quoted rate .

6.3.55 The contractor shall carry out 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 within the quoted rate.

6.3.56 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. Pipes below 2" diameter, shall be sponge cleaned with air flushing.

- 6.3.57 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.
- 6.3.58 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.
- 6.3.59 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.,
- 6.3.60 Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.

- 6.3.61 Flame cutting of piping and other equipment shall be strictly done as per BHEL Engineer's instructions and in his presence only.
- 6.3.62 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.
- 6.3.63 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.
- 6.3.64 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.
- 6.3.65 Flow nozzles, orifice, spray nozzles of de-super neater shall be mounted / erected after chemical and / or steam blowing at site.

- 6.3.66 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.
- 6.3.67 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.
- 6.3.68 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.
- 6.3.69 Contractor shall fabricate bends at site from running meters of piping for the above and cut, edge prepare , lay and weld the piping as per BHEL Engineer's instructions.
- 6.3.70 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.

- 6.3.71 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.
- 6.3.72 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.
- 6.3.73 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.
- 6.3.74 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.

6.3.75 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.

6.3.76 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 start, during erection and after erection till handing over to customer . Wherever deficiency in painting / rusting is noticed ,then the same is to be attended by the contractor , at his all inclusive cost .(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 part of contractor to carry out work according to above clauses will entitle BHEL to carryout the job through 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 WELDING, HEAT TREATMENT & RADIOGRAPHY

6.5.1 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 ingress.

6.5.2 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.

6.5.3 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 BHEL Engineer shall be stamped by the welder on each joint done by the welder . The contractor will be responsible for the periodic renewal, retesting of the welders as demanded by BHEL Engineer/ statutory requirements.

- 6.5.4 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 rejections of joints welded by him in the opinion of BHEL Engineer, will adversely affect the quality of welding. Even though the welder has earlier passed the tests it does not relieve the contractor from his contractual obligations, to check the performance of the welders.
- 6.5.5 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.
- 6.5.6 All welded joints shall be subjected to acceptance by BHEL Engineer.
- 6.5.7 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 beads, 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 recorder. 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 chinks, temperature recorders, thermocouple attachment units, graph sheets, etc required for the job and maintain them in good condition.

- 6.5.8 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.
- 6.5.9 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.

- 6.5.10 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.
- 6.5.11 The 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 are tentative, which may be increased depending upon the quality of joints at the discretion of BHEL.
- 6.5.12 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.
- 6.5.13 All radiographs shall be free from mechanical, chemical or process marks to the extent they shall not confuse the radiographic image and noticed.
- 6.5.14 Penetrometer as per ASME/ISO, shall be used for all exposures.
- 6.5.15 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. Lead identifying screens for front and back of the film shall be used as per the instruction of BHEL Engineer.

- 6.5.16 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.
- 6.5.17 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.
- 6.5.18 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.
- 6.5.19 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.
- 6.5.20 All the radiographs shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.

- 6.5.21 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.
- 6.5.22 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of the Engineer and Re- radiographed. The decision of the Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor.
- 6.5.23 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.
- 6.5.24 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.
- 6.5.25 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.

- 6.5.26 The contractor has to make his own arrangements for air-conditioned dark room to process the radiographs.
- 6.5.27 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.
- 6.5.28 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.

6.6.0 HYDRAULIC TEST, PRE - COMMISSIONING & COMMISSIONING

- 6.6.1 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.

- 6.6.2 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 BHEL Engineers.
- 6.6.3 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.
- 6.6.4 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.
- 6.6.5 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 the 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.
- 6.6.6 Lube oil, seal oil, governing oil, pipelines to ST, STG Pumps, etc. shall be all flushed. Contractor will have to lay temporary

pipework to connect 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.

- 6.6.7 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.
- 6.6.8 Replacing / changing mechanical / other seals of removal and cleaning / replacing of filters etc. during pre-commissioning / commissioning stage are covered within the scope of work.
- 6.6.9 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.
- 6.6.10 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 piping /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 re commissioning activities / operation like water flushing / steam blowing / washing / flushing / passivation and normalization as applicable is in the scope of the contract.

6.6.11 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 free of cost. . All other consumable would have to be provided by the contractor.

6.6.12 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, the entire 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 cost. Before commissioning of oil system the pipelines should be hydraulically tested using the hydraulic test pump to the required pressure.

- 6.6.13 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.
- 6.6.14 Steam blowing of system piping if required will involve laying of temporary pipe lines and valves etc and dismantling and restoration of piping. The required steam shall be provided at a central point by BHEL.
- 6.6.15 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 to be erected by contractor from materials provided by BHEL.
- 6.6.16 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.

- 6.6.17 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 are covered within the scope of work.
- 6.6.18 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.
- 6.6.19 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.
- 6.6.20 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.

6.6.21 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 to any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

6.6.22 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.

- 6.6.23 Providing necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 6.6.24 Main Steam Line & Hot Reheat Line Strainer 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 to be removed for inspection of derbies & cleaning and refixed. Contractor has to carry out the work as part of his work out any extra cost.
- 6.6.25 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.
- 6.6.26 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.

- 6.6.27 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.
- 6.6.28 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.
- 6.6.29 The contractor shall carryout any other tests 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.
- 6.6.30 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.

- 6.6.31 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.
- 6.6.32 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.
- 6.6.33 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.
- 6.6.34 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.

6.6.35 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.

6.6.36 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 till the contract period is completed.

6.6.37 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.

6.6.38 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.

6.6.39 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. Payment for this work ,if any, shall be governed by extra work clause indicated.

- 6.6.40 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.

6.7.0 FINAL PAINTING

- 6.7.1 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.
- 6.7.2 For details of painting refer Painting scheme / schedule enclosed.
- 6.7.3 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.
- 6.7.4 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.

- 6.7.5 Required paints, thinner other consumable such as wire brush, brush etc shall have to be arranged by the contractor at his cost.
- 6.7.6 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.
- 6.7.7 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 V 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 laid down by the customer.

- 6.7.8 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.
- 6.7.9 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.
- 6.7.10 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.
- 6.7.11 Primer & finish coat shall be of reputed paint supplier approved by BHEL/customer.
- 6.7.12 GI , Stainless steel, brass, aluminum, copper and other non-ferrous materials shall not be painted unless otherwise specified.

6.7.13 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. C or below 10 deg. C, and when the humidity is greater than 90%.

6.8.0 TIME SCHEDULE

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

6.8.2 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 within 16 months from the date of actual commencement of erection work at site.

6.8.3 For the above purpose, the erection work shall be commenced as may be stipulated in the letter of intent and shall be 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.

6.8.4 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.

6.8.5 During the tenure of contract, if BHEL is not satisfied with the progress of work, BHEL have the right to withdraw any portion of work/ balance work and get the same done either employing their own men or through any other agency at the risk and cost of the contractor. The contractor shall not be entitled for any compensation whatsoever in this regard.

6.9.0 TERMS OF PAYMENT

6.9.1 CONDENSER(12%)

6.9.1.1	Preparation of foundation for condenser erection	0.5%
6.9.1.2	Assembly welding and placement of bottom plates sole plates hot well and spring elements	1.5%
6.9.1.3	Assembly and welding of side plates water chambers And water boxes	1.5%
6.9.1.4	Installation and welding of tube support plates air evacuation piping and internals	1.5%
6.9.1.5	Assembly and welding of Dome walls and stiffening Structure & Placement of LPH 1	1.5%

6.9.1.6	Installation, expansion and end milling and flaring of condenser tubes	3.0%
6.9.1.7	UV Lamp test of steam space and hydraulic testing	1.0%
6.9.1.8	Floating of condenser and welding of condenser with Turbine exhaust hood	1.5%
	Total percentage for Condenser	12%
6.9.2	TURBINE (15%)	
6.9.2.1	Matching leveling alignment of base plates and bearing pedestal and longitudinal girders and grouting	2.0%
6.9.2.2	Assembly of bottom half of LP cylinder leveling and alignment	2.0%
6.9.2.3	Placing of LP rotor leveling and centering	2.0%
6.9.2.4	Placing of HP & IP modules centering and leveling	1.0%
6.9.2.5	Alignment of HP/IP/LP rotors honing and coupling	2.0%
6.9.2.6	Assembly welding of LP outer casing	2.0%
6.9.2.7	Erection of ESV, IV, LP & HP Bypass valves and assembly of regulation system	2.0%
6.9.2.8	Fixing of permanent keys revision of main oil pump and alignment box up of front bearing pedestal	2.0%
	Total percentage for Turbine	15%

6.9.3.0 TURBOGENERATOR (12%)

6.9.3.1	Preparation of foundation and frames for stator	1.0%
6.9.3.2	Lifting , Positioning and centering of stator on Foundation	1.5%
6.9.3.3	Threading of rotor after completion of all electrical and other tests	2.0%
6.9.3.4	Grouting of Generator Bearing pedestal & Exciter	2.0%
6.9.3.5	Final alignment Reaming honing and coupling of generator with turbine rotor	2.0%
6.9.3.6	Boxing up of Generator	2.0%
6.9.3.7	Gas tightness test of stator with total system	1.0%
6.9.3.8	Completion of Generator Testing	0.5%

Total percentage of Generator 12%

6.9.4.0 HEATERS & DEAERATOR (10%)

6.9.4.1	Erection,Alignment,Welding & NDT of FST & Deaerator	2.5%
6.9.4.2	Erection & Welding of Internals & Hyd.Test	2.5%

6.9.4.3	Main Oil Tank ,Oil coolers	1.0%
6.9.4.4	Erection of HP heaters	1.0%
6.9.4.5	Erection of LP Heaters	1.0%
6.6.4.6	Erection of GSC & Drain Cooler	1.0%
6.9.4.6	Generator Cooling System Coolers	1.0%
Total Percentage for Heaters & Deaerator		10.0%

6.9.5 PUMPS (12%)

6.9.5.1	Erection of One No. Boiler feed pump, hydraulic couplings, motor and booster pumps along with Lube oil and other systems (pro rata 2% for 1 pump complete)	6.0%
6.9.5.2	Erection of Condensate pumps and Motors along with accessories	3.0%
6.9.5.3	Erection of JOP, AOP, EOP & other oil pumps	1.0%
6.9.5.4	Erection of Vacuum pumps	1.0%
6.9.5.5	Erection of Other Pumps	1.0%
Total percentage for Pumps		12%

6.9.6 PIPING (21%)

6.9.6.1	Air evacuation and vacuum system piping	1.5%
6.9.6.2	MS&HRH Line Strainer Erection and Fixing Internal after steam blowing	2.0%
6.9.6.3	Extraction inside condenser and Steam Throw Device	1.0%
6.9.6.4	Aux steam Gland seals	1.0%
6.9.6.5	All Drain Lines and vent lines	2.0%
6.9.6.6	Turbine Lube oil piping & supports	2.0%
6.9.6.7	Seal steam system	2.0%
6.9.6.8	Turbine water drainage piping	1.0%
6.9.6.9	Control oil piping	2.0%
6.9.6.10	Cross around piping 2.0%	
6.9.6.11	Generator seal oil piping 1.0%	
6.9.6.12	Generator Gas system	1.0%
6.9.6.13	CW Piping (A row to condenser)	1.0%
6.9.6.14	Balance miscellaneous piping, valves etc.. erection	1.5%

Total percentage for piping 21%

6.9.7 MISCELLANEOUS WORKS (6%)

6.9.7.1	Flash tanks, steam traps, overhead storage tanks AT, nozzles, Debris filters, RE Joints, ME bellows, Clean oil/dirty oil/oil unloading tanks etc. and other miscellaneous items	2.0%
6.9.7.2	CO2 & H2 Cylinder Racks & Cylinders	1.0%

6.9.7.3	TG enclosures	1.0%
6.9.7.4	Supply and Application of Final paint	2.0%
	Total percentage for misc. works	6%

6.9.8 COMMISSIONING (5%)

6.9.8.1	Oil flushing	1.0%
6.9.8.2	Barring gear	1.0%
6.9.8.3	Rolling & Dumping	1.0%
6.9.8.4	Synchronization	1.0%
6.9.8.5	Full load & Trial Operation	1.0%
	Total Percentage for commissioning	5%

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

6.9.10 The balance amount of 5% of the contract value 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.

6.9.11 BHEL at its 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. Contractor has to submit a monthly progress report consisting of the following data /Information along with the monthly running bill, to be eligible to receive the monthly running bill.

6.9.12 he 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

6.9.13 Field Quality Assurance Formats:

It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets/welding logs and heat treatment charts and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining 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.

6.10 EXTRA CHARGES FOR MODIFICATION AND RECTIFICATION WORK

- a) BHEL may consider payment for extra works on man hour basis for such of those works which require major revamping / rework/rectification/modification which is totally unusual to normal erection or commissioning works 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.

- 6.10.1 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.
- 6.10.2 The decision of BHEL in this regard shall be final and binding on the contractor.
- 6.10.3 The following man hour rates will be applicable for modification/rectification work.
- 6.10.4 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.
- 6.10.5 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.

6.11 EXTRA WORK DOES NOT INCLUDE

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

6.11.2 **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.

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

6.12 OVER RUN CHARGES

6.12.1 In case due to reasons not attributable to the contractor, the work gets delayed and completion time gets extended beyond **Sixteen (16) months** from the date of commencement of the work, the contractor shall be entitled for any over run compensation (**ORC**) for a period after the expiry of **Sixteen (16) months**. In case of ORC arise the same will apply at **Rs.60,000/- (Rupees Sixty Thousand only)** per month for the extended period beyond **Sixteen (16) months**.

6.12.2 The period of overrun if any will have to be ascertained in consultation of erection Engineer before completion of 16 months contract 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 PRICE ESCALATION

6.13.1 PVC applicable from the calendar month of commencement of work.

$$P1 = 0.75 \times PO \frac{(F1-FO)}{FO}$$

Applicable even when F1 is lesser than FO. (Price reduction as applicable).

FO = New all India average consumer price index published by Labour Bureau, Simla, Government of India for Industrial workers (Base 2001 = 100) applicable from the month of commencement of work.

F1 = All India average consumer price Index published by labour Bureau, Simla, Government of India, for Industrial workers (Base 2001 = 100) applicable for the months under consideration.

P1 = Increase in the billing amount as per the escalation formulae for the particular month of billing.

PO = Billing amount calculated on the accepted contract rate.

6.13.2 Price escalation as per above formula will be calculated and paid (excluding payments towards extra works and overrun, if any) on month to month basis. BHEL however, reserves the right to freeze escalation for that such of duration of delays, from time to time which are entirely attributable to the contractor.

6.13.3 With the provision of price escalation as per the above no claim / compensation on account of any increase whatsoever, (irrespective of whether escalation are steep / unanticipated or not compensated by the above escalation provisions in full towards minimum wages, consumables, electrodes, gases or any other item / reasons) will be payable during the entire period of execution.

PVC is to be restricted to 10% of the contract value.

6.14.0 TAXES

6.14.1 Value Added Tax (VAT) for the works

Price quoted shall be inclusive of ALL TAXES except service tax.

Notwithstanding the fact that this is only an erection service contract not involving any transfer of materials whatsoever and not attracting VAT liability, being labour oriented job work, for the purpose of VAT 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 VAT Registration No. and VAT paid for the purchases etc.

The bidder shall get registered with **Karnataka State** VAT authorities and the registration certificate shall be forwarded to BHEL immediately after commencement of work. In case , the bidder had already registered under **Karnataka State** VAT, they must quote their registration number and forward copy of Registration Certificate while submitting this tender. The bidder has to obtain VAT clearance certificate from the concerned authorities on completion of work and submit along with the final bill as one of the document for contract closure.

In case the Bidder decides to include any VAT element along with the quoted price, they shall specify in the price bid,(1) The value of VAT included in the quote, (2) The rate of VAT adopted and (3) On what value, etc. as additional information. If no VAT element is included in the price, the same shall be indicated in the quote.

The bidder shall quote very competitive price after taking into consideration of above points.

6.14.2 SERVICE TAX

Price quoted shall be exclusive of Service Tax. The service tax as statutorily leviable and payable by the bidder under the provisions of service tax Law / Act shall be paid by BHEL as per bidder claim through various running bills. **The bidder shall furnish proof of service tax registration with Central Excise Department specifying the name of services covered under this contract.** Registration Certificate should also bear the endorsement for the premises from where the billing shall be done by the bidder on BHEL for this project. The bidder shall obtain prior consent of BHEL before billing the service tax amount.

6.14.3 OTHER TAXES

Any other taxes and duties (except VAT & Service Tax) viz. Entry Tax, Octroi, Seigniorage, Licenses, Deposits, Royalty, Stamp Duty, other charges / levies, etc. prevailing / applicable on the date of opening of technical bids and any variation thereof during the tenure of the contract are in the scope of bidder. In case BHEL is forced to pay any such taxes, BHEL shall have the right to recover the same from the bidder either from running bills or otherwise as deemed fit.

6.14.4 NEW LEVIES & TAXES

In case Government imposes any new levy / tax after award of the work during the tenure of the contract, 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.

6.14.5 STATUTORY VARIATIONS

Statutory variations are applicable only in the cases of Value Added Tax and Service Tax. The changes implemented by the Central / State Government in the VAT Act / Service Tax during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision shall be paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract including extended period, if any.

6.14.6 DIRECT TAXES

BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act/Rules.

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 License No.
- iii. Workmen Insurance Policy No.
- iv. Un Qualified Acceptance for Detailed L.O.I.
- v. Initial 50% Security Deposit.
- vi. Rs 100 /- Stamp Paper for Preparation of Contract agreement.
- vii. Acceptance for e payment (format enclosed)

Mode of Payment :

All payments due to you will be made through e-remittance / account payee cheque. In case of e-remittance, you are required to fill in the e payment format enclosed along with this tender on your letter head with banker's seal. The duly filled format may be sent along technical bid.

6.16.0 PROVIDEND FUND & MINIMUM WAGES

- 6.16.1 You are required to extent 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 Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of Wages. In case of "Non-compliance of Sec 21 or non-payment of wages" to the workmen before the expiry of wage period by the contractor, BHEL will reserve its right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.
3. The contractor shall submit monthly running bills alongwith the copies of monthly wages (of the preceding month) u/r 78 (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.
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 Act 1948 (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.

SCOPE AT A GLANCE

SECTION VII – APPENDIX I

SITE FACILITIES

PROJECT : RAICHUR TPS (STG & AUX .)

RATING : 250 MW

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			
A	Open space		Yes	
B	Living accommodation		Yes	

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.2.0	ELECTRICITY			
1.2.1	<u>Electricity For construction purposes</u> (to be specified whether chargeable or free)			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 materials 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	

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
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	
1.3.2	Water supply for bidder's office, stores, canteen etc		Yes	
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:			
1.4.1.1	For the site personnel of the bidder		Yes	
1.4.1.2	For the bidder's equipments 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	

Sl.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.5.2	For construction work (execution of the lighting work/ arrangements) 1. At office storage area 2. At the preassembly area 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			
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 : RAICHUR TPS (STG & AUX.)

RATING : 250 MW

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	Yes	In consultation with BHEL
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	In consultation with BHEL
2.1.4	Shipping lists etc for reference and planning the activities	Yes		In consultation with BHEL
2.1.5	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL
2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
2.1.7	Weekly erection schedules based on SI No 2.1.5		Yes	In consultation with BHEL
2.1.8	Daily erection / work plan based on SI No 2.1.7		Yes	In consultation with BHEL
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	
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	

Sl.No	Description PART II : ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
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)		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.1	250 T crawler crane			
2.2.2	250 T tyre mounted crane			
2.2.3	135 T Crawler crane One (1) No.	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)			
*** 135T crane will be provided for lifting FST/Deaerator and other heavy equipments outside TG Hall.				

Sl.No	Description PART II : ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.12	30T gantry crane		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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			
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			
2.2.29	Chain pulley block 5 T			
2.2.30	Chain pulley block 3T			

Sl.No	Description PART II : ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.31	Chain pulley block 1T /2T		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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 reqd)			
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 sheave 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			
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			
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			
2.2.89	EOT cranes in TG hall (as provided by customer) ♦ Main hook 125 T ♦ Aux hook 30 T	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	Yes		Suitable capacity
2.2.94	Hydro test pump 250 bar			
2.2.95	Hand operated hydro test pump			
2.2.96	Boiler filling pump 100m head with ~ 15 LP/Sec			
2.2.97	Pressure gauges 400 bar			
2.2.98	Pressure gauges 600 bar			
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		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.102	Hydraulic pipe bending machines to suit up to 80mm dia and 11 mm thick			
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 Climber			
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			
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		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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			
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			
2.2.139	Spirit levels			
2.2.140	Master spirit level			

2.2.141	Spring balance		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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			
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 oscilloscope continuity tester			
2.2.163	Rheostats			
2.2.164	Milli seconds syn timer			
2.2.165	Ultra violet recorder			
2.2.166	Tong tester			
2.2.167	Hardness tester			

2.2.168	Bolt stretching device		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.169	Reamers of various sizes			
2.2.170	Vacuum cleaner			
2.2.171	Sand blasting machine with accessories			
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 ()			To be arranged by Bidder
2.2.191	Tube expanders(expansion and flaring)			
2.2.192	Mercury plumb bob			
2.2.193	Band saw machines		To be arranged by the bidder	
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	For grouting
	Sand, bricks etc		Yes	
	TIG wires	Yes	Yes	As mentioned elsewhere
	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	Yes	--	Only paints for preservation provided.

	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		As required
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.

SCOPE AT A GLANCE

**PROJECT : RAICHUR TPS (STG & AUXILIARIES)
MW**

RATING : 250

Sl.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be 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	

Sl.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1.1.5	Preparation storage at site for proper stacking of materials		Yes	
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	Organizing 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	

Sl.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be taken care by		Remarks
		BHEL	Bidder	
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 dimensions 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 embedment		Yes	
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	

Sl.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be taken care by		Remarks
		BHEL	Bidder	
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	

SI.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1.5.8	Meeting between BHEL and bidder at BHEL office every day for monitoring the progress	Yes	Yes	

SECTION – VII

APPENDIX – II

RAICHUR 250 MW (TG PACKAGE)

BRIFE LIST OF EQUIPMENTS/COMPONENTS TO BE ERECTED

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, Combined RH SV&CV, CRH NRV , 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 & valves
- 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 main oil tank , injector assy, centrifuge, AOP, JOP with duplex filter , EOP with starter panels, Dirty oil tank with pumps, Duplex Filters, vapour fans and auxiliaries, clean oil tank with pumps, , oil unloading tank, connected oil piping, valves, control valves , H&S etc.,
- Leakage oil tank, waste oil tank, Oil equipments, piping, Valves, H&S , Miscellaneous tanks etc.
- Lifting Beam

2. TURBO GENERATOR

- Hydrogen Cooled Main Generator Consisting of the following
 - Stator
 - Rotor
 - End Shields & Bearing
 - Exciter
 - Seal Oil system with seal oil unit 1&2 (with oil tanks, filters, pumps , inter-connecting piping, fittings, valves , instruments etc..)
 - Gas system with H₂ distribution system, CO₂ distribution system with associated piping, valves , instruments etc..
 - Generator system with liquid detector rack, necessary valves and instruments ...
 - Generator package piping
 - piping , instruments/equipments, valves required for waste gas and waste fluid systems

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 Throw device
 - Air Extraction Pipe & Baffle
 - Stiffening/Support Pipes/Rods, Bars etc.,
 - Misc Fittings & Loose items
 - Instruments

- Gland Steam Condenser with pipes , loose items
- LP Heater 1, 2 &3 with pipes , loose items
- HP Heaters 5 & 6 with fittings
- Drain Cooler with loose items
- FST & Deaerators (FST in Sections)
- Turbine oil cooler with loose items
- Exciter Air Coolers
- Other coolers (if any)

4. PUMPS & MOTORS

- Boiler Feed Pumps (Motor Driven)
- Motors for MD BFP
- Hydraulic coupling for BFPs with oil coolers, lube oil coolers, loose items,

- Lube Oil Piping, Cooling Systems, BFP recirculation valves & other Accessories for BFPs
- Booster Pumps with accessories for BFP
- Condensate Extraction Pumps with accessories
- Motors for CEPs

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
 - Other Misc System Piping Etc.,
- Condenser Tubes
- Vacuum Pumps (Air evacuation package)
- Air exhauster with motor
- Oil Purification unit (Oil Centrifuge) & associated system
- Oil vapour exhauster
- 3 Way Control Valves
- Double three way valves
- Butterfly valves
- Limit valves /NRVs
- Drain Valves
- Hangers & Supports
- Pumps with Accessories (JOP, AOP, EOP)

- Spring cages /spray nozzles/diaphragm
- Damper
- Gear pump (Lub oil recirculation)
- H2 & CO2 Cylinders
- Gas dryer
- Control valves
- Vapour Exhauster
- Coupling Covers
- Turbine enclosure & cladding
- RE Joints (Pressure balance type) – inlet & outlet
- Flash Tanks (HP drain/LP drain/Unit flash)
- ME Bellows
- Hotwell make up pumps with accessories
- Condenser on load tube cleaning system

6. **CW Piping** between **"A" Row** (KPCL terminal Point) and **Condenser** including RE Joints (BHEL) & Butterfly valves (free issue item by KPCL) .

Pipe size : OD 1829 x 14 mm thick

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.
3. Insulation work including Turbine Insulation is excluded.

SECTION – VII , APPENDIX - III WEIGHT SCHEDULE - SUMMARY		
SL NO.	EQUIPMENT/PACKAGE	APPROX. WT (in MT)
A	Steam Turbine & Aux.	603
B	Turbo Generator & Aux	376
C	Condenser & Aux	366
D	Heat Exchangers	135
E	Pumps & Motors	135
F	Tanks & Miscellaneous items	40
G	CW Piping	30
H	BOI Items (including turbine integral piping , ME Bellows etc..)	355
	TOTAL WEIGHT (MT)	2040

Note :

1. The information furnished in weight schedules is only a description regarding the items 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 TG supplied by customer also are to be erected and commissioned by the contractor with in the quoted / accepted lumpsum value. But if the total weight so erected by the tenderer is with in 2244 (2040+ 204) MT , rate as per schedule shall be applicable.

3. The above statement shows the approximate weight of the various sub assemblies of the turbo generator set, associated auxiliaries and piping, fittings, etc., .The weights mentioned above

are only approximate and for general guidance and they are subject to verification as per design consideration.

4. The ODC of few major components / equipments were furnished in Appendix III of this specification , alongwith weight details of the components. The ODC details with weight of items for the piping works and misc. items are not indicated. However the contractor has to take the total erection weight furnished above for quoting / tendring purpose.

SECTION – VII – APPENDIX - III**WEIGHT DETAILS FOR STEAM TURBINE PACKAGE**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
1	SOLE PLATE PEDESTAL ANCHOR	3400 X 1200 X 800	2510
2	BASE PLATE ASSEMBLY	4500 X 1200 X 800	4500
3	BASE PLATE ASSEMBLY	2300 X 1250 X 600	2560
4	BASE PLANT L.P. CASTING	2300 X 2075 X 981	2680
5	LP OUTER CASING PARTS	7060 X 1480 X 2760	8085
6	LP OUTER CASING PARTS	7060 X 1480 X 2760	8085
7	LPC OUTER CASING PARTS	4570 X 3230 X 980	2500
8	LPC OUTER CASING PARTS	4570 X 3230 X 980	2500
9	COMPONENTS OF LP CASING UPPER PART	3500 X 300 X 300	495
10	L.P OUTER CASING PARTS	3450 X 1000 X 1100	900
11	ASSEMBLY DEVICES	900 X 700 X 550	180
12	INSPECTION SHAFT FOR IPC	3300 X 700 X 700	775
13	VALVE SUPPORT FOR HP OVERHAUL	1000 X 1000 X 400	800
14	COMPONENTS OF ASSY. FIXTURE FOR HPT	3800 X 2500 X 1200	6864
15	COMPONENTS OF ASSEMBLY FIXTURE OF HPT	2300 X 2100 X 900	1800
16	COMPONENTS OF ASSY. FIXTURE FOR HPT	3300 X 1800 X 1210	3352
17	COMPONENTS OF ASSEMBLY FIXTURE OF H.P.TURBINE	5010 X 4000 X 120	3356
18	HP - IP BEARING PEDESTAL ASSLY.	4080 X 2005 X 2126	13275
19	HP / IP BRG. PED. PARTS	1000 X 600 X 600	388
20	HP / IP BRG. PED. PARTS	500 X 200 X 150	37.5
21	AUXILIARIES OF LP TURBINE	3000 X 1300 X 1000	2100

SECTION – VII – APPENDIX - III**WEIGHT DETAILS FOR STEAM TURBINE PACKAGE**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
22	AUXILIARIES OF LP TURBINE	2000 X 1000 X 1825	1142
23	AUXILIARIES OF LP TURBINE	2000 X 1000 X 1825	1142
24	LP JOINT COVERING	2300 X 1800 X 940	1041
25	ASSEMBLY TOOLS	1900 X 1000 X 890	500
26	CAP (SPRING SUPPORT)	825 X 500 X 400	400
27	CAP (SPRING SUPPORT)	825 X 500 X 400	400
28	CAP (COMPEN.ASSY)	3240 X 1740 X 1340	3400
29	CAP (COMPEN. ASSY)	3240 X 1740 X 1340	3512
30	CAP (OBLIQUE REDUCER ASSLY)	1400 X 1400 X 1200	800
31	CAP (MITRE BEND ASSY)	1550 X 1550 X 1300	670
32	CAP (COMPEN. ASSY)	3240 X 1740 X 1340	3512
33	CAP (MAN-HOLE ASSLY)	1500 X 1600 X 1100	750
34	CAP (MAN-HOLE ASSLY)	1500 X 1600 X 1100	750
35	CAP (MITRE BEND ASSY)	1550 X 1550 X 1300	670
36	CAP (MITRE BEND ASSY)	1550 X 1550 X 1300	670
37	CAP (PIPE ASSLY)	2000 X 1100 X 1200	645
38	CAP (MITRE BEND ASSY)	1550 X 1550 X 1300	670
39	LONGITUDINAL GIRDER (LEFT)	6800 X 1820 X 1570	15182
40	LONGITUDINAL GIRDER (RIGHT)	6800 X 1820 X 1570	15182
41	LP FRONT WALL (TS)	6820 X 3750 X 910	10053
42	LP FRONT WALL (GS)	6820 X 3750 X 910	10053
43	LP SHAFT SEALING FRONT	1800 X 1700 X 740	2260

SECTION – VII – APPENDIX - III**WEIGHT DETAILS FOR STEAM TURBINE PACKAGE**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
44	LP SHAFT SEAL COMPENSATOR	1440 X 1420 X 520	1456
45	LP SHAFT SEALING (REAR)	1800 X 1700 X 740	2260
46	LP SHAFT SEAL COMPENSATOR ASSLY. (TS)	1440 X 1420 X 520	1456
47	LP CASING ASSEMBLY (FASTENERS)	1800 X 1700 X 740	2653
48	LP CASING ASSEMBLY (PARTS)	3760 X 2060 X 860	4900
49	LP CASING ASSEMBLY (PARTS)	450 X 450 X 250	140
50	EXTRACTION PIPE LINE (LPC)	1600 X 1000 X 750	520
51	EXTRACTION PIPE LINE (LPC)	3100 X 1350 X 750	670
52	EXTRACTION PIPE LINE (LPC)	2400 X 1350 X 850	1004
53	EXTRACTION PIPE LINE (LPC)	3300 X 1100 X 700	725
54	EXTRACTION PIPE LINE (LPC)	3300 X 1100 X 700	725
55	EXTRACTION PIPE LINE (LPC)	2700 X 1200 X 750	575
56	EXTRACTION PIPE LINE (LPC)	1100 X 850 X 850	307.6
57	EXTRACTION PIPE LINE (LPC)	2700 X 1750 X 1100	689
58	EXTRACTION PIPE LINE (LPC)	1550 X 1450 X 900	530
59	EXTRACTION PIPE LINE (LPC)	2000 X 600 X 600	366
60	EXTRACTION PIPE SHEATHING	2600 X 2000 X 1400	1330
61	INNER GUIDE PLATE OF DIFFUSER (TS)	2600 X 2400 X 1000	2118
62	INNER GUIDE PLATE OF DIFFUSER (GS)	2600 X 2400 X 1000	2118
63	DIFFUSER (TS)	4880 X 1730 X 2340	3275
64	DIFFUSER (GS)	4880 X 1730 X 2340	3275

SECTION – VII – APPENDIX - III**WEIGHT DETAILS FOR STEAM TURBINE PACKAGE**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
65	AUXILIARIES OF I.P. TURBINE	1050 X 480 X 550	390
66	AUXILIARIES OF I.P. TURBINE	1100 X 500 X 650	204
67	AUXILIARIES OF I.P. TURBINE	1100 X 500 X 650	204
68	LP - GEN. PEDESTAL ASSEMBLY	3220 X 2285 X 2075	10200
69	IP-LP PEDESTAL ASSEMBLY	3700 X 1860 X 2100	14600
70	LP INNER OUTER CASING (U/H)	6720 X 3150 X 2325	21750
71	LP INNER OUTER CASING (L/H) & LP INNER CASING (L/H)	6750 X3500X 2350	30907
72	LP INNER CASING ASSY. FASTENERS	1800X1700X740	1760
73	LP INNER - CASING (U/H) PARTIAL	4000X1570X2000	11722
74	STEAM INLET PIPE (LPT)	2700X1300X900	840
75	L.P. ROTOR	7210X3300X3350	56572
76	BEARING PEDESTAL PARTS	1000X700X700	1135
77	STUD HEATING DEVICE AND BREECH NUT HEATING DEVICE	1500X1200X250	315
78	GROMMET SLINGS	1500X1500X350	280
79	IP TURBINE	5750X3800X4070	58175
80	HP TURBINE	5060X3100X2900	56100
81	HP INLET ASSEMBLY	450X450X200	45
82	H.P. EXHAUST ASSEMBLY	1625X1335X675	1378
83	HPT RELATED PARTS	1000X1000X500	190
84	FRONT BEARING PEDESTAL	2950X2600X1600	12280
85	FRONT BEARING PEDESTAL PARTS	1800X1700X1000	600

SECTION – VII – APPENDIX - III**WEIGHT DETAILS FOR STEAM TURBINE PACKAGE**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
86	PARTS OF FRONT BEARING PEDESTAL	500X300X300	209
87	I.P TURBINE PARTS	700X700X500	285
88	RATING COLLABORATION AND NONOGRAM PLATES	850X550X150	50
89	I.P. INLET PIPE ASSEMBLY	3700X2200X1900	7088
90	OIL FLUSHING AND PRESSURE TEST DEVICE	750X400X550	130
91	STEAM BLOWING & HYD. TEST DEVICE	2000X2100X1140	2730
92	TOOLS AND PACKING DEVICES	1750X1200X980	684
93	SUSPENSION OF VALVES (IV)	3500X1500X700	2700
94	SUSPENSION OF VALVES (IV)	3500X1500X700	2700
95	FIRE PROTECTION VALUE ETC.	1900X1000X890	480
96	ASSEMBLY DEVICE FOR VALVES	920X1000X450	213
97	CHANGE OVER VALVE	500X400X200	49
98	ATT SOLENIOD VALVES	600X300X300	90
99	ESV & CV CASING WITH VALVES	2850X2600X1900	8515
100	ESV & CV CASING WITH VALVES	2850X2600X1900	8515
101	IV & CV CASING WITH VALVES	3790X3450X2565	18696
102	IV & CV CASING WITH VALVES	3790X3450X2565	18696
103	ESV SERVOMOTOR WITH L.S. MTG	2100X1350X1250	1662
104	ESV SERVOMOTOR WITH L.S. MTG	2100X1350X1250	1662
105	LIMIT SWITCH MTG. TEST VALVES	2100X1350X1250	1900
106	LIMIT SWITCH MTG. TEST VALVES	2100X1350X1250	1900

SECTION – VII – APPENDIX - III**WEIGHT DETAILS FOR STEAM TURBINE PACKAGE**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
107	CONTROL VALVE SERVOMOTOR	2000X1500X1500	1900
108	CONTROL VALVE SERVOMOTOR	2000X1500X1500	1900
109	I.P. CONTROL VALVE SERVOMOTOR	2000X1300X1350	1880
110	I.P. CONTROL VALVE SERVOMOTOR	2000X1300X1350	1880
111	CRH NRV WITH SERVOMOTOR	3100X3040X2410	5860
112	B STEAM BLOWING DEVICE CRH NRV	2000X1000X500	973
113	GOVERNING CONTROL RACK ASSLY	4700X1900X3300	4510
114	GLAND STEAM PRESSURE INDICATOR	400X300X250	20
115	FRAME FOR SUSPENSION (IV)	3100X3100X560	765
116	FRAME FOR SUSPENSION (IV)	3100X3100X560	765
117	LOOSE ITEMS OF FRAME FOR SUSP.	600X450X250	300
118	EMERGENCY GOVERNOR	400 X 400 X 500	76
119	INJECTOR FOR SUC.PIPE NB 350	3300 X 1750 X 1210	1029
120	MAIN OIL TANK & NOZZLE ARRGT. ASSY	6180 X 3260 X 2650	9981
121	MAIN OIL TANK & NOZZLE ARRGT. ASSY	4200 X 1200 X 900	402
122	OIL STRIPPER	600 X 600 X 850	133
123	OIL STRIPPER	2050 X 800 X 1410	468
124	VARIABLE ORIFICES THROTTLE VALVES & FLUSHING PARTS	1000 X 500 X 250	115
125	HOUSING FOR MS STRAINER	1700 X 1025 X 900	2200
126	HOUSING FOR MS STRAINER	1700 X 1025 X 900	2200

SECTION – VII – APPENDIX - III**WEIGHT DETAILS FOR STEAM TURBINE PACKAGE**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
127	STEAM STRAINER ASSEMBLY DEVICE MS & HRH	2140 X 1400 X 500	652
128	HOUSIN FOR HRH STEAM STRAINER	2200 X 1450 X 1100	4700
129	HOUSING FOR HRH STEAM STRAINER	2200 X 1450 X 1100	4700
130	STEAM STRAINER (MS)	1100 X 700 X 350	374
131	STEAM STRAINER (HRH)	1600 X 1450 X 750	485
132	STEAM STR. HSG. BLANKING ARRANGEMENT	1800 X 1650 X 1140	2945
133	STEAM STRAINER HOUSING GASKETS	800 X 800 X 500	50
134	COMPENSATOR	600 X 600 X 900	50
135	LEAKAGE OIL TANK	1000 X 1000 X 3000	515
136	WASTE OIL TANK	1000 X 1000 X 3000	515
137	INJECTOR FOR SUC.PIPE NB 400	3500 X 750 X 750	922
138	OIL STRAINERS	2050 X 1200 X 1410	568
139	TURBINE INSTRUMENTS RACKS	2750 X 1500 X 800	2600
140	TEMP. & PRESSURE CONNECTIONS	1700 X 750 X 750	800
141	IMPULSE PIPES (CARBON STEEL)	6900 X 650 X 650	2087
142	PRESS. TRANSMITTERS, SWITCHES & GAUGES	2800 X 1250 X 1250	875
143	TRANSMITTERS & J.B. OF BEARINGS	500 X 300 X 200	110
144	IMPULSE PIPES (ALLOY STEEL AND S.S)	6900 X 300 X 300	705
145	HPBP valves with oil system units, TIP valves etc..		11000
		TOTAL WT.(Kg)	602850

SECTION VII : APPENDIX III**(B) GENERATOR & AUX : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
1	FOUNDATION ITEMS OF GENERATOR	3550 X 715 X 880	4656
2	FOUNDATION ITEMS OF GENERATOR	2240 X 940 X 1220	2880
3	CONSUMABLES FOR FOUNDATION	500 X 500 X 200	15
4	GENERATOR STATOR	7520 X 4200 X 4770	218000
5	GENERATOR ROTOR	10550 X 1560 X 1660	47742
6	END SHIELD (TE) LOWER HALF	3640 X 1140 X 2000	6020
7	END SHIELD (EE) LOWER HALF	3640 X 1140 X 2000	6020
8	H.V.BUSHING	2000 X 950 X 600	590
9	LOOSE ITEMS OF WOUND STATOR	1500 X 1200 X 1000	1010
10	GENERATOR ACCESSORIES	2140 X 1240 X 1040	1546
11	GENERATOR ACCESSORIES(TERMINAL BUSHING BOX)	3500 X 1800 X 1250	4075
12	GAS BAFFLE RING, INSERT COVER COVER ETC.	3700 X 3500 X 1340	4364
13	BEARING SHELLS	1100 X 835 X 950	953
14	END SHIELD (EE) UPPER HALF	3640 X 1140 X 2000	5620
15	END SHIELD (TE) UPPER HALF	3640 X 1140 X 2000	5620

SECTION VII : APPENDIX III**(B) GENERATOR & AUX : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
16	SEAL RINGS	600 X 600 X 200	73
17	DEVICE FOR ROTOR INSERTION INTO STATOR	2240 X 940 X 1220	1036
18	ERECTION DEVICES	2250 X 1180 X 1140	997
19	WIRE ROPES	1800 X 1450 X 200	201
20	DRY AIR BLOWER	1350 X 1250 X 800	190
21	TERMINAL CONNECTORS	1840 X 660 X 400	506
22	CONSUMABLES	500 X 600 X 300	45
23	BRUCHLESS EXCITER SET	5670 X 2390 X 2810	22386
24	EXCITER FRONT COVER	4310 X 2950 X 2950	4122
25	RR. WHL. COVER & SEALING WALL DE FOR EXCITER	1800 X 1600 X 1600	970
26	EXCITER REAR COVER	4330 X 3050 X 2950	3909
27	EXCITIER BED PLATE ACCESSORIES	5500 X 1050 X 800	3212
28	EXCITER ACCESSORIES	2000 X 500 X 500	350
29	COOLER RACK ASSEMBLY FOR EXCITER	3000 X 1800 X 1100	1551
30	SEAL OIL UNIT - I	3550 X 2900 X 3700	9160

SECTION VII : APPENDIX III**(B) GENERATOR & AUX : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
31	SEAL OIL STORAGE TANK	3500 X 1300 X 1280	1460
32	GAS UNIT	2550 X 1790 X 2560	1150
33	HYDROGEN DISTRIBUTION	3480 X 1540 X 440	333
34	CO2 DISTRIBUTOR	2770 X 1240 X 440	247
35	SEAL OIL UNIT - II	3610 X 2040 X 2350	3263
36	LIQUID DETECTOR RACK	1700 X 900 X 1800	450
37	LOOSE VALVES	2000 X 1000 X 500	959
38	LOOSE INSTRUMENTS	1000 X 1000 X 500	80
39	CO2 VAPOURISER	1520 X 640 X 840	225
40	GENERATOR PIPING	6500 X 1200 X 100	6374
41	GENERATOR PIPING	6500 X 700 X 700	1926
42	GENERATOR PIPING	1900 X 1500 X 600	1615
		TOTAL WT.(Kg)	375901

SECTION VII : APPENDIX III**(C) CONDENSER & AUX. : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
1	CONDENSER (HOTWELL)	11200 X 1900 X 1200	6913
2	BOTTOM PLATE	7150 X 3450 X 625	6793
3	BOTTOM PLATE	7150 X 3450 X 625	6793
4	BOTTOM PLATE	7150 X 3850 X 625	8296
5	BOTTOM PLATE	1900 X 700 X 300	271
6	CONDENSER SUPPORT	1750 X 1000 X 1250	3450
7	CONDENSER SUPPORT	1750 X 1000 X 1250	3450
8	CONDENSER SUPPORT	1750 X 1000 X 1250	3450
9	CONDENSER SUPPORT	1750 X 1000 X 1250	3450
10	CONDENSER SUPPORT	1600 X 950 X 950	4660
11	WATER CHAMBER (LHS)	5224 X 3610 X 360	6150
12	FRONT WATER BOX (GEN SIDE)	5950 X 3610 X 2485	15867
13	WATER CHAMBER (RHS)	5224 X 3610 X 360	6150
14	FRONT WATER BOX (TUR SIDE)	5950X3610X2485	15867
15	WATER CHAMBER (RHS)	5224X3610X360	6150
16	REAR WATER BOX (GEN SIDE)	4760X3610X2025	9576
17	WATER CHAMBER (LHS)	5224X3610X360	6150
18	REAR WATER BOX (TUR SIDE)	4760X3610X2025	9576

SECTION VII : APPENDIX III**(C) CONDENSER & AUX. : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
19	SIDE WALL (TUR.END)	5248X1705X16	1105
20	SIDE WALL (TUR.END)	5248X1705X16	1645
21	SIDE WALL (TUR.END)	5248X2480X16	1645
22	SIDE WALL (TUR.END)	5248X2480X16	1645
23	SIDE WALL (TUR.END)	5248X1670X16	1080
24	SIDE WALL (TUR.END)	1000X350X250	200
25	SIDE WALL (TUR.END)	5850X200X150	550
26	SIDE WALL (GEN.END)	5248X1705X16	1105
27	SIDE WALL (GEN.END)	5248X2480X16	1645
28	SIDE WALL (GEN.END)	5248X2480X16	1645
29	SIDE WALL (GEN.END)	5248X2480X16	1645
30	SIDE WALL (GEN.END)	5248X1670X16	1080
31	SIDE WALL (GEN.END)	1000X350X250	200
32	SSIDE WALL (GEN.END)	5850X200X150	550
33	SHELL INTERNAL DETAILS	3650X850X625	4780
34	SHELL INTERNAL DETAILS	3650X850X625	4780
35	SHELL INTERNAL DETAILS	3650X850X625	4780
36	SHELL INTERNAL DETAILS	3650X850X625	4780
37	SHELL INTERNAL DETAILS	1000X750X350	600

SECTION VII : APPENDIX III**(C) CONDENSER & AUX. : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
38	SHELL INTERNAL DETAILS	3700X850X350	4600
39	AIR EXTRACTION PIPING	5460X990X410	1200
40	SHELL INTERNAL DETAILS	4700X3426X348	4100
41	SHELL INTERNAL DETAILS	4700X3426X348	4100
42	SHELL INTERNAL DETAILS	4700X3426X348	4100
43	SHELL INTERNAL DETAILS	4700X3426X348	4100
44	SHELL INTERNAL DETAILS	4700X3426X348	4100
45	SHELL INTERNAL DETAILS	4700X3426X348	4100
46	SHELL INTERNAL DETAILS	4700X3426X348	4100
47	SHELL INTERNAL DETAILS	5500X940X630	7560
48	SHELL INTERNAL DETAILS	4440X260X100	350
49	SHELL INTERNAL DETAILS	3000X1500X500	4655
50	LOWER DOME WALL (TUR.END)	11000X3950X910	8767
51	LOWER DOME WALL (TUR.END)	4000X800X100	700
52	LOWER DOME WALL (TUR.END)	900X300X300	270
53	LOWER DOME WALL (GEN.END)	11000X3950X910	7698
54	LOWER DOME WALL (GEN.END)	4000X800X100	700
55	LOWER DOME WALL (GEN.END)	900X300X300	270
56	LOWER DOME WALL (F.W/B SIDE)	7502X4046X545	6012

SECTION VII : APPENDIX III**(C) CONDENSER & AUX. : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
57	LOWER DOME WALL (F.W/B SIDE)	6238X934X1155	1444
58	LOWER DOME WALL (F.W/B SIDE)	1325X1150X500	550
59	LOWER DOME WALL (R.W/B SIDE)	7550X4000X1900	6727
60	LOWER DOME WALL (R.W/B SIDE)	6236X1134X1160	1427
61	LOWER DOME WALL (R.W/B SIDE) LOOSE ITEMS	1300X1065X305	215
62	LOWER DOME WALL (R.W/B SIDE)	6016X200X200	726
63	LOWER DOME WALL (R.W/B SIDE)	6016X200X200	726
64	LOWER DOME WALL (R.W/B SIDE)	6016X200X200	726
65	LOWER DOME WALL (R.W/B SIDE)	6016X200X200	726
66	LOWER DOME WALL (R.W/B SIDE)	3400X200X200	382
67	LOWER DOME WALL (R.W/B SIDE)	3400X200X200	382
68	LOWER DOME WALL (R.W/B SIDE)	1760X1480X1230	4300
69	LOWER DOME WALL (R.W/B SIDE)	2380X1310X1100	4295
70	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310	1083
71	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310	1083
72	UPPER DOME WALL (F/W/B SIDE)	5880X1930X380	3635
73	UPPER DOME WALL (LOOSE ITEMS)	5400X350X32	475
74	UPPER DOME WALL (LOOSE ITEMS)	670X250X450	410

SECTION VII : APPENDIX III**(C) CONDENSER & AUX. : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
75	UPPER DOME WALL (RWB SIDE)	5880X1930X448	3270
76	B W/BOX REMOVAL DEVICE	2500X1000X750	2600
77	B W/BOX REMOVAL DEVICE(CONDENSER)	2000X1500X500	2135
78	FRAME	1850X840X230	650
79	FRAME	1840X840X230	650
80	STEAM THROW DEVICE	1450X900X700	1040
81	STEAM THROW DEVICE	1450X900X700	1040
82	CONDENSER (LOOSE ITEMS)	850X250X250	30
83	CONDENSER	2900X956X406	377
84	CONDENSER LOOSE ITEMS	1000X500X500	275
85	CONDENSER LOOSE ITEMS	1000X800X800	1450
86	CONDENSER LOOSE ITEMS	600X320X200	6
87	CONDENSER LOOSE ITEMS	3300X250X200	200
88	STAND PIPE NO.1	2750X420X400	61
89	CONDENSER STAND PIPE	3150X350X330	300
90	STAND PIPE NO.2	2750X420X390	62
91	CONDENSER INSTRUMENTRATION	1500X1000X1000	650
92	CONDENSER INSTRUMENTRATION	1000X750X500	145

SECTION VII : APPENDIX III**(C) CONDENSER & AUX. : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
93	CONDENSER INSTRUMENTRATION	1400X800X700	74
94	GLAND STEAM CONDENSER	1015X1180X1400	825
95	STAND PIPE/LOOSE ITEM (GSC)	2000X400X200	200
96	GLAND STEAM CONDENSER (LOOSE ITEMS)	700X500X150	10
97	LOOSE ITEMS OF GSC (FRAGILE)	600X800X400	100
98	LOOSE ITEMS OF GSC (NON FRAGILE)	1500X650X450	320
99	DRAIN COOLER	4650X1000X1250	3500
100	LOOSE ITEMS (DRAIN COOLER)	800X500X300	101
101	LP HEATER NO.1	12000X1500X1650	11880
102	LPH NO.1 (LOOSE ITEMS)	1830X425X385	43
103	LPH -1 (LOOSE ITEMS - FRAGILE)	2700X500X400	113
104	LOOSE HEATER NO.1 (STAND PIPE -I)	850X800X600	72
105	LOOSE ITEMS (STAND PIPE -1 FOR LPH -1)	0X0X0	70
106	LP HEATER NO.2	12000X1500X1650	9950
107	LPH -2 (LOOSE ITEMS)	1830X690X425	74
108	LPH- 2 (LOOSE ITEMS - FRAGILE)	2700X500X400	140
109	LPH -2 (STAND PIPE -1)	850X800X600	90
110	LPH -2 (STAND PIPE - 2)	1000X800X700	450

SECTION VII : APPENDIX III**(C) CONDENSER & AUX. : WEIGHT DETAILS**

SL.NO	DESCRIPTION	DIMENSION (MM)	GROSS WT (Kg)
111	LOOSE ITEMS (STAND PIPE - 1 & 2 FOR LPH -2)	0X0X0	70
112	LP HEATER NO.3	12000X1500X1650	9875
113	LPH - 3 (LOOSE ITEMS)	1830X690X425	74
114	LPH - 3 (LOOSE ITEMS - FRAGILE)	2700X500X400	140
115	LPH - 3 (STAND PIPE -1)	850X800X600	90
116	LPH -3 (STAND PIPE -2)	1000X800X700	425
117	LOOSE ITEMS (STAND PIPE - 1&2 FOR LPH -3)	0X0X0	70
118	TURBINE OIL COOLER	5050X1650X1980	8200
119	TURBINE OIL COOLER	5050X1650X1980	8200
120	TOC (LOOSE ITEMS)	750X500X200	80
121	TOC (LOOSE ITEMS)	800X600X600	60
122	EXCITER AIR COOLER	2700X850X550	892
123	EXCITER AIR COOLER	2700X850X550	892
		TOTAL WT.(Kg)	331287
124	REJOINTS - INLET	3500 x 3000x 5200	18500
125	REJOINTS -OUTLET	3200 x 3000 x 3600	16500
		TOTAL WT.(Kg)	366287

SECTION VII : APPENDIX III

(D) HEAT EXCHANGER EQUIPMENTS : WEIGHT DETAILS

SL. NO	DESCRIPTION	DIMENSION (MM)	TOTAL WT (Kg)
1	HP HEATER - 5	11300 X 2400	35000
2	HP HEATER - 6	12000 X 2400	45000
3	DEAERATING HEATER	8500X2600X2700	13000
4	FEED STORAGE TANK SECTION - I	5000X3900X4100	10000
5	FEED STORAGE TANK SECTION - 2	11500X3900X4100	21000
6	LOOSE ITEMS (stand pipe, safety relief valve, spool piece etc..)		3000
7	DEAERATOR PLATFORM (Angles, Channels, gratings etc..)		8000
		TOTAL WT.(Kg)	135000

SECTION VII : APPENDIX III

(E) PUMPS & MOTORS : WEIGHT DETAILS

Boiler Feed Pump (BFP) – FK6D30 & Booster Pump (BP) – FA1B

S No	Description of Equipment	Dimensions (mm)	Unit Weight (kg)	Total Qty. (No.)	Total Weight (kg)
		L x B x H			
1	BFP Skid (Pump Assly. + Base Plate + tubing + Seal Coolers)	2250x1000x1050	5770	3	17310
2	BP Skid (Pump Assly. + Base Plate + tubing)	1650x1200x950	2511	3	7533
3	Hydraulic Coupling (DD) Assly.	1800x1700x1800	3560	3	10680
4	Hyd. Coupling W.O.Cooler (DD)	3700x1500x500	1475	3	4425
5	Hyd. Coupling L.O.Cooler (DD)	3100x1300x450	775	3	2325
6	Hyd.Coupling Loose Items	-----	710	3	2130
7	Suction Strainer at BP Suction (DD)	900x800x1400	800	3	2400
8	BFP Recirculation valve (DD)	1800x550x1400	350	3	1050
9	Loose Items	-----	2500	3	7500
					55353

Condensate Extraction Pump (CEP) – EN5J40

Sl. No	Description of Equipment	Dimensions (mm)	Unit Weight (kg)	Total Qty. (No.)	Total Weight (kg)
		L x B x H			
1	CEP assembly	5700x550x700	6150	2	12300
2	Canister	4000x950x1500	2700	2	5400
3	CEP Foundation Ring	1500x1500x200	580	2	1160
4	CEP Suction Strainer	800x800x1100	1350	2	2700
6	Loose Items	-----	300	2	600
					22160

Motors for BFP & CEP					
SL NO	Description		Unit Weight (Kg)	Qty (no.)	Total Weight (kg)
1	BFP Motor (4600 KW)	4000 x 3000 x 3500	15000	3	45000
2	CEP Motor (650 KW)	3000 x 2000 x 2000	6000	2	12000
					57000
			TOTAL WT.(Kg)		134513

(F) TANKS & MISCELLANEOUS ITEMS : WEIGHT DETAILS				
Sl. No	Description of Equipment	Dimensions (mm)	Total Weight (kg)	
1	Flash tanks HP drain	3920 x 3000	4550	
2	Flash tanks LP drain	2700 x 2000	3100	
3	Unit Flash tank	2500 x 1400	1070	
	Misc tanks :			
4	Clean oil tank	4600 x 5100 x 3000	11000	
5	Dirty oil tank	4600 x 5100 x 3000	11000	
6	Oil unloading tank	2500 x 1500 x 1000	600	
7	Miscellaneous items		8680	
		TOTAL WT.(Kg)		40000

SECTION VII : APPENDIX III

(G) CW PIPING : WEIGHT DETAILS

Sl. No	Description	Size in MM	Weight (kg)
1	CARBON STEEL PIPE	OD 1829 X 14 mm thick	30000
		TOTAL WT.(Kg)	30000

NOTE :

1. The above list (Appendix - III) contains only the Packages of major items, its ODC and unit weights to be handled at site.

2. The list is tentative and is given to enable the contractor to study the nature of work. 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 indicated above .

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 disman

SECTION VII
APPENDIX - IV

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

S.No	Description	Qty
01	EOT Crane 125T/30 T at TG Hall	01
02	135T Crane for FST & Deaerator	01**
03	Slings for Stator Lifting	Set
04	Hydro Test pumps(400/600Kg/Cm² for HP lines) With accessories	01

**** - For Lifting FST/Deaerator outside TG Hall**

Note –

1. All the above T&Ps shall be issued on free of hire charges on need basis for erection/pre-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 :**
 - 3.1 EOT crane in TG hall will be given on need basis . Qualified and experienced operator is to be provided by the contractor on full time basis for his work . Attending routine maintenance , providing manpower , tools & tackles for any repair /rectification of crane is also in the scope of the contractor . The contractor has to provide required manpower for handling EOT crane trailing cable while in operation. The Quoted rate shall be inclusive of above .

- 3.2 Generator Stator lifting is by Tandem operation only.
EOT crane will be supplemented in addition to the one which has been already provided for erection **only at the time of Generator Stator lifting** .
- 3.3 Since this crane will be provided by customer to 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 135T crane, the crane will be provided by BHEL free of cost along with crane operator. But the required fuel & lubricants shall be arranged by the contractor at his cost.
5. 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
6. Any Loss/Damage of tools by the contractor shall have to be replaced or other wise cost thereof shall be recovered from the contractor.
7. 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 - V
PAINTING SCHEDULE

1.0 SCOPE

1.1 This section covers the painting requirements for the power plant equipment, structures, piping etc. and any other surface required to be painted.

2.0 CODES AND STANDARDS

Painting of equipment shall be carried out as per the specifications indicated below and shall conform to the relevant IS specification for the material and workmanship.

The following Indian Standards may be referred to for carrying out the painting job:

IS: 5	: Colours for ready mixed paints and enamels
IS:1303	: Glossary of terms relating to paints
IS:2379	: Colour code for identification of pipelines
IS:1477	: Code of practice for painting of ferrous metals In buildings (Parts I & II)
IS:2524	: Code of practice for painting of non-ferrous Metals in buildings (Parts I & II)
IS:2395	: Code of practice for painting of concrete, Masonry and plaster surfaces (Parts I & II)
IS:2338	: Code of practice for finishing of wood and Wood based materials (Parts I & II)
IS: 6278	: Code of practice for white washing and colour Washing
IS: 3140	: Code of practice for painting asbestos cement Building Products

- IS: 158 : Ready mixed paint, brushing, bituminous, Black leadfree, acid, alkali, water and heat resisting
- IS: 2074 : Ready mixed paint, air drying, red Oxide Zinc , Chrome priming
- IS:101 : Ready mixed paint, brushing, Zinc Chrome, Priming
- IS: 2932 : Enamel, synthetic, exterior (a) undercoating(b) finishing

3.0 PREPARTION OF SURFACES

All surfaces to be painted shall be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes shall be adopted to clear the surfaces. However, in certain locations where power tool cleaning cannot be carried out, sand scrapping may be permitted with steel wire brushes and/or abrasive paper. Cleaning with solvents shall be resorted to only in such areas where other methods specified above have not achieved the desired results. Cleaning with solvents shall be adopted only after written approval of the OWNER / OWNER REPRESENTATIVE. The sheet steel of electrical and instrumentation panels shall be pre treated through chemical cleaning (7 tank) process of rinsing, degreasing, rinsing, derusting ,rinsing, phosphating and rinsing. However , incase mechanical cleaning is also required, the contractor shall carry out the same to get a smooth finish.

4.0 PRIMER PAINT

After the surface is prepared, one coat of Zinc Phosphate primer conforming to IS: 2074 shall be applied. After this first coat is dried up completely, second coat of red oxide primer shall be applied. Primer shall be applied by brushing to ensure a continuous film without 'holidays'. The dry film thickness of each coat shall be minimum 30 microns.

5.0 FINISH PAINT

Synthetic enamel paint conforming to IS:2932 shall be used for finish coats. The colour/shade shall be as approved by the OWNER. After cleaning the dust on the dried up primer, first coat of synthetic enamel shall be applied. After this first coat dries up hard, the surface is wet scrubbed cutting down to a smooth finish and ensuring that at no place the first coat is completely removed. After allowing the water to get evaporated completely, the second finish coat of synthetic enamel paint shall be applied.

6.0 SUGGESTED COLOUR CODES FOR PAINTING

SNo	Name of the equipment	Colour	IS -5 grade	Colour band	IS-5
1.0	Structures,,platforms, galleries,ladders and hand rails	Dark admiralty grey	632		
2.0	Boiler casing, ESP and ducting	Nut brown	413		
3.0	Crane				
3.1	Crane structure	Golden Yellow	356		
3.2	Trolley and Hook	Crimson	540		
4.0	Fans,pumps,motors,Compressors	Light Grey	631		

SNo	Name of the equipment	Colour	IS -5 grade	Colour band	IS-5
5.0	Tanks (with out insulation and cladding)	Light grey			
5.1	Out door	Aluminium			
5.2	Indoor	Light grey	631		
6.0	Vessels & all other proprietary equipment (with out insulation & cladding)	Light grey	631		
7.0	Switch gear	Light grey	631		
8.0	Control & relay panels	Light grey	631/ 70,78 of IS 1650		
9.0	Turbine	Golden yellow	356		
10.0	Generator & Excitor	Light Grey	631		
11.0	Transformers	Aluminium			

SNo	Name of the equipment	Colour	IS -5 grade	Colour band	IS-5
12.0	Machinery guards	Signal red	537		
13.0	Piping (with out insulation and cladding)				
13.1	Water system				
	Boiler feed	Sea green	217		
	Condensate	Sea green	217	Light brown	410
	DM water	Sea green	217	Light orange	557
	Soft water	Sea green	217	French blue	166
	Bearing cooling water	Sea green	217	French blue	166
	Potable & filtered water	Sea green	217	French blue	166

SNo	Name of the equipment	Colour	IS -5 grade	Colour band	IS-5
	Service & Clarified water	Sea green	217	French blue	166
	Raw water	Sea green	217	White	
	Cooling water	Sea green	217	French blue	166
13.2	Air System				
	Station air	Sky blue	101		
	Control air	Sky blue	101	White	
13.3	Oil system				
	Fuel oil	Light brown	410	French	166
	Light oil	Light brown	410	Brilliant green	221

SNo	Name of the equipment	Colour	IS -5 grade	Colour band	IS-5
	Lubricating oil	Light brown	410	Light grey	631
	Transformer oil	Light brown	410	Light orange	557
13.4	Gas System				
	Carbon dioxide	Canary yellow	309	Light grey	631
	Hydrogen	Canary yellow	309	Signal red	537
13.5	Fire services	Fire red	536		
13.6	Ash slurry pipes	Black			
13.7	Vacuum Pipes	Sky blue	101	Black	
13.8	Fuel pipes(pulverised coal)	Light brown	410		

SNo	Name of the equipment	Colour	IS -5 grade	Colour band	IS-5
13.9	Drainage	Black			

Notes :

1. The colour code basically refers to IS 2379 for piping with necessary modifications/
2. Where band colour is specified , same shall be provided at 30 metre intervals on long uninterrupted lines and also adjacent to valves and junctions

SECTION – VII – APPENDIX - VI

BHEL : PSSR : CHENNAI	
	DETAILS OF CONTRACTOR/SUPPLIER FOR E- REMITTANCE OF PAYMENTS - BY BHEL/PSSR
1	NAME & ADDRESS OF THE CONTRACTOR/SUPPLIER
2	BANK A/C NO
3	TYPE OF A/C (CC / CURRENT)
4	NAME OF THE BANK
5	NAME OF THE BRANCH
6	BRANCH CODE
7	BANKER'S ADDRESS (BRANCH)
	MICR NO
	IFSC CODE
NOTE : THE ABOVE DETAILS ARE TO BE FURNISHED IN THEIR LETTER HEAD BY THE CONTRACTOR /SUPPLIER ,DULY ATTESTED BY THEIR BANKERS	

SECTION VII
APPENDIX – VII
DECLARATION SHEET

I, _____ hereby certify that, all the information and data furnished by me with regard to this Tender Specification No.BHEL:PSSR:SCT:1299 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 – VIII

TENDER SPECIFICATION NO BHEL:PSSR:SCT:1299

**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 Govt. of India Undertaking)

Power Sector – Southern Region

EVR Periyar Building

690 , Anna Salai, Nandanam, Chennai – 600 035.

SECTION VII

APPENDIX - IX

CHECK LIST

TENDER SPECIFICATION NO: BHEL: PSSR : SCT : 1299

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 status : 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: 1299

FOR

Handling at Stores / Storage yard,
Transportation to Site of work , Erection,
Testing, Commissioning of Steam
Turbine , Generator , Integral Piping,
Pumps and other Auxiliaries connected
with the system including supply and
application of final painting for unit 8-
of 250 MW set , Stage - III

at

Raichur Thermal Power Project

Stage – III , 1 x 250 MW, Unit No 8

Raichur , Karnataka

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.

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 Stores / Storage yard,
Transportation to Site of work , Erection, Testing,
Commissioning of Steam Turbine, Generator,
Integral Piping, Pumps and other Auxiliaries
connected with the system including Supply
and application of final painting for Unit – 8
of 1x 250 MW Stage – III at Raichur Thermal
Power Station, Raichur, Karnataka.

(PRICE BID)

PART II

Issued to
M/s.

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED

Additional General Manager/Contracts

(This tender document is not transferable)

Place: Chennai-600 035.
Date:

SECTION VII – APPENDIX – X
RATE SCHEDULE BHEL :PS:SCT:1223

SL NO	Description of work	Lumpsum Amount in Rupees (In Figures Words)
01	<p>Supply of labour, all consumables and tools and tackles (except those specifically 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 250 MW set, at RAICHUR Thermal Power Project , Shakthi Nagar, Raichur, Karnataka 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 STG 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.</p> <p>Approximate Weight 2040 MT (Lumpsum)</p>	Rs.

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 2040 (2040 + 204 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 2244.
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.
7. Additional information to be furnished by the bidder alongwith the price bid
 1. Element of VAT added with the above quoted price
Rs _____
 2. Rate of VAT % _____%
 3. Value on which VAT has been included _____

SIGNATURE OF THE TENDERER