

TENDER SPECIFICATION

BHEL:PSSR:SCT: 1394

FOR

Handing at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of LP piping and its accessories , Hangers & Supports, Valves, Miscellaneous equipments/ systems and other static equipments including supply and application of final painting for Unit 2 of 1 X 500 MW Stage -II

at

Bellary Thermal Power Station

Kudatini Village, Bellary

Karnataka State

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: 1394

Messrs

Date:

Dear Sir,

Sub: Handing at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of LP piping and its accessories , Hangers & Supports, Valves, Miscellaneous equipments/ systems and other static equipments including supply and application of final painting for Unit 2 of 1 X 500 MW Stage –II at Bellary TPS ,Kudatini Bellary , Karnataka State

Please find enclosed one set of non-transferable tender documents containing -**135**- pages along with 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 09.)

The completed quotations shall reach the office of the under signed on or before **01-06-2010 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
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)

1. Details of previous experience during the last seven years indicating contract value, duration, completion period and present engagement as per G.C.C.
2. Organization structure of the Company as per GCC.
3. 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.
4. Turnover of the Company in last 3 Financial years pertaining to this scope of work only.
5. Latest Income Tax clearance certificate.
6. 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.
7. Declaration sheets as per Appendix of Tender Specification.
8. Checklist and Schedule of General particulars as per Appendix in GCC.
9. 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 LP piping works of minimum one unit of capacity 210 MW or above in a thermal power plant during the last seven years, preceding the scheduled date of bid submission.

"Executed " means synchronization of the unit

- b) The bidders should have a minimum average financial turn over of Rs. **137 Lakhs** in the preceding three financial years ending 31st March 2009.

The Bidder must have earned profit in any one of the last three financial years ending 31.03.2009 and should have positive net worth as on 31.03.2009.

Bidder should submit audited balance sheet and profit & loss account of the company along with all annexures for last three years ending 31.03.2009 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.
- d) Approval of the agency by Customer.
- e) BHEL reserves the right to adopt the process of "Reverse Auction" (on line bidding) among the bidders who are found to be qualified on the Technical Bid. No extension of time on the account will be entertained for bid submission.

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 09). 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:1394

Description	EMD
Handing at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of LP piping and its accessories , Hangers & Supports, Valves, Miscellaneous equipments/ systems and other static equipments including supply and application of final painting for Unit 2 of 1 X 500 MW Stage –II at Bellary TPS ,Kudatini Bellary , Karnataka State	Rs. 2,00,000/- (Rupees Two Lakh only)

Cost of Tender Documents (Including all Taxes)	:	Rs.1040 /-
Sale Starts on	:	12.05.2010
Sale closes on	:	31.05.2010
Due date and Time for Submission	:	01.06.2010 15.00 Hrs.
Date and time for opening Of Technical Bids	:	01.06.2010 15.30 Hrs

QUALIFICATION REQUIREMENT

a) The bidders should have executed LP piping works of minimum one unit of capacity 210 MW or above in a thermal power plant during the last seven years, preceding the schedule date of bid submission.

"Executed " means synchronization of the unit

b) The bidders should have a minimum average financial turn over of **Rs.137 Lakhs** in the preceding three years ending 31st March 2009.

The Bidder must have earned profit in any one of the last three financial years ending 31.03.2009 and should have positive net worth as on 31.03.2009.

Bidder should submit audited balance sheet and profit & loss account of the company along with all annexures for last three years ending 31.03.2009 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.

d) Approval of agency by customer

e) BHEL reserves the right to adopt the process of "Reverse Auction" (on line bidding) among the bidders who are found to be qualified on the Technical Bid. No extension of time on the account will be entertained for bid submission.

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

Interested parties can get the Tender documents from the office of the Additional 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

TENDER SPECIFICATION : BHEL:PSSR:SCT:1394

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:1394** 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

**BELLARY 1 X 500 MW UNIT – 2
PROJECT INFORMATION - GENERAL**

01	Project Title	BELLARY THERMAL POWER PROJECT 1 X 500 MW UNIT NO. 2
02	Owner/Purchaser	Karnataka Power Corporation Ltd., " Shakthi Bhavan " , No. 82, Race Course Road, Bangalore - 560 001
03	Location	Kudatini Village, Bellary District, Karnataka State, India
04	Latitude and Longitude	15 ⁰ 11' 58' N Latitude 76 ⁰ 43' 23' E Longitude
05	Elevation above mean sea level	478 metres
06	CLIMATIC CONDITIONS	
a)	Temperature	
	Monthly Basis	
	Mean of daily maximum temperature	42.5 °C (in the month of April)
	Mean of daily minimum temperature	19.5 °C (in the month of December)
	Mean of daily maximum temperature	37.5 °C
	Mean of daily minimum temperature	19.5 °C
	Highest temperature recorded	42.5 °C
	Lowest temperature recorded	14.6°C
	Relative Humidity	Varies between 11% and 70%
	Annual average rain fall	482 to 846 mm most of which occurs during August to October
07	Wind Speed	
	a) Annual mean wind speed	8.4 Km / Hr
	b) Maximum mean wind speed	19 Km / Hr in the month of July

08	Wind Load	
	Calculations for which wind effect shall be in accordance with IS 875 - 1987 (Part 3)	
	a) Basic wind speed of 39 m / sec as given in fig 1 of the code	
	b) Factor K1 shall be taken as 1.06	
	c) Terrain category shall be 2 and corresponding values shall be taken for K2	
	d) Factor K3 shall be taken as 1.0	
09	Wind Loading for Stack	
	a) For wind pressure as per clause 8 above	
	b) For RC stacks as per IS 4998	
10	Seismic Data (as per IS 1893 latest issue)	
	a) Zone	Zone III
	Importance factor (I)	2.5 for Electrical equipment 1.5 for others
11	Auxiliary Power Supply	Auxiliary electrical equipment to be supplied against this specification shall be suitable for operation on the following supply system
	a) For Motors rated above 175 KW	11000 KV , 3 Phase , 3 wire ,50 Hz medium earthed AC
	b) For motor control center	415 V, 3 phase,3 wire solidly earthed AC
	c) For Motors rated below 175 KW	415 V, 3 phase,3 wire solidly earthed AC
	d) DC motor starters, DC solenoids, DC alarm, control and protections	220 V DC, 2 Wire, unearthed DC
	e) AC controls & protective devices	110 V ,1 phase, 50 Hz, 2 wire AC supply. The single phase 110 V AC supply shall be derived by contractor by providing 415 V / 110 V control transformers of adequate rating with MCCB / MCB on both the primary and secondary sides
	f)Uninterrupted power supply	230 V, 1 phase, 50 Hz, 2 Wire AC supply from UPS system for I & C (including indicator recorders) and UCMS only

	g)AC solenoids, indicators/ recorders, space heaters (for motors rated 30 KW and above)	240 V , 1 phase 2 wire 50 Hz AC system with effectively earthed neutral . The power supply shall be derived by contractor by providing 415 V / 240 V transformer of adequate rating with MCCB / MCB on primary / secondary sides.
	h)Winding heating of motors below 30 KW	24V , 1 phase, 50 Hz, AC with one point earthed. This shall be derived by contractor by providing 415 V 3 phase, 3 wire, AC supply through an adequately rated step down transformer of adequate rating with MCCB / MCB on primary / secondary sides
	i) Solid state controls (including solenoid valves)	24 V DC, 2 wire, supply from UPS for instrumentation system only
	j) Lighting fixtures	24 V, 1 Phase, 2 wire , 50 Hz system
	k) Lighting fixtures and space heater in panels	240 v,1 Phase, 2 wire , 50 Hz system
	l) The above voltages may vary as follows:	
	All devices shall be suitable for continuous operation over the entire range of voltage and frequency indicated below without any change in their performance	
	i) AC supply	Voltage variation +/- 10% Frequency variation +/- 5% Combined voltage & frequency variation +/- 10%
	ii) DC Supply	Voltage variation + 10% minus 20%

SECTION III

COMMON CONDITIONS OF CONTRACT – BELLARY 2 - LPP PACKAGE

3.1 SCOPE OF CONTRACT

- 3.1.1 The Intent of this specification is to provide services for executing the 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 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 provided by BHEL from time to time.
- 3.1.3 Provision of all types of labour, Supervisors, 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.
- 3.1.4 Proper out-turn as per BHEL plan and commitment.
- 3.1.5 Completion of work in time.
- 3.1.6 Good quality and accurate workmanship for proper performance of equipment / systems.
- 3.1.7 Preservation of all components at all stages of pre-assembly / erection / testing and commissioning till unit is handed over.

3.2 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) will be provided free of charges. Contractor has to make his own arrangements for labour colony.

3.2.2 ELECTRICITY:

For construction purpose Electricity will be provided at one single point free of cost. Further distribution shall be arranged by the contractor, at his cost.

3.2.3 WATER:

Water for construction purpose will be provided by BHEL at one single point free of charge, as provided by Customer.

3.2.4 TOOLS & TACKLES:

All the tools and tackles required for the complete erection of components shall be arranged by the contractor, except the items specified and agreed upon by BHEL and the quoted rate shall be inclusive of such requirements.

3.2.5 CONSUMABLES:

Such of those consumables as indicated as consumables provided by BHEL alone will be provided to the contractor by BHEL free of charge. Other required consumables like electrodes, filler wires, all gases, consumables and other materials for this scope of work are to be arranged by the contractor at his cost.

3.2.6 **CRANES**

EOT crane of customer as per availability without **operator shall** be made available in the T.G. Hall free of charge for erection purposes on sharable basis as per the requirement as per BHEL engineer's discretion.

The contractor has to arrange for trained operators for EOT Cranes 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.

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.

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.

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.

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

3.3 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 purposes and as well as drinking purposes to various work-fronts shall be contractor's responsibility and at his cost.

3.3.3 ELECTRICITY DISTRIBUTION:

Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cable 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.

3.3.4 POSSESSION OF GENERATORS

As there are bound to be interruptions in regular power supply, power cut / load shedding in any construction sites, 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 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 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 the contractor. This may also be noted while quoting.

3.3.5 LIGHTING FACILITY:

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.

3.3.6 POWER REQUIREMENT:

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.

3.3.7 CONTRACTOR'S OBLIGATION ON COMPLETION:

On Completion of work, all the temporary buildings, structures, pipe lines, cable 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, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

3.4 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 these gases. Non-availability of gases cannot be considered as reasons for not attaining the required progress.
- 3.4.2 BHEL reserves the right to reject the use of any gas in case required purity is not maintained.
- 3.4.3 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.
- 3.4.4 The contractor shall ensure safekeeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.,

3.5 ELECTRODES :

- 3.5.1 All the required electrodes as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement regarding 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 number and date of expiry etc.,
- 3.5.2 The TIG welding wires for CS, AS and SS welding will be supplied by BHEL free of cost as supplied by manufacturing units. All other electrodes including stainless steel electrodes required shall be arranged by the contractor at his cost. The utilization of the filler wire shall be duly accounted for exercising maximum care and ensuring economical usage for minimum wastage. If during erection, it is found that the consumption of filler wire is more than the actual requirement by improper usage, the cost for the additional quantity so consumed shall be recovered from the contractor.
- 3.5.3 Storage of electrodes shall be done in an air-conditioned / humidity controlled room as per manufacturer's instructions / requirement, at his own cost by the contractor.
- 3.5.4 All low hydrogen electrodes shall be baked/dried in the electrode drying oven to the temperature and period specified by 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 contractor at his cost. Separate ovens shall be used for baking and for holding besides the portable ovens.
- 3.5.5 In case of improper arrangement or procurement of above electrodes, BHEL reserves the right to procure the same from any source and recover the cost from the contractor's first/ subsequent bills at market value plus departmental charges of BHEL, communicated from time to time. Postponement of such recovery is not permitted.

3.5.6 BHEL reserves the right to reject the use of any electrodes at any stage 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 free of hire charges on sharing basis the tools and plants indicated **in Section VII Appendix IV** only. It may be noted that distribution of these equipments 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 equipments shall be the contractor's responsibility and shall be as per instructions/standard practice of BHEL Engineer.

3.6.3 Any loss/damage to any or part of the above equipments shall be to contractor's account and the expenditure on these accounts 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 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.

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

3.6.7 The contractor shall return the T & P issued to him by BHEL in good working condition as and when so desired by BHEL. (on 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, then 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.

- 3.6.8 Contractor shall arrange all other T & PS required for the satisfactory execution of work at his cost.
- 3.6.9 All the T & P arranged by contractor including electrical connections wherein required shall be reliable / proven / tested and provided with necessary test certificate.
- 3.6.10 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.
- 3.6.11 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. Normal wear and tear will be taken into account.
- 3.6.12 Contractor shall have/employ at all times experienced operators and technicians for routine and breakdown maintenance of the equipment. Any delay in rectification of defects will warrant BHEL rectifying the defect and charging the cost to the contractor.
- 3.6.13 If at any time it is noticed that contractor is not using any of the T & P or equipment properly according to the instructions of BHEL, BHEL will have the right to withdraw any and all such equipment and any cost due to this shall be contractor's account.
- 3.6.14 All the T & P would be issued only at BHEL stores and it shall be the responsibility of the contractor to take delivery from BHEL stores, transport the same to site and return the same to BHEL stores in good condition after use.
- 3.6.15 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. Test certificates obtained from the statutory authority should be submitted before their usage.

- 3.6.16 For movement of cranes etc. It may become necessary to lay sleeper bed for obtaining leveled safe approach for usage of equipment. It shall be the responsibility of the contractor to lay necessary sleepers. The sleepers shall be arranged by the contractor at his cost.
- 3.6.17 Contractor shall make good any loss or damage to the equipments supplied to him and day to day maintenance and operations of equipments shall be borne by the contractor including all consumables like petrol, oil and air filters etc.,

3.7 SUPERVISORY STAFF AND WORKMEN:

- 3.7.1 The Contractor shall supply/employ all skilled workmen like 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 stores/storage yard to erection site, transportation, erection, testing and commissioning envisaged under this specification. Only fully trained and competent men with previous experience on the job shall be employed. They shall hold valid certificates wherever necessary.

BHEL reserves the right to decide on the suitability of the workers and other personnel who will be 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.

- 3.7.2 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 particularly welding and NDT. 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.
- 3.7.3 The Contractor shall also furnish daily labour report showing by classification the number of employees engaged in various categories of work and a progress report of work as

required by BHEL Engineer. The contractor shall also give a summary report at the end of the month and plan of deployment for the consequent month as per the plan of activities as required by BHEL, to meet the overall contract requirement.

- 3.7.4 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 contractor and his personnel shall co-operate with other personnel/ other contractor coordinating his work and proceed in a manner that shall not delay or hinder the progress of work as a whole.
- 3.7.5 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. Wherever finish or tolerances are not specified in drawings/documents, BHEL Engineers instructions are taken as final.
- 3.7.6 The contractor shall employ the necessary number of qualified and approved full time electricians at his cost to maintain his temporary electrical installation till the completion of work.
- 3.7.7 It is the responsibility of the contractor to engage his workmen in shifts or on overtime basis for achieving the target set by BHEL and also during erection, commissioning and testing period. The contractor's quoted rate shall include all these contingencies.
- 3.7.8 If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road, kerb, fence, enclosure, water pipes, cables, drains, electric or telephone posts or wires, trees or any other property or to any part of the erected components etc, then 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.

- 3.7.9 The contractor shall provide at his cost watch & ward round the clock for the safety of the equipment under erection / in his stores at site. A technically qualified (Diploma in Technical safety) safety officer should be employed by the contractor to handle all the safety requirements in work area.

3.8 SCOPE OF MATERIAL HANDLING AND SITE STORAGE AND OTHER RESPONSIBILITIES

- 3.8.1 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.
- 3.8.2 The contractor shall identify necessary supervisor/labour for the above work in sufficient numbers as may be needed by BHEL for areas covering his scope.
- 3.8.3 It shall be contractor's responsibility to arrange necessary tractors, trailer or trucks/slings/tools and tackles/labour including operators Fuel lubricants etc., for loading from storage yard and on to transport equipment, move them to erection site/pre-assembly yard and unload the same at pre-assembly yard/ erection site and the quoted rate shall include the same.
- 3.8.4 All equipment so used by contractor shall be of proven quality and safe in operation as approved by BHEL site Engineers from time to time.
- 3.8.5 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.
- 3.8.6 All welding filler wires issued to contractor shall be preserved by him carefully to prevent deterioration of their

properties. Special care shall be taken to preserve alloy steel and other special electrodes / filler wires. Contractors shall exercise maximum care in using these electrodes, filler wires to minimize wastage by maintaining a record of all usages.

- 3.8.7 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.
- 3.8.8 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 and records to be maintained.
- 3.8.9 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 / through SOMS (PI refer to clause on SOMS). At periodic/intervals of work, complete and detailed account of the equipment so erected and electrodes used shall be submitted to the BHEL Engineer.
- 3.8.10 The contractor shall follow monthly plan for erection and the same will be mutually agreed upon after discussion. The contractor shall arrange for Engineers, Supervisors and labour force and tools and plants and consumables to suit the agreed plan and execute the work accordingly.
- 3.8.11 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.
- 3.8.12 The contractor shall make suitable security arrangement including employment of security personnel to ensure the protection of all materials/equipments and works from theft, fire, pilferage and any other damage and loss.
- 3.8.13 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.

- 3.8.14 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.
- 3.8.15 The work covered under this scope of work is of highly sophisticated nature requiring best quality / precision workmanship engineering and construction management. The contractor 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.
- 3.8.16 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.
- 3.8.17 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. Wherever necessary suitable temporary fencing and lighting shall have 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.
- 3.8.18 The contractor shall be responsible for taking all safety precautions during the construction and keeping the site safe at all times. At the end of each working day or when the work is temporarily suspended, contractor shall protect all construction materials, equipments and facilities from causing damage to existing property and interfering with the operations of the station when it goes into services. The contractor shall comply with all applicable provisions of safety regulations, clean-up programme and other precautionary measures which BHEL has in effect at the site.

- 3.8.19 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. The history cards for major equipments to be maintained by the contractor.
- 3.8.20 The contractor shall take delivery of equipment from storage yard/stores/sheds. He shall also make arrangements for verification of equipment, scrupulously maintaining records and keeping safe custody 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.
- 3.8.21 Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

3.9.0 CIVIL WORKS

- 3.9.1 Foundation of all equipments and plants with necessary civil works shall be provided by BHEL/Client. The dimension of the foundation 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 adjustments up to 25mm of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipments plants shall be carried out by the contractor. All the materials like cements, including special grouting cement like Conbextra, or its equivalent, sand, etc. shall also be arranged by the contractor at his cost wherever necessary.
- 3.9.2 The contractor at his cost shall arrange for grouting of foundation bolt holes of supports and equipment as specified in the drawings / specification or as advised by the

Engineer of BHEL after preparing the foundation top surface for grouting, All the materials for grouting (sand, gravel & cement including special Cement) shall be arranged by the contractor. The grouting has to be done up to basement level. The required consumables like Portland cement, gravel, sand etc., have to be provided by the contractor at his cost. The contractor at his cost shall arrange special cement like Conbextra, GP2/shrinkomp or its equivalent where required.

3.9.3 The contractor at his cost shall arrange for grouting of anchor points of T & P issued to him and also grouting of winches or any other supports required for T & Ps. Necessary grout materials are to be arranged by the contractor at his cost.

3.9.4 The civil works for buried piping will be under the scope of the contractor. Pl. see the relevant clauses on buried piping details.

3.10.0 **DRAWINGS AND DOCUMENTS:**

3.10.1 The detailed drawing specification available with BHEL Engineers will form part of this tender specification. These documents will be made available to the contractor during execution of work at site.

3.10.2 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. Contractor shall maintain complete records of drawings and documents given to them time to time and maintain the latest drawings / documents in their custody. Contractor shall refrain from defacing the drawing / documents available with them.

3.10.3 The data furnished in various appendices enclosed 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.

- 3.10.4 Should any error or ambiguity be discovered in the specification, or information, the contractor shall forthwith bring the same to the notice of BHEL before commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor.
- 3.10.5 Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimensions/details without specific approval of BHEL.
- 3.10.6 Nitrogen purging to be carried out for Stainless Steel pipe welding.

3.11.0 **SITE CLEANLINESS AND SAFETY REQUIREMENTS**

- 3.11.1 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.
- 3.11.2 Non-conformity of safety rules and safety appliances will be viewed seriously and the BHEL has right to impose fines on the contractor as under:

Sl.No.	Safety measures	Fine (Rs.)
01	Not wearing safety helmet	50/-
02	Not wearing safety belt	100/-
03	Grinding without goggles	50/-
04	Not using 24V supply for internal work	500/-
05	Electrical plugs not used for hand machines	100/-
06	Not slinging properly	200/-
07	Using damaged sling	200/-
08	Lifting cylinders without cage	500/-
09	Not using proper welding cable with lot of joints	

	and not insulated properly	200/-
10	Not removing small scrap from platforms	200/-
11	Gas cutting without taking proper precaution or not using sheet below gas cutting	200/-
12	Not maintaining elec. Winches which are being operated dangerously	500/-
13	Improper earthing of electrical T & Ps	500/-

3.11.3 The contractor should exclusively deploy one Safety Engineer along with a safety supervisor for effective implementation and co-ordination of safe working conditions. The safety engineer should be a Degree / Diploma holder with a diploma / degree certificate in Industrial safety Engineering or allied subject. A copy of the safety engineer's qualification shall be submitted to BHEL Engineer.

3.11.4 **CONTRACTOR SHALL DEPLOY A SAFETY OFFICER EXCLUSIVELY TO HANDLE SAFETY REQUIREMENT.**

SPECIFIC REQUIREMENTS FOR ISO 9001 - 2000

3.12.0 **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 contractor 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 contractor for the non-conformances if any, observed and pointed out by BHEL.

3.13.0 **INSPECTION / QUALITY ASSURANCE / QUALITY CONTROL STATUTORY INSPECTION**

3.13.1 Various Inspection / quality control / quality assurance procedures/methods at various stages of erection and commissioning will be as per BHEL / Customer quality control procedure/codes/IBR and other statutory provisions and as per BHEL Engineer's instructions.

3.13.2 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.

3.13.3 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.

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

3.13.5 All the Important Measurements shall be recorded in the Daily Log Book with sketches based on BHEL Drawings indicating Readings / Measurements actually Taken and Signed by BHEL/Customer / Contractor Representatives.

- 3.13.6 Approval Given by Customer/BHEL for welding, results tests etc., shall also be recorded in the log book.
- 3.13.7 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. Welder's Performance Record shall be furnished every month. The performance Report of Welders shall indicate the percentage of Repair for each welder.
- 3.13.8 Heat Treatment details of 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. Welder's performance Record shall be furnished every month. The performance Report of Welders shall indicate the percentage of Repair for each welder.
- 3.13.9 All the Electrical/Technical Measuring and Testing Instruments/Gauges, Feeler Gauges, Height 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 of BHEL Engineer.
- 3.13.10 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.
- 3.13.11 The Welders performance will be reviewed from time to time as per the BHEL / IBR Standards and any welders not performing to the Standards set by BHEL/IBR Standards will be removed from working, Contractor shall arrange for the Alternate welders immediately.

- 3.13.12 All the welders shall carry identity cards as per the Performa prescribed by BHEL only Welders Duly authorized by BHEL / Boiler Inspector / Consultant shall be engaged on the work.
- 3.13.13 Contractor shall ensure speedy alignment and welding of all Equipment erected by him after placement. Also all alignments, Welding, NDT Test required for stage Inspection shall be completed as per Quality Assurance Procedures. All the Quality assurance procedures have to be complied with before effecting column erection, Ceiling Beams erection, drum lifting, further structural work, Hydraulic Test, Trial Run of Equipment, Pre-commissioning and any other tests required to be conducted for completing erection and commissioning.

3.14.0 STAGE INSPECTION BY FES / QA ENGINEERS

- 3.14.1 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. Contractor shall arrange all labour, Tools and Tackles, etc. for such stage inspections free of cost.
- 3.14.2 Any modifications suggested by FES and QA Engineers Team shall be carried out. Claims of Contractor, if any shall be dealt as applicable.
- 3.14.3 Any minor rectifications of minor repairs of defective work found out during stage Inspection shall be rectified free of cost, by the contractor.
- 3.14.4 Any major Rectification or Major Repair / Major Rework 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 possible.

3.15.0 STATUTORY INSPECTION

- 3.15.1 The scope includes Getting Approvals from the statutory authorities wherever required (Like Boiler Inspector and labour officers). This includes arranging for inspection visits of Boiler/labour/factory Inspector periodically as per BHEL Engineer's instructions, submitting documents/reports ,radiograph, etc. and following up the matter with them.
- 3.15.2 All fees connected with the contractors for testing his welders / men / workers and testing, inspection calibrating of his instruments and equipments, shall be paid by the contractor. It shall be the contractor's responsibility to obtain approval of statutory authorities, wherever applicable, for the conducting of any work which comes under the purview of these authorities. Any cost arising from this shall be the contractor's account. However, BHEL shall pay all other fees. (FEES FOR VISITS INSPECTION FEES, REGISTRATION FEES, ETC.,) In case these inspection have to be repeated due to default / fault of the contractor and fees have to be paid again, the contractor shall have to bear the charges. These would be deducted from his bills.

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 .If any common facility has been arranged at site, the contractor may also join by adhering to the terms and conditions laid down at the site on cost basis.

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 liaise 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.

06. ELCB's (Earth leak circuit breakers) at electrical safety aspects as per relevant is standard. 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 authorize 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 IMTE's 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 months 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. Subcontractor 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 HSE 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 A

SPECIAL CONDITIONS OF CONTRACT – BELLARY 2 - LPP PACKAGE

- 6.0.0 The scope of work under this specification covers, but not limited to the following:
- 6.1.0 Handling at site stores / storage yard, transporting to site, inspection, pre-assembly, erection, alignment, welding, NDT, fixing of hangers & supports, chemical cleaning / pickling, oil flushing, water flushing, hydro testing & steam blowing, surface finish, supply & application of primer & finish paints including labeling & flow direction on the piping / over insulation & hangers and supports, pre-commissioning, commissioning, trial operation & handing over to customer of all LP piping with associated mechanical equipments, like tanks, pumps, valves, strainers, filters, hoists, cranes etc. as enumerated in the scope of contract at **Bellary TPP, Unit -2 x 500 MW ,Kudatini Village , Bellary District, Karnataka State.**
- 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 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 work in other places.
- 6.1.3 The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely operation of equipment installed. The contractor must have adequate quantity of tools, construction aids, equipments etc., in his possession. He must also have on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel.

6.2.0 TRANSPORTATION FROM STORES / YARD

- 6.2.1 Loading at storage yard, transport to site, unloading at Pre-assembly area / site/working area is 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 piping / components shall be handled very carefully to prevent any damage or loss. 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 ERECTION

- 6.3.1 List of PGMA and list of equipment to be erected by the contractor & approximate weight individual PGMA's and number of joints are given in the **SECTION VII Appendix II** and are meant for giving general idea to the contractor only on the magnitude of the work involved. The piping components are sent in parts for convenient transportation / layout requirements. They are to be cleaned, pre-assembled in stage by stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.

- 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 The required shims and packer plates (either machined or plain) as specified in the drawing/as per requirement shall be supplied by the contractor with in the quoted rate.
- 6.3.5 Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc. shall also be blue matched by Prussian Blue. Required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions.
- 6.3.6 Grouting of equipments is included in the scope of contractor. Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., dewatering, 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 with in the scope this work. All grouting materials like cement, including special cements such as non-shrinkable free flow cements like Conbextra GP2/Shrinkomp N30 or its equivalent etc. (as approved by BHEL), sand, gravel etc., shall be arranged by the contractor at his quoted rate.
- 6.3.7 Contractor shall arrange the necessary clearance from the statutory authorities as required for installation of the plant and equipment and render all assistance, service required in this

regard. However, Inspection fee / any statutory fees if any, will be paid by BHEL.

- 6.3.8 Brief list of equipments/sub-assemblies to be erected by the contractor & approximate weight are given in the appendices and is meant for giving general idea to the contractor only about magnitude of the work involved. The components are sent in parts for convenient transportation. The components are to be cleaned, assembled in stage by stage, welded, erected and aligned as per the drawing dimensions/tolerance and instructions of BHEL Engineers.
- 6.3.9 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation of 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/indicated in the drawing & documents 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.
- 6.3.10 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
- 6.3.11 All fittings like elbows, tees, reducers, flanges, inserts etc., valves flow nozzles, etc shall be matched with pipes for welding which may required re-edge preparation, grinding etc, if found necessary.
- 6.3.12 The valves will have to be checked, lapped or overhauled in full or in parts before erection / after chemical cleaning/during commissioning. Experienced technicians shall be arranged by the contractor at his own cost.
- 6.3.13 All the pumps & 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 on foundation.

- 6.3.14 For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.
- 6.3.15 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 manpower, complete facilities for dismantling, cleaning & refitting, etc, including consumable, shall be provided by the contractor at no extra cost.
- 6.3.16 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.
- 6.3.17 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, Metallic expansion joint assemblies and other components as per instruction of BHEL Engineer during erection at the quoted rate. The contractor has to arrange necessary paints free of cost. The necessary compressor for air cleaning is to be arranged by contractor at his cost.
- 6.3.18 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 free of cost.
- 6.3.19 The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered.
- 6.3.20 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.

- 6.3.21 All the motors / pumps shall be stripped open, 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.
- 6.3.22 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 joints.
- 6.3.23 All the lubricant oils 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 free of cost. Required manpower will 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 his cost. Care should be taken to avoid any spillage / wastage.
- 6.3.24 Self Cleaning / Suction 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.
- 6.3.25 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.
- 6.3.26 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.
- 6.3.27 Erection of platform and supporting structures around the equipments / valves / filters etc., is covered in the scope of

contract and shall be erected by the contractor as per accepted tonnage rate for structural erection work.

- 6.3.28 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.
- 6.3.29 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.
- 6.3.30 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 sizes 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. . Piping below size 2", 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.
- 6.3.31 Slope of 1:500 MM shall be maintained towards drain point unless otherwise specified.
- 6.3.32 LP piping 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. The contractor shall also do necessary drilling of holes on main pipe for welding of stubs at site. Fittings like bends, tees, elbow, mitre bends, reducers, flanges etc., will be supplied as loose items.
- 6.3.33 Erection of all the piping systems supplied along with PEM supplied auxiliaries covered in this contract, is to be erected by the contractor as per the accepted tonnage rate.

- 6.3.34 Carrying out erection of piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall within 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, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer, within the quoted rate. IBR / statutory requirements, if any, shall be in the scope of contractor and necessary drawings / details only will be given by BHEL.
- 6.3.35 Contractor should fabricate bends of $\leq 2''$ diameter size from running meters of pipe.
- 6.3.36 Certain adjustments in length may be necessary while erecting pipelines and the contractor should remove the extra lengths / add extra lengths / to suit the final layout after preparing edges afresh and adopting specified heat treatment procedure, are in the scope of work at the quoted rate.
- 6.3.37 Minor adjustments 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 are to be carried out within the quoted rate.
- 6.3.38 Pipes above 2'' diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2'' diameter, shall be sponge cleaned with air flushing.
- 6.3.39 Contractor shall arrange all the equipments, alignment bolts, tools, consumables like welding electrodes (all type), TIG wires (Other than the supplied TIG wires from BHEL if any) 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.
- 6.3.40 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 subjected 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.

- 6.3.41 All the weld joints on equipments and piping shall be ground or filled on completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface devoid of ripples, undulations etc.,
- 6.3.42 Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.
- 6.3.43 Flame cutting of piping, wherever required, shall be strictly done as per BHEL Engineer's instructions and in his presence only.
- 6.3.44 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.
- 6.3.45 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, for this work.
- 6.3.46 The work on piping systems (air, water, oil steam, gas etc.) will include laying, edge preparation, fixing and welding of the elbows / fittings / valves, flow elements, filters ,strainers, 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.
- 6.3.47 Flow nozzles, orifice, spray nozzles etc shall be mounted / erected after chemical cleaning / flushing at site.
- 6.3.48 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 etc.

- 6.3.49 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.
- 6.3.50 Erection of all drains / vents / relief / escape / safety valve, pipings to various tanks sewage / drain canal / flash box/ flash tank / condenser / sump / atmosphere etc. from the stubs on the piping to the equipments erected by the contractor is completely covered in the scope of work.
- 6.3.51 Contractor should fabricate bends at site from running meters of piping for the above work and cut, edge prepare and lay the piping as per BHEL Engineers instructions.
- 6.3.52 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 for the erected equipments / pipe lines are covered in the scope of this specification.
- 6.3.53 The contractor shall conduct non destructive tests like radiography dye penetrant tests, magnetic particle test etc. on weld joints, castings, valve bodies and other equipments etc. as per drawing / welding schedule.
- 6.3.54 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 necessary cutting work etc. shall be carried out at site by contractor within the quoted rate.
- 6.3.55 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 for temporary supports will be issued on free of

charges by BHEL, either from scrap / spare materials. The same shall removed and returned to BHEL store after erection of permanent supports. The above works shall be carried out by the contractor within quoted rate.

- 6.3.56 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 BHEL, by the contractor as per accepted tonnage rate for structural erection work.
- 6.3.57 Contractor shall be supplied with two extra blue prints of the layout & isometrics drawings. 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.
- 6.3.58 Contractor should obtain the formal clearance from Chief Inspector of Boilers / Karnataka to carry out erection & Welding of piping under IBR preview. Arrangement for the visit of Boiler inspector for field inspection etc., is in the scope of contractor, and necessary drawing / details only will be given by BHEL. Inspection fee, if any shall be paid by BHEL.
- 6.3.59 Contractor shall arrange the necessary clearance form other Statutory authorities as required for installation of the plant and equipment and render all assistance, service required in this regard. Inspection fee, if any will be paid by BHEL.
- 6.3.60 For Hangers and Support the instruction given in the drawing & Documents must followed for handling, erection, setting of COLD/HOT values and logging etc.

6.4.0 GALVANISED STEEL PIPING

- 6.4.1 Galvanized pipe shall be joined by screwing in to socket and screwed ends of GI pipes shall be thoroughly cleaned and painted with a mixture of red and white lead before joining. The exposed threaded portion on either side of the socket joint shall be applied with Zinc Silicate Paste. All these consumables are in the scope of contractor and shall carry out within the quoted rate.

- 6.4.2 GI pipe with flanged joints shall have screwed flanges. Flanged joints faces shall be painted with red lead and bolting up evenly on all sides with compressed asbestos gaskets in between two flanges.
- 6.4.3 Teflon tapes shall be used to seal out screwed joints and shall be applied to the male threads only. Threaded parts shall be wiped clean of oil or grease with appropriate solvent if necessary and allowing proper time for drying before applying the sealant. Pipe ends shall be attached by screwing the pipe through the flange and pipe and flange shall be refaced accurately. Required Teflon tapes are to be arranged by the contractor at his cost.
- 6.4.4 Required threading should be done by the contractor at site as specified in the drawing. The pipes shall be cut only by Hacksaw / Machining. Required Teflon tapes are to be arranged by the contractor within the quoted rate.
- 6.4.5 ALL THE SCREWED JOINTS IS TO BE SEAL WELDED IF REQUIRED BY CUSTOMER , SUITABLE ELECTRODES FOR FULL SEAL WELDING ARE TO BE ARRANGED BY THE CONTRACTOR AT HIS COST.

6.5.0 RUBBER LINED PIPING

- 6.5.1 All the rubber – lined pipes are flange joined and the flanges are also rubber lined. No welding is allowed on these pipes. If any damages occurred / notices in the above pipe lines during erection / transportation / commissioning of rubber lined pipes, the same has to be rectified by the contractor at his cost.

6.6.0 BURIED PIPING

- 6.6.1 The pipe in general shall be laid with the top of the pipe minimum 2.0/1.5 Mtr below finished general ground level or as specified in the drawing. Anti corrosive treatment for all buried pipes suitable for sea – water application and supply & application of anti corrosive treatment, required consumables are in the scope of contractor and shall carry out as per drawing within the quoted rate.
- 6.6.2 The scope of work of buried piping including earth work excavation, sand filling etc., are given in **Section – VI-B**

- 6.6.3 The civil works for the buried piping are to be done for this scope of work. The contractor has to ensure that the width of the trench shall be sufficient to give free working space on each side of the pipe.
- 6.6.4 Free access is to be provided for the welding of the circumferential joints by increasing the width and depth of the trench at these points. There should be no obstruction to the welder from any side so that good welded joint is obtained. This type of incidental works are to be carried out by the contractor within quoted rates.
- 6.6.5 Prior to lowering and laying pipe in any trench, the contractor shall ensure for the backfill and compact the bottom of the trench or excavation in accordance with IS 5822 / as per drawing to provide an acceptable bed for placing the pipe.

6.7.0 COATING & WRAPPING shall be done as follows.

- 6.7.1 The external surfaces of the buried pipes shall be thoroughly cleaned by sand blasting method for free of rust, weld scales, burns etc., before start application of anti corrosive coats. Kerosene, solvent or other cleaning material should not be used for external cleaning of the pipes. The above work shall be carried out to the satisfactory of BHEL engineers or as instructed by BHEL engineers.
- 6.7.2 The entire length of pipe shall be cleaned and coated leaving the end about 230 mm for joints, which shall be coated manually at site after laying, welding and testing the pipe.
- 6.7.3 Coating & Wrapping shall be done after completion of welded and / or flanged connections and after completion and approval of Hydro testing. Materials required for coating, wrapping and consumables required for cleaning operations as stated in para (1) above are to be arranged by the contractor within the quoted rate.
- 6.7.4 The materials used for coating and wrapping are
- a. Coating Primer (Coal Tar Primer)
 - b. Coating Enamel (Coal Tar Enamel)
 - c. Wrapping Materials

All primer / Coating / Wrapping materials and method of application shall conform to IS 10221 except asphalt / bitumen material. The materials (primer / coating / wrapping) as per AWWA – C – 203-93 are also acceptable.

- 6.7.5 Protective coating shall consist of coal tar primer, coal tar enamel, inner wrap of fibre glass , and final outer wrap of enamel impregnated fibre glass.
- 6.7.6 Number of coats and wraps, minimum thickness for each layer of application shall be as per IS-10221 and shall be decided based on soil corrosivity / resistivity. However the total thickness of completed coating shall not be less than 4.0 mm, including anti corrosive tape of 4 mm thick.
- 6.7.7 Alternatively the anti-corrosive protection can consist of anti-corrosive protection tapes. Material and application of tapes shall conform to AWWA – C – 203. These tapes shall be applied hot over the coal tar primer. The total thickness of the finished protective coating shall be 4 mm minimum. The required above mentioned tapes are to be provided by the contractor at his cost.
- 6.7.8 All the provisions for bed preparation / laying the pipe / application of primer / coating / wrapping with tapes etc., as indicated above are applicable for buried galvanized steel (GI) pipes also.
- 6.7.9 Buried GI pipes shall not have flanged joints. All the joints shall be screwed with socket. Screwed ends of GI pipes shall be thoroughly cleaned and painted with a mixture of red and white lead before joining. Threaded portion on either side of the socket joint shall be applied with Zinc Silicate Paste. All these consumables are in the scope of contractor and shall carry out within the quoted rate.

6.8.0 PRESERVATION / TOUCH UP PAINTING

- 6.8.1 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 pre-assy stage, during erection and after erection till the equipment is cleared for final painting, wherever deficiency in painting / rusting is noticed. The primer paint shall be matching shop primer. BHEL will supply the preservation paint and thinner on

free of charges and required manpower, other required consumables, T & P etc shall be provided by the contractor with in the quoted rate.

- 6.8.2 The contractor shall effectively protect the finished work from action of weather and from damage of defacement and shall cover the finished parts, then and there, for their protection.
- 6.8.3 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.

6.9.0 PROGRESS OF WORK

- 6.9.1 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed form 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 employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charge incurred on this account including all expenses together with BHEL overheads from contractor's bills.
- 6.9.2 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables report and other reports considered necessary by the Engineer.

The manpower reports shall clearly indicate the manpower deployed category / wise daily, specifying also the activities in which they are engaged.
- 6.9.3 The progress reports shall indicate that progress achieved against planned with reasons indicating delays if any, 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, in a format designed and approved by BHEL site Engineer.
- 6.9.4 The contractor shall arrange for weekly progress review meetings with the "Engineer" at site during which actual progress during the week vis-à-vis schedule programme shall be discussed for action to be taken for achieving targets. The programme for subsequent week shall also be presented by the

contractor for discussions. The contractor shall constantly update / revise his work programme to meet the overall requirement and suit the material availability.

- 6.9.5 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the sit premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.
- 6.9.6 The contractor shall maintain a record in the form as prescribed by BHEL for all operations carried out on each weld and maintain a record indicating the number of welds, the name of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejections if any, percentage of rejection, etc. and submit copies of the same to the BHEL Engineer as required.

6.10.0 WELDING,HEAT TREATMENT & RADIOGRAPHY(where ever applicable)

- 6.10.1 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/schedule 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.
- 6.10.2 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.
- 6.10.3 All welders shall be tested and approved by BHEL Engineer before they are quality ensured on work though they may possess the requisite certificates. BHEL reserves the right to reject any welder without assigning any reason. The welders identification code as approved by the BHEL Engineer shall be stamped by the welder on each joint done by them. The contractor will be responsible for the periodic renewal, retesting of the welders as demanded by BHEL statutory requirements.

- 6.10.4 BHEL Engineer is entitled to stop any contractor's welders from his work if his work is unsatisfactory for any technical reason or there is a high percentage of rejection of joints welded by him which 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.

The contractor shall deploy required number of H.P. welders to carry out the H.P. weld joints. The welding works should not be held up due to shortage / want of I.B.R./H.P. welders. The number of H.P. welders is to increased, if necessary, as per directive of concerned engineers. If the contractors fail to provide sufficient H.P. welders, depending upon site requirement, BHEL will arrange the welders and the expenditure for the above will be recovered from the bills with overhead.

- 6.10.5 All charges for testing of welders (pre production test) including destructive and non-destructive tests, if conducted by BHEL or by the inspecting authority at site shall have to be borne by the contractor. Necessary pipe material and the welding TIG wire, if any, will be arranged by BHEL and all testing/facilities will have to be arranged by contractor with in the quoted rate.
- 6.10.6 All welded joints shall be subjected to acceptance by BHEL Engineer.
- 6.10.7 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 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.

- 6.10.8 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 production work, and all welders including high pressure welders shall have a portable electrode drying oven at the work spot.
- 6.10.9 All butt Joints 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.
- 6.10.10 The technical particulars, specifications and other general details of work shall be in accordance with BHEL welding, Heat treatment and NDE manuals or equivalent as decided by BHEL Engineer.
- 6.10.11 Contractor shall carryout Radiography as per welding Manual booklet applicable as per IBR, enclosed. However percentage radiography shown in the respective drawings shall be final and binding on the contractors.

The field joints are to be radiographed and preheating and post weld heat treatment to be done as per BHEL procedure and manuals.

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

- 6.10.12 Low speed high contrast fine grain films (D7 or equivalent) in 10 cm width only should be used for weld joint radiography., Film density shall be between 1.5. to 2.00
- 6.10.13 All radiographs shall be free from mechanical, chemical or process marks to the extent they shall not confuse the radiographic image and noticed.
- 6.10.14 Penetrometer as per ASME/ISO, shall be used for all exposures.

- 6.10.15 Lead numbers and letters (generally of 6mm 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 intensifying screens for front and back of the film shall be used as per the instructions of BHEL Engineer.
- 6.10.16 The weld joint is to be marked with permanent mark A,B,C, etc. 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 multiple exposure on pipes, an overlap of about 25 mm of film shall be provided.
- 6.10.17 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 BARC, from time to time, contractor's radiographers shall also be registered with BARC for film bedge service.
- 6.10.18 Contractor shall provide all skilled, unskilled work men required for the job, which will include Engineers, supervisors, operators, as required for timely and satisfactory execution of radiography work.
- 6.10.19 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.
- 6.10.20 All the radiographs shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.
- 6.10.21 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.
- 6.10.22 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of Engineer and Re-radio graphed. The decision of Engineer regarding acceptance or

otherwise of the joint shall be final and binding on the contractor.

- 6.10.23 Wherever radiographs are not accepted on account of poor exposure, joints shall be re-radiographed and new film submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defect persists after 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, rewelded and re-radiographed at contractor's cost.
- 6.10.24 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.
- 6.10.25 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 desired by BHEL Engineer. The contractor's scope of work include such preparation and no extra charges are payable for this.
- 6.10.26 The contractor has to make his own arrangements for air-conditioned dark room to process the radiographs.
- 6.10.27 It may also become necessary to adopt inter layer radiography / MPT / UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The contractor shall take all this into account and quote the price inclusive of all such work and radiography.
- 6.10.28 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.
- 6.11.0 **HYDRAULIC TEST, PRE – COMMISSIONING & COMMISSIONING**
- 6.11.1 Hydraulic testing pump for HP lines shall be provided by BHEL free of hire charges if required. 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.

- 6.11.2 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 make necessary arrangements and other services to carry out the required tests as per the instructions and directions of the BHEL Engineers.
- 6.11.3 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. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL. Wherever air vents are necessary for completion of HT successfully, the contractor has to carryout at his cost.
- 6.11.4 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable deaeration / 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 within quoted rate. 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. Seal welding of thermo wells and blanks of Temperature Element are to be removed by grinding only after steam blowing.
- 6.11.5 The hydraulic testing of the equipment and piping, covered under this scope of work 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 of suitable capacity shall be arranged by the contractor at their cost Before hydraulic test, all the hangers are to be locked by locking pin/plate or temporary support. After completion of Hydraulic

test, these are to be removed and all hangers are to be readjusted if required, to the desired valve within quoted valve.

- 6.11.6 All the above tests shall be repeated till all the equipment satisfy the requirement of BHEL to their customer. As far as the hydraulic pressure test is concerned and same shall be conducted to the satisfaction of Boiler inspector wherever applicable. Any rectifications required shall have to be done / redone by the contractor at his cost.
- 6.11.7 Transportation of oil drums from customer's BHEL's stores, filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer / BHEL stores. Similarly transport of chemicals for various pre-commissioning activities / processes mentioned in the above clauses and returning of remaining and / or the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.
- 6.11.8 Replacing / cleaning of filters of the erected equipments and piping system etc., during pre-commissioning / commissioning stage is within the scope of work.
- 6.11.9 Contractor shall lay the temporary pipelines with fittings, accessories and erection / commission pumps, tanks, valves, fittings, hangers and supports 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 are in the scope of work. Necessary, materials for this will be provided by BHEL. Overhauling / cleaning / servicing of valves, pumps, fittings in temporary system and acid cleaning tanks etc prior to the above operations / activities will also be carried out by the contractor at his cost. All the chemicals will be supplied by BHEL free of cost.
- 6.11.10 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, and 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 fabricated by the contractor within the quoted rate. Required materials will be provided by BHEL free of cost. Chemicals for chemical cleaning will be provided by BHEL and handling of chemicals & other consumables and other connected activities has to be carried out by the contractor at their cost. All other consumables would have to be provided by the contractor.

Laying of insulation of this temporary piping, tanks are to be carried out by the contractor within quoted rate, and required insulation materials will be provided by BHEL. The welding joints in the temporary pipe lines for acid cleaning and steam blowing are to be welded by HP welders only. Required NDT tests are to be carried out for the above joints within quoted as per customer / BHEL requirement.

- 6.11.11 Contractor shall lay all necessary electric cables and switches etc. required for the hydraulic test and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 6.11.12 During steam blowing operations the required manpower for fixing the target plates shall be arranged by the contractor as per the instructions of BHEL Engineer within the quoted rates. The manpower for the above operation may be required round the clock if necessary. The contractor shall carry out the above operation as per the instructions of BHEL Engineer within the quoted rates.
- 6.11.13 During the initial stages of work, trenches for draining water may not be available for alkali flushing or mass flushing for discharging and draining 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.
- 6.11.14 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, re-fixing as per BHEL Engineer's instructions is within the scope of work/specification.
- 6.11.15 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces.

- 6.11.16 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. Charges for dismantling of temporary lines etc should be included with in the Quoted Rates.
- 6.11.17 Contractor may have to replace old/damaged gaskets / packing etc., for equipments and the same shall be carried out by contractor as per requirement.
- 6.11.18 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. The parts to be replaced shall be provided by BHEL free of cost. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.
- 6.11.19 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 6.11.20 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.
- 6.11.21 During this period, though BHEL's and customer's staff will also be associated in the work, the contractor's responsibility will be make available resources in his scope till such time the commissioned units are taken by the customer.
- 6.11.22 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.

- 6.11.23 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programme made to achieve the schedule agreed with customer.
- 6.11.24 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part commissioning assistance for a period of six months or till handing over of sets to customer, whichever is earlier.
- 6.11.25 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.
- 6.11.26 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.
- 6.11.27 Hanger adjustment / re adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.
- 6.11.28 The contractor has to provide required man power assistance during pre-commissioning and commissioning checks of motor operated valves, actuators, control valves etc without any extra charges.

6.12.0 FINAL PAINTING

- 6.12.1 The scope of work shall also include supply and application of final painting as required and specified for the components and its auxiliaries and piping.
- 6.12.2 Before commencement of final painting contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.
- 6.12.3 Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of red oxide primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.
- 6.12.4 Required paints, thinner other consumable such as wire brush, brush etc shall have to be arranged by the contractor at their own cost.
- 6.12.5 In the case of steel fabricated items, raw steel after fabrication has to be cleaned and subsequent painting to be carried out.
- 6.12.6 All the exposed metal parts of the equipments including pipings, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of (IS 2932) suitable primer and required number of finish coats Zinc phosphate or of synthetic Enamel, 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 as per the instructions of BHEL/Customer official.
- 6.12.7 All un insulated piping systems, hanger and supports shall have two coats of zinc phosphate primer and finish paint of synthetic enamel
- 6.12.8 Paint shall be applied by brushing. It shall be ensured that brush marks are minimum. 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.

- 6.12.9 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 after periodical intervals.
- 6.12.10 Primer & finish paint shall be of reputed paint supplier approved by BHEL. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready mix type in original sealed containers as packed by the paint manufacturer. No thinners shall be permitted. Paint manufacturers instructions shall be followed in method of application, handling, drying time etc.,
- 6.12.11 The actual colour to be applied shall be approved by the customer before starting of actual painting work. The scope of painting includes application of colour 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.
- 6.12.12 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 40 microns and the dry film thickness of finish paint shall not be less than 120 microns.
- 6.12.13 No paint shall be applied when the surface temp is above 55 deg. Cen or below 10 deg. Cen, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather. Also refer painting spec furnished by customer.
- 6.12.14 The paints are to be purchased from BHEL / Customer approved agencies only. The tenderers have to keep in mind that paints of reputed makes like BERGER, ASIAN, SHALIMAR, JENSON & NICHOLSON are only permitted. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities and also Refer painting specification furnished by customer.

6.13.0 TIME SCHEDULE

- 6.13.1 **The contractor has to mobilize in all respects with in two weeks from the date of issue of fax letter of intent.**
- 6.13.2 The entire work of erection piping as detailed under this tender specifications shall be carried out and completed with in **12 months (Twelve) from** the date of actual commencement of erection work at site. In case BHEL desires to advance the commissioning, contractor has to complete all the works with in the quoted / accepted rate, to suit the advanced commissioning.
- 6.13.3 During the total period of contract the contractor has to carryout the activities in a phased manner as required by BHEL Engineer and as per the programme of events / Targets fixed by BHEL / Customer.
- 6.13.4 The work under this scope of contract is deemed to be completed in all respects only when all the components / equipments are erected and trial runs, testing and commissioning of all the equipments are completed. The decision of BHEL in this respect shall be final and binding with contractor.
- 6.13.5 During the tenure of contract, if BHEL is not satisfied with the progress of work, BHEL have the right to withdraw any portion for work / balance work and get the same done either directly employing their own men or through other agency at your risk and cost. You shall not be entitled for any compensation whatsoever in this regard.
- 6.13.6 Contractor has to mobilize his resources and workforce in such a manner that the entire work is completed to achieve the time schedule and Milestone schedules.

6.14.0 TERMS OF PAYMENT : FOR LP PIPING ERECTION 1A & 1B

- 6.14.1 15% of the value on completion of preassembly and placement in position wherever applicable.
and
20% of the value on completion of erection and alignment for the items wherever preassembly was involved.

Or

6.14.2 35% of value on completion of erection & alignment for the items where preassy is not involved.

FOR ALL PIPES: 1A , 1B 1C & 1D

6.14.3 40% of the value after completion of welding and rapping coating in case of buried piping

OR

40% of the value after completion of welding (excluding buried piping)

6.14.4 10% of the value after completion of Hydraulic test

6.14.5 5% of value after completion of hydraulic testing and filling up and submission of FQA sheets.

6.14.6 3% of contract value after reconciliation of materials, T & P etc, including cutting & removal of scraps, temporary supports and return the same to stores etc.

6.14.7 2% on submission of final bill and acceptance.

FOR HANGERS & SUPPORTS AND OTHER EQUIPMENTS :2A

6.14.8 35% of value after erection of equipments.

6.14.9 20% of value after alignment of equipments

6.14.10 15% of value after trail run of equipment / hydraulic test

6.14.11 10% after commissioning of the equipment

6.14.12 10% Final bill and completion.

6.14.13 5% submission of log sheets and as built drawings

FOR EXCAVATION 3A , 3B

- 6.14.14 75% of value will be paid on completion of earth work excavation.
- 6.14.15 20% will be paid after completion of back filling and compaction as per drawing / instruction of BHEL Engineer.
- 6.14.16 The balance 5% of contract value (actual quantity multiplied by accepted unit rate) shall be paid after guarantee period of 12 months. The guarantee period will commence from the date of handing over of unit to customer or six months after the unit reaches full load after commissioning of all equipments / system whichever is earlier. However, this 5% can be released against bank guarantee valid for 12 months from the date of commencement of guarantee period as aforesaid in the prescribed Performa of BHEL.

6.14.7 EXTRA CHARGES FOR RECTIFICATION AND MODIFICATION WORKS

- a) BHEL may consider payment for extra works on man day basis for such of those works which require major revamping / rework/rectification/modification which is totally unusual to normal erection or commissioning work which are not due to contractor's faulty erection.
- b) The 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. The decision of BHEL in this regard shall be final and binding on the contractor.
- 6.14.8 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.

- 6.14.19 The decision of BHEL in this regard shall be final and binding on the contractor.
- 6.14.20 The following man hour rates will be applicable for modification/rectification work.
- 6.14.21 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.
- 6.14.22 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.

6.15.0 EXTRA WORK DOES NOT INCLUDE

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

6.16.0 Extra works are broadly defined as below:

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

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

6.17.0 OVER RUN CHARGES

- 6.17.1 In case due to reasons not attributable to the contractor, the work gets delayed and completion time gets extended beyond **Twelve (12) months** from the date of commencement of the work, the contractor shall not be entitled for any over run compensation (ORC) for a period of first **Two (2) months** after the expiry of **Twelve (12) months**. In case ORC arises the same will apply at **Rs. 50,000/= (Rupees Fifty thousand only) per month** for extension of the completion period beyond **12 months** as stated above duly taking into account the balance work at the end of that period.
- 6.17.2 The period of overrun will have to be ascertained before the commencement of grace period.
- 6.17.3 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.
- 6.17.4 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.

6.18.0 PRICE ESCALATION

- 6.18.1 PVC applicable from the calendar month of tender opening.

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

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).

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.

6.18.2 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.

6.18.3 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.

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

6.19.0 TAXES

6.19.1 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** 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** 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.

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

6.19.2 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.

6.19.3 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.

6.19.4 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.

6.19.5 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.

6.19.6 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.

6.20.0 IMPORTANT CONDITIONS FOR PAYMENT

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

- i. PF Registration 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. E acceptance form

6.21.0 PROVIDEND FUND & MINIMUM WAGES

- 6.21.1 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.
- 6.21.2 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.
- 6.21.3 The final bill amount would be released only on production of clearance certificate from PF/ESI and labour authorities as applicable.

6.22.0 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 disbursement 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.

6.23.0 FINAL SITE INSPECTION & TEST

6.23.1 The employer / owner shall maintain at site a joint protocol for recording actual measurement of work carried out at site, inspection and witnessing of various tests conducted by the contractor. The owner/employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner/employer without any extra cost to the owner / employer. The contractor shall take this into consideration while quoting his rates for various items/works. No cost whatsoever such duplication of inspection of work be entertained.

SECTION – VI B

CIVIL WORKS FOR BURIED PIPING – BELLARY 2 - LPP PACKAGE

1.0.0 **SCOPE :**

This specification covers earth work excavation in all types of soil, soft rock including setting out, clearing and grubbing, shoring, dewatering, back filling around pipelines to grade, watering, compaction of fills, testing, approaches, disposal of surplus earth, protective fencing, lighting etc relevant to the locations covered under this contract.

1.0.1 **Setting out**

On receiving the approval from the engineer with modifications and corrections if any, the contractor shall set out the work from the control points furnished by the engineer and fix permanent points and markers for ease of periodic checking as the work proceeds. These permanent points and markers shall be fixed at the interval as prescribed by the engineer and shall be got checked and certified by the engineer after whom the contractor shall proceed with the work. It should be noted that this checking by the engineer prior to the start of the work will in no way relieve the contractor of his responsibility of carrying out the work to true lines, levels and grades as per the drawings and specification. If any errors are noticed in the contractor's work at any stage, the same shall be rectified by the contractor at his own risk and cost.

1.0.2 **Clearing and Grubbing**

The area to be excavated shall be cleared out of fences, trees, logs, stumps, bushes, vegetation, rubbish, slush etc. Trees upto 300mm girth shall be uprooted. Trees above 300mm girth to be cut shall be approved by the engineer and marked. Cutting of trees shall include removing roots as well. After the tree is cut and roots taken out, the pot holes formed shall be filled with good earth in 250mm layers and compacted unless directed otherwise by the engineer. The trees shall be cut in to suitable pieces as instructed by the engineer. Before earthwork is started, all the spoils, unserviceable materials and rubbish shall be burnt or

removed and disposed to the approved disposal area(s) as specified by the engineer. Useful materials, saleable timber, fire woods etc shall be the property of the owner and shall be stacked properly at the worksite in a manner as directed by the engineer.

1.0.3 Excavation for Foundations and Trenches

1.0.3.1 General

All excavation shall be done to the minimum dimensions as required for the safety and working facility. In each individual case, the contractor shall obtain prior approval of the engineer for the method he proposes to adopt for the excavation including dimensions, side slopes, shoring, dewatering, drainage and disposal etc. This approval however shall not in any way make the engineer responsible for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. All excavation in open cuts shall be made true to the line, slopes and grades as shown on the drawings and/or as directed by the engineer. No material shall project within the dimension of minimum excavation lines marked. Boulders (if any) projecting out of the excavated surfaces shall be removed if they are likely to be a hindrance to the work/workers in the opinion of the engineer.

Method of excavation shall in every case be subject to the approval of the engineer. The contractor shall ensure the stability and safety of the excavation, adjacent structures, services and works etc including the safety of the workmen. If any slip occurs, the contractor shall remove all the slipped materials from the excavated pit without any extra cost to the engineer/owner. All loose boulders and semi detached rocks which are not inside but so close to the area to be excavated and may liable to fall or otherwise endanger the workmen, equipment of the work etc during excavation in the opinion of the engineer shall be stripped off and removed away from the area of excavation. The method to be used for removal shall be such that it should not shatter or render unstable or unsafe the portion which was originally sound and safe. In case any material not required to be removed initially but later to become loose or unstable in the opinion of the engineer shall also be promptly and satisfactorily removed.

The rough excavation may be carried out upto a maximum depth of 150 mm above the final level. The balance shall be excavated with special care. If directed by the engineer, soft and undesirable spots shall be removed even below the final level. The extra excavation shall be filled up as instructed by the engineer. If the excavation (in all types of soil and rock) is done to a depth greater than that shown on the drawing or as directed by the engineer, the excess depth up to the required level shall be filled with cement concrete not leaner than 1:4:8 or richer as directed by the engineer at the own risk and cost of the contractor. In case where excavation in soil, soft rock (including weathered rock) and hard rock are involved, the excavation in each stratum shall be carried out separately with the approved methodology and as per the instructions of the engineer.

All excavated materials such as rock, boulders, bricks, dismantled concrete blocks etc shall be the property of the owner and shall be stacked separately as directed by the engineer. All gold, silver, oil, minerals, archeological and other findings of importance, trees cut or other materials of any description and all precious stones, coins, treasures, relics, antiquities and other similar things which may be found in or upon the site shall be the property of the owner and the contractor shall duly preserve the same to the satisfaction of the engineer/owner. The contractor shall deliver the same to such person or persons as may be authorized or appointed from time to time by the owner to receive the same.

Prior to starting the excavation, the ground level at the location shall be checked jointly with the engineer.

1.0.3.2 **Excavation in All Type of Soil and in Soft Rock**

The excavation in all type of soil, soft rock including decomposed rock etc shall be carried out as per the approved proposal and as directed by the engineer. The work shall be carried out in a workmanlike manner without endangering the safety of nearby structures/services or works and without causing hindrance to any other activities in the area. Foundation pits shall not be excavated to the full depth unless construction is imminent. The last 150mm depth shall be excavated once concreting work is imminent. At the

discretion of the engineer, the full depth may be excavated and the bed be covered with lean concrete as specified after watering and compacting the bed. As the excavation reaches the required dimensions, lines, levels and grades etc, the work shall be got checked and approved by the engineer. In cases where deterioration of the ground, upheaval, slips etc are expected, the engineer may order to suspend the work at any stage and instruct the contractor to carry out the protection works before the excavation will be restarted.

1.0.3.3 Disposal

The excavated spoils shall be disposed of in any (or all) of the following manner as directed by the engineer.

a) By using it straightway for backfilling.

b) By stacking it temporarily to use for backfilling at a later date during execution of the contract.

c) i)By either spreading
or

ii)By spreading and compacting at designated disposal areas.

a) By selecting the useful material and stacking it neatly in designated areas as indicated by the engineer for use in backfilling by some other agency.

1.0.3.4 Disposal of Surplus Materials

All surplus material from excavation shall be removed and disposed of from the excavation site to the designated disposal area indicated by the engineer. All good and sound rocks obtained from excavations and all assorted materials of dismantled structures are the property of the owner and if the contractor wants to use it, he shall have to obtain it from the engineer at a mutually agreed rate. All sound rocks and other assorted materials like excavated bricks etc shall be stacked separately.

1.0.3.5 Protection

The contractor shall notify the engineer as soon as the excavation is expected to be completed within a day so that he shall inspect it at the earliest. Immediately after approval of the engineer, the excavation must be covered up in a shortest possible time. But in no case the excavation shall be covered up or worked on before approval by the engineer. Excavated material shall be placed 1.5m or half the depth (of excavation) whichever is more from the edge of the excavation or further away if directed by the engineer. Excavation shall not be carried out below the foundation level of the structure close by until the required precautions are taken. Adequate fencing is to be made enclosing the excavation. The contractor shall protect all the underground services exposed during excavation. All existing surface drains in the work area shall be suitably diverted by the contractor before taking up excavation to maintain the working area neat and clean.

1.0.3.6 Dewatering

All excavation shall be kept free of water and slush. Grading in the vicinity shall be controlled to prevent the surface water running into the excavations. The contractor shall remove any water inclusive of rain water and subsoil water etc accumulated in the excavation by pumping or other means as approved by the engineer and keep the excavations dewatered and/or lower the subsoil water level to 300mm below the founding level until the construction of foundation and backfilling are completed in all respects.

Sumps made for dewatering must be kept clear of the foundations. The engineer's prior approval on the method of pumping to be adopted shall be taken; but in any case, the pumping arrangement shall be such that there shall be no movement or blowing in of subsoil due to the differential head of water during pumping.

1.0.3.7 Timber Shoring

Close or open type timber shoring as approved by the engineer depending on the nature of sub-soil, depth of pit or trench and the type of timbering shall be adopted. Timbers made out of approved quality shall only be used. It shall be the responsibility of the contractor to take all necessary steps to prevent the sides of trenches and pits from collapsing.

a) Close Timbering

Close timbering shall be done by completely covering the sides of the trenches and pits generally with short, upright members called "polling boards". These shall be of 250mm wide(min.) and 40mm thick(min.) sections as directed by the engineer. The boards shall generally be placed vertically in pairs, one on each side of the cut and shall be kept apart (maximum spacing is limited to 1.20m) by horizontal walers of strong wood cross strutted with wooden struts or as directed by the engineer. The length of wooden struts shall depend on the width of the trench or pit.

In case where the soil is very soft and loose, the boards shall be placed horizontally against the sides of excavation and supported by vertical walers which shall be strutted to similar timber pieces on the opposite face of the trench or pit. The lowest board supporting the sides shall be taken into the ground. No portion of the vertical side of the trench or pit shall remain exposed to avoid any slipping out of earth.

The withdrawal of the timber shall be done very carefully to prevent the collapse of the pit or trench. It shall be started from one end and proceeded systematically to the other end. Concrete or masonry shall not be damaged during the removal of the timber. No claim shall be entertained for any timber which cannot be withdrawn and is lost or buried.

b) Open Timbering

In case of open timbering, vertical board of 250mm wide(min.) and 40mm thick(min.) shall be spaced sufficiently apart to leave unsupported strips of maximum 500mm average width. The detailed arrangement, size of timber and

the spacing etc shall be subjected to the approval of the engineer. In all other respects, the specification for close timbering shall apply to open timbering as well.

1.0.3.8 **Treatment of Slips**

The contractor shall take all precautions to avoid high surcharges and provide proper surface drainage to prevent flow of water over the sides of the excavations. These precautions along with proper slopes, berms, shoring and control of ground water should cause no slips to occur. If however slips still occur, the same shall be removed by the contractor with his own risk and cost.

1.0.4.1 **Backfilling**

1.0.4.2 **General**

The material to be used for backfilling shall be approved by the engineer which shall be obtained directly from the excavation, from the nearby areas where excavation work by the same agency is in progress, from the temporary stacks of excavated spoils or from the borrow pits as directed by the engineer. The material shall be free from lumps and clods, roots and vegetations, harmful salts and chemicals, organic materials etc.,

In locations where sand filling is required, the sand used should be clean, well graded and be of the quality normally acceptable for use in concrete.

1.0.4.3 Filling and Compaction in Pits and Trenches all Around the Structures As soon as the work in foundation has been accepted, the spaces around the foundation in pits and trenches shall be cleared of all debris, brick bats, mortar droppings etc and filled with approved earth in layers not exceeding 250mm (in loose thickness). Each layer(loose) shall be watered, rammed and properly compacted to the required degree to the satisfaction of the engineer. Earth shall be compacted with approved mechanized compaction machine. Usually, no manual compaction shall be allowed unless specifically permitted by the engineer. The moisture content of the fill material during compaction shall be controlled near to its optimum moisture content so as to

obtain the required degree of compaction. The final surface shall be trimmed and levelled to proper profile as desired by the engineer.

1.0.4.4 **Plinth Filling**

The plinth shall be filled with earth in layers not exceeding 250mm (in loose thickness) and each layer shall be watered and compacted to the required degree with approved compaction machine or manually if specifically permitted by the engineer. When the filling reaches the finished level, the surface shall be flooded with water for at least 24 hours, allowed to dry and then rammed and compacted in order to avoid any settlement at a later stage. The finished surface of fill shall be trimmed to the slope intended to be provided for the floor.

1.0.4.5 **Filling in Trenches for Water Pipes and Drains.**

Filling in trenches for pipes and drains shall be commenced as soon as the joints of pipes and drains have been tested and passed. Where the trenches are excavated in soil, the filling shall be done with earth on the sides and top of pipes in layers not exceeding 150mm, watered, rammed and compacted taking care that no damage is caused to the pipe below.

In case of trenches excavated in rock, the filling upto a height of 300mm or the diameter of the pipe whichever is more above the crown of the pipe or barrel shall be done with fine material such as earth, moorum, disintegrated rock or ash as per the availability at site and shall be filled in compacted layers not exceeding 150mm. The remaining filling shall be done in layers with the mixture of boulders (of size not exceeding 150mm) and fine material as specified elsewhere in the specification. Each layer shall be watered, rammed and compacted to the required degree and to the satisfaction of the engineer.

1.0.4.6 **Filling in Disposal Area**

Surplus materials from excavation which are not required for backfilling shall be disposed of in the designated disposal areas. The spoils shall not be dumped haphazardly but should be spread in layers approximately 250mm thick when loose, watered and compacted with the help of a compacting equipment as per the directions of the engineer. In wide areas, rollers shall be employed and compaction shall be done to the satisfaction of the engineer at the optimum moisture content which shall be checked and controlled by the contractor. In certain cases the engineer may direct the contractor to dispose the surplus materials without compaction which can be done by tipping the spoils from a high bench neatly maintaining a proper level and grade of the bench.

1.0.5.1 **Approaches and Fencing**

The contractor should provide and maintain proper approaches for the workmen and inspection. The roads and approaches around the excavation should be kept clear at all times so that there is no hindrance to the movement of men, material and equipment of various agencies connected with the project. Sturdy and elegant fencing is to be provided around the top edge of the excavation as well as around the bottom of the fill at the surplus disposal area where dumping from a high bench is in progress.

1.0.6.1 **Lighting**

Full scale area lighting is to be provided if night work is permitted or directed by the engineer. If no night work is in progress, red warning lights should be provided at the corners of the excavated pit and the edges of the fill.

2.0.0 **TESTING AND ACCEPTANCE CRITERIA**

2.0.1 **Excavation**

On completion of excavation, the dimension of the pits will be checked as per the drawings after the pits are completely dewatered. The work will be accepted after all undercuts have been set right and all over excavations are filled back to the required lines, levels and grades by placing ordinary cement concrete of 1:4:8 proportion and/or richer and/or by compacted earth as directed by the engineer. The choice of the grade of concrete will be a matter of unfettered discretion of the engineer. Over excavation of the sides shall be made good by the contractor while carrying out the backfilling. The excavation work will be accepted after the above requirements are fulfilled and all the temporary approaches encroaching inside the excavation have been removed.

2.0.2 **Backfilling**

The degree of compaction required will be as per the stipulation laid down in IS:4701 and the actual method of measuring the degree of compaction will be as decided by the engineer. The work of back filling will be accepted after the engineer is satisfied with the degree of compaction achieved.

3.0.0 **RATES AND MEASUREMENTS**

3.0.1 **Rates**

a) The item of work in the schedule of quantities describes the work very briefly. The various items of the schedule of quantities shall be read in conjunction with the corresponding section in the technical specification including amendments and additions if any. For each item in the schedule of quantities, the bidder's rate shall include all the activities covered in the description of the items as well as for all necessary operations in detail as described in the technical specification.

b) No claims shall be entertained if the details shown on the released for construction drawings differ in any way from those shown on the tender drawings.

c) The unit rate quoted shall include minor details which are obviously and fairly intended and which may not have been included in these documents but are essential for the satisfactory completion of the work.

d) The bidder's quoted rate shall be inclusive of supplying and providing all labour, men, materials, equipments, tools and plants, supervision, services, approaches, schemes etc.

e) In case blasting in hard rock is envisaged, the unit rate quoted for earth work shall include the cost of storage and safety arrangements for the materials required for blasting. No separate payment will be made on this account.

3.0.2 Measurements

Method of measurements are specified in the proceeding sections. Where not so specified, the latest version of IS:1200, Part-1 shall be applicable.

a) The length, breadth and depth shall be measured correct to the nearest centimeter if measurements are taken by tape. Rounding of numerical shall be as per relevant IS Codes. If the measurements are taken with staff and level, the levels shall be recorded correct to 5mm. The area and volume shall be worked out in square meter and cubic meter respectively correct to the nearest of two decimal places.

b) For earth work in excavation, the ground levels shall be taken before and after completion of the work in the actually excavated area. The quantity of earth work in excavation shall be computed from these levels in cubic meter.

c) Where soft rock and hard rock are mixed, the measurement shall be done as follows. The two types of rock shall be stacked separately and measured in stacks. The net quantity of each type of rock shall be so arrived by applying a deduction of 50% for looseness/voids in the stacks. If the sum of net quantity of the two types of rock so arrived exceeds the total quantity of excavation, then the quantity of each type of rock shall be worked out from the total quantity (from excavation) in the ratio of net quantities in stack measurements of the two types of rock. If stacking is not

feasible, the method as suggested by the engineer shall be followed.

d) Where soil, soft rock and hard rock are mixed, the measurement shall be done as follows. The soft and hard rock shall be removed from the excavated material and stacked separately and measured in stacks. The net quantity of each type of rock shall be so arrived by applying a deduction of 50% for looseness/voids in stacks. The difference between the entire excavation and the sum of the quantities of soft and hard rock so arrived shall be taken as soil.

3.0.3 Scope of work for buried piping

3.0.3.1 The work involves, excavation of earth up to a depth of 2.0 metre or as indicated in the drawing, for a width of approximate 1.8 Metre and with sufficient space of welding and back filling.

3.0.3.2 Contractor may indicate separate rate for earth work excavation in ordinary soil, soft rock, or Hard rock per cubic metre for all depths including back filling after completing pipe line work.

3.0.3.3 Sand filling :

The scope involves **Supply** and spreading of sand to form sand bed as directed BHEL engineer at site. Contractor may indicate separate rate for above.

The sand used should be clean, well graded and be of the quality normally acceptable for use in concrete.

3.0.3.4 All the T & P and consumable for the civil work is to be arranged by the contractor only at his cost.

3.0.3.5 Hydraulic test is to carried out for buried piping also Where the length of laid and welded pipe is more, pressure test is to be conducted in sections, blanked at both ends. All arrangements for Hydro test like arranging water, pumps, piping, valves, blanks, pipe connections, etc., are to be arranged by contractor within the quoted rate.

The section of the pipe can be closed and back filled for the portion of the pipe hydraulically tested and cleared.

3.0.3.6 Buried pipe work for raw water piping and ACW piping is to be commenced immediately and should be completed within 2 month's time.

SCOPE AT A GLANCE

SECTION VII – APPENDIX I

SITE FACILITIES – LP PIPING PACKAGE

PROJECT : BELLARY STAGE – II RATING: 500 MW UNIT 2

SI.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	

SI.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
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	
1.2.0	ELECTRICITY			
1.2.1	<u>Electricity For construction purposes</u> (to be specified whether chargeable or free)			Free of charge
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:		Yes	
1.2.2.1	Distribution from single point including supply of materials and service		Yes	

SI.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	
1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	
1.2.2.4	Living facilities for office use including charges		Yes	
1.2.2.5	Demobilization of the facilities after completion of works		Yes	
1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
1.3.0	WATER SUPPLY			
1.3.1	For construction purposes:			
1.3.1.1	Making the water available at single point	Yes		
1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	

SI.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.3.2	Water supply for bidder's office, stores, canteen etc		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:		Yes	
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	
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	

SI.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
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 : BELLARY STAGE – II

RATING: 500 MW

Unit 2

SI.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.1.0	Engineering works for construction :	Yes		
2.1.1	Providing the erection drawings for all the equipments covered under this scope	Yes		
2.1.2	Drawings for construction methods		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	
2.1.4	Shipping lists etc for reference and planning the activities	Yes		
2.1.5	Preparation of site erection schedules and other input requirements		Yes	
2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.1.7	Weekly erection schedules based on SI No 2.1.5		Yes	
2.1.8	Daily erection / work plan based on SI No 2.1.7		Yes	
2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
2.1.10	Preparation of preassembly bay		Yes	
2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	
2.1.12	Arranging the materials required for preassembly		Yes	

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.0	SUGGESTED LIST OF TOOLS AND PLANTS (BHEL should indicate the proposed number of items considered as free issue)			
2.2.1	250 T crawler crane		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.2	250 T tyre mounted crane			
2.2.3	150 T crawler crane			
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			
2.2.12	30T gantry crane			
2.2.13	15 T gantry crane			
2.2.14	10T gantry crane			
2.2.15	30T tractor trailer			
2.2.16	20T trailer			
2.2.17	10 T trailer / truck			
2.2.18	Electrical winches 15 T with / wire ropes Drum lifting			
2.2.19	Electrical winches 10T with / without wire ropes			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.20	Electrical winches 5 T with / without wire ropes		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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			
2.2.31	Chain pulley block 1T /2T			
2.2.32	Pulling & lifting machines 5T			
2.2.33	Pulling & lifting machine 3T			
2.2.34	Pulling and lifting machine 2T / 1T			
2.2.35	Multi sheave pulley block 200 T (4) Drum Lifting			
2.2.36	Multi sheave pulley block 100 T (As Required)			
2.2.37	Multi sheave pulley block 50T			
2.2.38	Multi sheave pulley block 30T			
2.2.39	Multi sheave pulley block 20T			
2.2.40	Multi sheave pulley block 5T			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.41	Single sheave shackle pulley block 20T		TO BE A R G U M E N T E D B Y T H E B I D D E R A S P E R S C O P E O F W O R K	
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			
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			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.60	Pedestal drilling m/c		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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			
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			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks	
		BHEL	Bidder		
2.2.83	Hydraulic jacks 100T		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK		
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 ◆ Main hook 105 T ◆ Aux hook 15 T	YES			Sharing basis
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	IF required			
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 LPsec				
2.2.97	Pressure gauges 400 bar				

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks	
		BHEL	Bidder		
2.2.98	Pressure gauges 600 bar		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK		
2.2.99	Pressure gauges 100 bar				
2.2.100	Acid cleaning pumps with all accessories including switch gears	Yes			AS required
2.2.101	Stress relieving / preheating equipments including transformers, controllers, heating pads and insulating materials and consumables				
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				

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.110	Ultrasonic flaw detector		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.111	Dye penetrant test kits (as required)			
2.2.112	Moving platforms Sky Claimer			
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			
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			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.127	Piano wires		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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			
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			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.148	Temp bath for calibration		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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			
2.2.169	Reamers of various sizes			
2.2.170	Vacuum cleaner			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.171	Sand blasting machine with accessories		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
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			

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.188	Vibrator for grouting		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.189	Mixing m/c (grouting and concreting)			
2.2.190	Tube expanding machine ie drives – hydraulic or pneumatic ()			
2.2.191	Tube expanders(expansion and flaring)			
2.2.192	Mercury plumb bob			
2.2.193	Band saw machines			
2.2.194	Copper rods			
2.2.195	Needle vibrators			
2.3.0	All consumables including :			
	Ordinary cement			
	Grouting cement			
	Any special cement			
	Sand, bricks etc			
	TIG wires			
	Electrodes		Yes	
	Brazing rod, flux etc		Yes	
	Soldering			
	DA, oxygen, argon		Yes	
	Nitrogen required for chemical cleaning			
	Nitrogen required for construction		;	

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	Paints along with thinner, brushes, cleaning materials etc for preservation of components	Yes *	Yes	* Only Paint and thinner for preservation by BHEL
	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,			
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		

Sl.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.5.2	Servicing the required equipments and commissioning		TO BE ARRANGED BY BIDDER AS PER SCOPE OF WORK	
2.5.3	Chemicals required for the operation including Nitrogen gas	As applicable		
2.5.4	Handling equipments / consumables for the chemical cleaning works			
2.5.5	Effluent disposal system			
2.5.6	Services for the effluent disposal			

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 : BELLARY STAGE – II

RATING: 500 MW

UNIT - 2

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	Yes		
3.1.1.0	HANDLING & TRANSPORTATION			
3.1.1.1	Stores/storage yard to preassy area/ erection site		Yes	
3.1.1.2	Pre assembly area to site of installation		Yes	
3.1.1.3	Erection site to pre assembly area / stores/ storage area if required		Yes	
3.1.1.4	Touch up painting wherever required till final painting.(please refer the relevant clause for supply of paints, thinners etc)		Yes	
3.1.1.5	Preparation storage at site for proper stacking of materials		Yes	

SI.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1.2	ERECTION TESTING & COMMISSIONING			
3.1.2.1	Erection drawings/ documents/ working instructions etc	Yes		
3.1.2.2	Welding schedules			
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	

SI.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	

SI.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	
3.1.5.8	Meeting between BHEL and bidder at BHEL office every day for monitoring the progress	Yes	Yes	

SECTION - VII APPENDIX - II

PROJECT: BELLARY 500 MW UNIT - 2

LP PIPING - WEIGHT SCHEDULE

SL NO	DESCRIPTION	Approx. WT in MT	RATE SCH REF
01	Stainless steel piping	28.4	1 A
02	Carbon steel piping	784.8	1 B
03	Galvanized Iron piping	45.0	1 B
04	Buried piping	520.0	1 C
05	Buried piping (without Wrapping & Coating)	150.0	1 D
06	Hangers & supports/ Steel structural etc.,	108.9	2A
07	Other equipments/Cranes & hoists etc.,	213.0	2A
	TOTAL WEIGHT OF ABOVE (in MT)	1850.0	

Note :

1. The detailed weight schedule for above is enclosed in Appendix - II A for reference
2. The weight indicated above is approximate and liable to vary. However the total tonnage will be + or - 15% of total weight. The payment will be made to the contractor for the tonnage actually erected at the respective category as per the quoted/accepted tonnage rate
3. There may be variation or addition of PGMAs, description, weights etc., and any additional scope of work supplied under the above package shall be erected by the contractor and payment will be made as per the quoted/accepted rate in the respective category.
4. The erection & dismantling of temporary piping , pumps, tanks, dummy plates & other misc equipments etc., for pre commissioning & commissioning activities like hydraulic test, chemical cleaning are covered in this contract and shall be carried out with in the quoted tonnage rate

SECTION - VII APPENDIX - II A
PROJECT: BELLARY 500 MW UNIT - 2
LP PIPING - WEIGHT SCHEDULE

PG MA	DESCRIPTION	Approx. Wt	Total Wt.	Category	Rate Sch ref
A. LP PIPING (6919)					
80-412	Condensate transfer	20.00		SS piping	1A
80-473	Demineralised water system	8.35		SS piping	1A
			28.35		
80-412	Condensate transfer	14.41		CS piping	1B
80-463	TG Aux. cooling water	112.70		CS piping	1B
80-468	ACW/CW piping (excluding Buried piping)	260.00		CS piping	1B
80-477	Service water piping (excluding buried piping)	277.70		CS piping	1B
80-612	Service air for individual units	24.83		CS piping	1B
80-673	Lub oil piping system	8.18		CS piping	1B
80-901	valves	0.90		CS piping	1B
			698.73		
B(1) : Buried piping (as per tender specification)					
80-468	CW Make up to Forebay : Pipe 711X2x10 (Approx -700 M)	123.00		Buried - CS	1C
	CW blow down : Pipe 508 x 8 (Approx 425M +360 M)	78.00		Buried - CS	1C
80-477	Raw water piping (Raw water pump discharge): Pipe 813x10 (Approx 1600 M)	317.00		Buried - CS	1C
	Fittings & others	2.00		Buried - CS	1C
			520.00		

B(2) : Buried piping (Excluding wrapping , coating)

80-468	ACW piping Pipe 813x 10(approx. 650 M)	150.00		Buried - CS	1 D
			150.00		
80-616	Inst Air for individual unit	24.32		GI piping	1B
			24.32		
80-922	Hangers & supports - Non steam lines	55.08		H & S /Steel	2A
			55.08		
B. LP PIPING (0636)					
80-460	SG Aux Cooling Water Unit System	44.50		CS piping	1B
80-471	Boiler Wash Water To & From Unit	11.29		CS piping	1B
80-477	Service Water	1.88		CS piping	1B
80-480	Fire Water-Other Areas	6.19		CS piping	1B
80-901	valves	2.80		CS piping	1B
80-905	valves	9.70		CS piping	1B
	Miscell Piping & systems	9.70		CS piping	1B
			86.06		
80-612	Service Air For Unit	9.02		GI piping	1B
80-616	Inst Air For Unit	11.65		GI piping	1B
			20.67		
80-815	Hangers & Supports-Miscellaneous PPG	15.17		H & S /Steel	2A

80-821	Aux.Structure-Miscellaneous Ppg,Lu	8.61		H & S /Steel	2A
	Steel Materials (Platforms, etc.,)	30.00		H & S /Steel	2A
			53.78		
C. Other Equipments :					
PEM/Bhopal scope :					
C 1.1	Tanks	18.00			2A
C 1.2	Pumps with accessories	53.00			2A
C 1.3	DoZing skids	16.00			2A
C 1.4	Valves/Others	16.00			2A
C 1.5	Butter fly valves	28.00			2A
C 1.6	Air Traps	2.00			2A
C 1.7	Cranes & Hoists	60.00			2A
C 1.8	Control valves & flow elements	10.00			2A
C 1.9	Other equipments/Bellows etc..	10.00			2A
	Sub total of above		213.00		
	OVERALL WEIGHT in MT		1850.0		

SECTION VII APPENDIX – III

BELLARY STAGE – II 500 MW UNIT – 2

Broad Scope of system covered under scope of work –LP PIPING

The Broad scope covers the installation and commissioning of all

- Piping and Associated all types of fittings, Hanger & supports, expansion bellows ,etc.,
- Flow measuring devices/sensors like nozzles, orifice plates, etc.,
- Air and moisture traps, air release valves
- Safety relief valves, butter fly valves, Expansion joints
- Valves –with Manual, electrical, pneumatic operated actuators
- All Misc. Pumps –Horizontal, vertical and submersible with motors including HT Motors
- Strainers, filters , coolers , Pre fabricated tanks
- Hoists & cranes –either manual or motor operated
- Chemical dosing system Skid and associated equipments

The area of work covers, but not limited to the following systems:

- Boiler & auxiliaries system
- TG & Auxiliaries system
- Condensate system
- Drains and vents of all system including effluent discharge, waste water, etc.,
- Raw water system (Buried piping including civil work and wrapping)
- Pre Water treatment system
- DM water system
- Auxiliary cooling water system

- DM water cooling system
- Instrument air system
- Service water system
- Potable water system
- Miscellaneous piping systems

The material range from MS, GI, CS, SS, etc., the connection are either welded, flanged or threaded as per system and drawings.

The valves are operated -manual, electrical or Pneumatic or hydraulic –
The valves may be supplied either mounted with or without actuator. If supplied separately, the actuator is to be assembled to the valve at site during erection.

The pumps are supplied along with motors . The motors are to be erected and aligned with the pumps and with gear box wherever supplied.

SECTION VII

APPENDIX -IV

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

S.No	Description	Qty
01	EOT Cranes at TG Hall 105 T /15T	01
02	Acid cleaning pumps /accessories	As required
03	HP Hydraulic test pump	If required

Note

1. All the above T&Ps shall be given to contractor on shareable basis and the allotment is made by BHEL/Site in Charge, on need basis.
2. For handling at store and transportation, contractor shall make his own arrangement
3. EOT Crane (without operator) – Since this crane will be arranged from the customer by BHEL, allotment will be made only on need basis. Contractor has to plan the activities on item wise where the EOT crane is required to be used and submit to BHEL site for approval. In case the erection can be carried out by using other T&Ps, contractor shall make his own arrangement. The decision of BHEL Site I/c on this will be final and binding. **The contractor has to arrange for trained operator for EOT Crane.**
4. 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.
5. In case of non-availability of these equipments, due to any reason i.e., unavoidable breakdown, major overhaul or any other reason etc., the contractor should make arrangement at his own cost to meet the erection targets. No extra claim will be admitted due to non-availability of any of the above equipments. No delay in execution of work shall be accepted on this account
6. Any Loss/Damage of tools by the contractor shall have to replace 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
DECLARATION SHEET

I, _____ hereby certify that, all the information and data furnished by me with regard to this Tender Specification No.**BHEL:PSSR:SCT:1394** 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 –VI

TENDER SPECIFICATION NO BHEL:PSSR:SCT:1394

**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 - VII

CHECK LIST

TENDER SPECIFICATION NO: BHEL: PSSR : SCT : 1394

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

SECTION VII Annexure - VIII

	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 - IX

REVERSE AUCTION PROCEDURE

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION

Against this NIT for the subject work, tender shall be processed through **"REVERSE AUCTION PROCEDURE"** i.e. **ON LINE BIDDING on INTERNET**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. BHEL will inform the vendor in writing in case reverse auction, the details of service provider to enable them to contact and get trained
4. Business rules like event date, time, start price, bid decrement, extensions, etc., also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. BHEL will provide the calculation sheet (e.g.: EXCEL sheet) which will help to arrive at "Total Cost to BHEL".
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider within 24 hours of action without fail.

10. During Reverse Auction, if no bid is received within the specified time, BHEL at its discretion may decide to revise opening price/scrap the reverse auction process/proceed with conventional mode of tendering.
11. Sealed bid reverse auction: The opening bid (in the initial auction) of the bidders shall be same as that quoted in their final sealed price submitted to BHEL. The bidder shall confirm in writing to BHEL that their opening bid in both cases shall be same as that quoted in their final sealed price bids submitted to BHEL against this NIT along with Technical bid.
12. BHEL reserves the right to cancel Reverse Auction (RA) without assigning any reasons and resort to considering the sealed bids submitted by vendor for processing and finalizing the tender.
13. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
14. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.
15. Bids given by the bidders during the reverse auction process will be taken as an offer to execute the work. Bids once made by the bidder, cannot be cancelled/withdrawn and bidders shall be bound to execute the work as mentioned above at the final bid price. BHEL shall take appropriate action as the lowest bidder do not execute the contract as per the rates quoted by him

TENDER SPECIFICATION

BHEL:PSSR:SCT: 1394

FOR

Handing at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of LP piping and its accessories , Hangers & Supports, Valves, Miscellaneous equipments/ systems and other static equipments including supply and application of final painting for Unit 2 of 1 X 500 MW Stage -II

at

Bellary Thermal Power Station

Kudatini Village, Bellary

Karnataka State

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 Govt. of India Undertaking)

Power Sector – Southern Region

EVR Periyar Building

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

TENDER SPECIFICATION NO:BHEL:PSSR:SCT:1394

NAME OF WORK

Handing at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of LP piping and its accessories , Hangers & Supports, Valves, Miscellaneous equipments/ systems and other static equipments including supply and application of final painting for Unit 2 of 1 X 500 MW Stage -II at Bellary TPS ,Kudatini Bellary , Karnataka State

(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:PSSR :SCT:1394

Sl.No	Description	Approx Weight(MT)	Unit Rate (Rs	Amount (Rs)
01	<p>Erection, Testing ,commissioning & completion of trial operations of the complete piping, Stainless Steel, Carbon Steel , GI and buried piping together with valves, fittings hangers & supports etc. as per the detailed description and nature of work enumerated in the Tender specification, supply and application of final painting including supply of consumables, tools and tackles except the T & P supplied by BHEL, all handling and transportation from BHEL/Customer's stores and other incidental works during the pre-assy, Erection, Testing and Commissioning works as detailed in the Tender specification. This shall include all types of handling and transportation of materials from the site stores sheds / storage yard, to place of erection and including any extra work of modification / rectification that may arise during the erection, testing and commissioning works which is incidental to normal erection works. The buried piping works involves supply and application of coal tar coating and application of fibre glass wrapping material as specified in the tender specification / drawings.</p>			

1A	Stainless Steel Piping	28		
1B	Carbon steel and GI piping	830		
1C	Buried piping	520		
1D	Buried piping (excluding wrapping & coating)	150		
2	Erection, Testing and commissioning and completion of trial operations of miscellaneous equipments such as pumps, underslung cranes, hoists, tanks and hanger & supports for piping together with valve fittings as detailed in the description and nature of work enumerated in the tender specification and supply and application of final painting including consumables, tools and tackles except the T & P supplied by BHEL , all handling and transportation from BHEL/ Customer's stores and other incidental works during the pre-assy, Erection, Testing and Commissioning works as detailed in the Tender specification. This shall include all types of handling and transportation of materials from the site stores sheds / storage yard, to place of erection and including any extra work of modification / rectification that may arise during the erection, testing and commissioning works which is incidental to normal erection works. This includes load testing of under slung crane and hoist and arrangement of loads for testing is also included in the scope of work.			

2A	Hangers and supports and other equipments	322		
	Total	1850		
CIVIL WORKS FOR BURIED PIPING :				
3	Earthwork excavation in all kinds of soils ,soft rock including setting out, clearing and grubbing, shoring, dewatering, back filling around pipelines to grade, watering, compaction of fills, testing, approaches, disposal of surplus earth, protective fencing, lighting etc., relevant to the locations covered under this contract as per standards specified in the tender specification and drawings			
3A	Ordinary soil	16000 CuM		
3B	Soft rock	2500 Cu M		
4	Sand filling : The scope involves Supply and spreading of sand to form sand bed as per tender specification , drawings and as directed by BHEL engineer at site.	2500 Cu M		

Total Contract Value (SI No 01 to 04) Rs _____

In Words _____

Signature of Contractor

NOTE TO RATE SCHEDULE:

1. The quantities indicated in column 3 are approximate and are liable for variation and alteration at the discretion of BHEL. The quoted unit rate shall be applicable for any additional product groups of manufacturing unit, if included at a later date. The work executed shall be measured and priced at unit rate quoted by the contractor and accepted by BHEL.
2. The Tenderer is expected to fill up the rate column after satisfying all terms and conditions of Tender Specification.
3. 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.

SIGNATURE OF THE TENDERER