

TENDER SPECIFICATION

BHEL:PSSR:SCT: 1300

FOR

Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of HP/PCP and LP Piping inclusive of CW piping including supply and application of Protective Coating (Anti-Corrosive tapping), Painting for Units 1 & 2 of 250 MW set

at

Neyveli TS –II Expansion ,

(for Neyveli Lignite Corporation)

Neyveli, Cuddalore Dt, Tamilnadu

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: 1300

Messrs

Date :

Dear Sir,

SUB: Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of HP/PCP and LP Piping inclusive of CW piping including supply and application of Protective Coating (Anti-Corrosive tapping), Painting, etc for Units 1 & 2 of 2x 250 MW set at Neyveli TS –II Expansion, (for Neyveli Lignite Corporation) Neyveli, Cuddalore Dt, Tamilnadu.

Please find enclosed one set of non-transferable tender documents containing - 121 - pages of Tender Specification along with separate booklet for Rate Schedule and General conditions of contract 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 Lakh only) in the form of Demand Draft drawn in favour of M/s.Bharat Heavy Electrical Limited Chennai - 35. Bids with Deviations from the tender conditions will be rejected.

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

The completed quotations shall reach the office of the under signed on or before **26.06.2008** at **15.00** Hrs. The Technical bids, will be opened on the same day at **15.30** hrs.

We shall separately intimate the date for opening the price bids only to those parties who are technically qualified.

You are requested to depute your authorized representative at the time of opening.

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

Kindly acknowledge 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 EAVY ELECTRICALS LIMITED

Place : Chennai -35

ADDL GENERAL MANAGER / CONTRACTS

This Tender document is not transferable.

Encl: One set of Tender documents.



Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)

Power Sector – Southern Region

EVR Periyar Building

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

SPECIAL INSTRUCTIONS TO BIDDERS

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

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

01. Details of previous experience during the last five years indicating contract value, duration, completion period and present engagement as per G.C.C.
02. Organisation structure of the Company as per GCC.
03. Financial status of the firm enclosing balance sheet and profit and loss account for the past 3 years and certificate from the Company's Banker as per G.C.C
04. Turnover of the Company in last 3 financial years pertaining to this scope of work only.
05. Latest Income Tax clearance certificate.
06. **BIO DATA** of key personnel presently in the Rolls of the company and proposed site organization for carrying out the work including deployment of Engineers and Supervisors.
07. Declaration sheets as per Appendix of Tender Specification.
08. Checklist and Schedule of General particulars as per Appendix in GCC.
09. T & P owned/deployment details as per G.C.C.
10. Technical manpower deployment details as per G.C.C
11. Other relevant details as per GCC and checklist.
12. These terms and conditions will be read and construed along with General Conditions of contract and in case of any conflict or inconsistency between the General conditions and the Terms and conditions of the tender specification, the provisions contained in the Term and conditions (NIT, Rate Schedule, Common conditions, Special Conditions including Appendices) shall prevail.

13. THE BIDDERS ARE REQUESTED TO FURNISH THE DOCUMENTS LIKE COPIES OF LOIS, WORK ORDERS ETC PERTAINING TO THE EXPERIENCE INDICATED IN QUALIFYING REQUIREMENT, AS GIVEN BELOW.

14 . QUALIFICATION REQUIREMENT

- a) The bidder should possess the experience of having executed Power cycle piping/HP piping work in a thermal Power plant of minimum capacity of 60 MW or above in the last seven years.
- b) The Bidder should have an average financial turnover of Rs. 460 lakhs for the last three years ending on 31.3.2007.

The bidder should have earned profit in any one of the last three financial years ending on 31.3.2007 and should have positive net worth as on 31.3.2007.

The bidder should submit audited Balance Sheet and Profit and Loss Account of the Company for the last three years ending on 31.3.2007 in support of the above requirement.

- c) Notwithstanding the above, BHEL reserves the right to reject any tender or all the tenders for the reasons whatsoever beyond our control and the decision of BHEL is final.
- d) Approval of the party by customer
- e) LD / Penalty shall be leviable as per the applicable clauses of GCC.

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

16. SAFETY PLAN

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



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EVR Periyar Building

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 super scribed 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 super scribed and submitted to Additional 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 , 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 Lakh only). This EMD amount shall be submitted in the form of demand draft only drawn in favour of M/s. Bharat Heavy Electricals Limited, Chennai – 35.

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

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

Additional General Manager/Contracts.



Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)

Power Sector – Southern Region

EVR Periyar Building

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

TENDER NOTICE

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

Tender Specification No. BHEL:PSSR:SCT: 1300

Description	EMD
Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of HP /PCP and LP Piping inclusive of CW piping including supply and application of Protective Coating (Anti-Corrosive tapping), Painting for Units 1 & 2 of 250 MW set at Neyveli TS –II Expansion ,(for Neyveli Lignite Corporation) Neyveli, Cuddalore Dt, Tamilnadu	Rs.2,00,000/- (Rupees Two Lakh only)

Cost of Tender Documents (Inclusive of tax)	:	Rs.1040/-
Sale Starts on	:	05.06.2008
Sale closes on	:	25.06.2008 15.00 hrs.
Due date and Time for Submission	:	26.06.2008 15.00 Hrs.
Date and time for opening Of Technical Bids	:	26.06.2008 15.30 Hrs.

QUALIFICATION REQUIREMENT

- a) The bidder should possess the experience of having executed Power cycle piping/HP piping work in a thermal Power plant of minimum capacity of 60 MW or above in the last seven years .
- b) The Bidder should have an average financial turnover of Rs. 460 Lakhs for the last three years ending on 31.3.2007.

The bidder should have earned profit in any one of the last three financial years ending on 31.3.2007 and should have positive net worth as on 31.3.2007.

The bidder should submit audited Balance Sheet and Profit and Loss Account of the Company for the last three years ending on 31.3.2007 in support of the above requirement.

- c) Notwithstanding the above, BHEL reserves the right to reject any tender or all the tenders for the reasons whatsoever beyond our control and the decision of BHEL is final.
- d) Approval of the party by customer
- e) 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.

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 IS LIABLE TO BE SUMMARILY REJECTED.

Additional General Manager /Contracts

TENDER SPECIFICATION : BHEL:PSSR:SCT:1283

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: 1300 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/- (Rupee 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/- (Rupee Two Lakhs only) mentioned above, make up the Security Deposit for the work as provided for in the Tender Specification within the stipulated time as may be indicated by BHEL, Power Sector : Southern Region, Chennai – 600 035.

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

DATE:

CONTRACTOR:

PLACE:

ADDRESS:

Witness with their address

Signature

Name

Address

PROJECT INFORMATION

- 1.0 OWNER : Neyveli Lignite Corporation
- 2.0 PROJECT TITLE: Thermal Power Station - II Expansion 2
X 250 MW CBFC

3.0 INTRODUCTION

The Thermal Power Station has been set up at Neyveli for Neyveli Lignite Corporation of India Limited, situated at a distance of 200 kms from Chennai. The existing station is having 7 units each of 250 MW. Now the plant is being extended by adding two more units of 250 MW capacity in the same premises.

4.0 APPROACH TO SITE

The power station site is connected to Chennai - Tanjore State High way (15.0 Kms) metalled road. Nearest railway station is Neyveli, on the Virudachalam-Cuddalore section of Southern Railway at a distance of 5.0 km. The power station is having its own broad gauge siding for bringing coal and support fuel and can be utilized for extension project. Nearest airport is Chennai,

5.0 METEOROLOGICAL DATA

Ambient temperatures:

- 5.1 Ambient temperatures
1. Maximum temperature of the air in the sun. 48.0 Deg C
 2. Maximum temperature of the air in the shade. - 45.6 Deg C
 3. Minimum temperature of the air in the shade - 1.6 Deg C
- 5.2 Maximum Relative Humidity : 95%
- 5.3 Minimum Relative Humidity : 20%

- 5.4 Average Annual rainfall : mm
- 5.5 Seismic Zone :
- 5.6 Height above MSL : M (Average)
- 5.7 The basic wind speed Vb(as per IS:875 Latest Revision) at 10 m above the mean ground level : 39m/sec.

6.0 ELECTRICAL DATA

- 6.1 Ambient temperature for Design of electrical equipment : 42°C
- 6.2 Ambient temperature for Design of electrical equipment in air-conditioned area if 2x100% air conditioning system is provided. :
- 6.3 Relative humidity for design of electrical equipment : %
- 6.4 Rated frequency : Hz
- 6.5 Frequency variation : All equipment shall be suitable for rated frequency of 50 Hz with variation of (+) 5% to (-) 5% and 10% combined variation (sum of absolute values) of voltage and frequency.
- 6.6 The voltage level for motor shall be as follows:
 - > 160 KW : 6.6 KV \pm 10 % ,3 ph , 50 Hz
 - < & = 160 KW : 415 V \pm 10 % ,3ph , 50 Hz
- 6.7 AC control voltage : 240 V ,1ph, 50 HZ (To be derived through Control Transformer)
- 6.8 UPS Voltage : 240 V ,1ph , 50 Hz
- 6.9 DC Voltage for motor, protection, control and emergency lighting : 220 V
- 6.10 DC Voltage for control & instrumentation : 24 V
- 6.11 AC Voltage for lighting, Space heating : 240 V , 1ph , 50 Hz

- 6.12 AC emergency supply : 415V; 3 Ph; 3 wire
- 6.13 DC Voltage variation : 187 V - 242 V for 220 V DC
21.75 V - 28 V for 24 V DC

- 6.14 Fault levels:
 - 220 KV System : 40 kA
 - 6.6KV System : 40 kA
 - 415V System : 50 kA
 - 220V DC System : 15 kA

6.15 Grounding:

- a). 220KV System : Solidly grounded
- b). Generator : High resistance grounded through distribution Transformer with resistor loaded secondary
- c). 6.6KV System : Low Resistance Grounded with Earth-Fault Current limited to 300A
- d). 415V System : Solidly grounded
- e). 220V DC System : Ungrounded
- f). Diesel Generator : Ungrounded

SECTION III

COMMON CONDITIONS OF CONTRACT

3.1 SCOPE OF CONTRACT

- 3.1.1 The Intent of this specification is to provide erection and commissioning services for execution of projects according to most modern and proven techniques and codes. The omission of specific reference to any method and equipment or material necessary for the proper and efficient services towards installation of the Plant shall not relieve the contractor of the responsibility of providing such services, facilities to complete the project or portion of project awarded to him. The quoted rate shall deem to be inclusive of all such contingencies.
- 3.1.2 The contractor shall carry out the work in accordance with instructions/ drawings/ specification/ standard practices supplied by BHEL from time to time.
- 3.1.3 Provision of all types of labour, Supervisors, Engineers watch and ward as required, tools and tackles as required, consumables as required under various clauses of tender specification for handling transportation, erection, testing and commissioning.
- 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/ till unit is handed over, as specified in detail in clause 3.9.0(Preservation clause)

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 of 415 V- 3 Phase Supply will be provided free of charge at one single point nearer to the site as provided by the customer. Further distribution shall be arranged by the contractor for his office & Stores Shed and for construction at his cost.

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

3.2.3 WATER:

Water for construction purposes will be provided at single point, free of charge, as provided by customer to BHEL nearer to the site. The contractor at his cost shall arrange further distribution.

3.2.4 TOOLS & TACKLES:

All the tools and tackles required for the complete erection of components shall be arranged by the contractor except those items specifically indicated as being supplied by BHEL , as indicated in Section VII- Appendix V and the quoted rate shall be inclusive of such requirements.

One 75T & 18T crane should made available throughout erection

3.2.5 CONSUMABLES:

All welding electrodes for C.S, gases, paints, Anti-corrosive tape wrapping material and consumables are to be arranged by the contractor at his cost.

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

3.3.1 CIVIL CONSTRUCTION:

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

3.3.2 WATER DISTRIBUTION:

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

3.3.3 ELECTRICITY DISTRIBUTION:

Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, cables, etc. observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

3.3.4 POSSESSION OF GENERATORS :

As there are bound to be interruptions in regular power supply, power cut / load shedding in any construction sites, due to inherent power shortage in State on this account, suitable extension of time, if found necessary only be given and contractor is not entitled for any compensation. It shall be the responsibility of the tenderer / contractor to provide, maintain the complete installation on the load side of the supply with due regard to safety requirements at site. It shall be the responsibility of the contractor to have at least (2 to 4) diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by tenderers. This may also be noted while quoting.

3.3.5 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 DISTRIBUTION:

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

3.3.7 CONTRACTOR'S OBLIGATION ON COMPLETION:

On Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and leveled and the contractor at his cost shall remove debris as per instruction of BHEL. 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 :

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.

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

3.4.2 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

- 3.4.3 The contractor shall ensure safe keeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.
- 3.4.4 The contractor shall arrange air / gas manifold ensuring proper distribution and reduction of handling time.

3.5 ELECTRODES

- 3.5.1 Contractor at his cost shall arrange all the required electrodes except Electrode for P91 Welding . 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 required welding consumables for all works including electrodes, filler wires for welding are to be arranged by the contractor at his cost.
- 3.5.3 The Tig welding wires as supplied by the respective manufacturing units will be issued to the Contractor free of cost
- 3.5.4 Storage of electrodes shall be done in an air-conditioned / humidity controlled room as per requirement, at his own cost by the contractor.
- 3.5.5 All low hydrogen electrodes shall be baked/dried in the electrode-drying oven to the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Contractor at his cost shall provide electrode drying oven and portable drying ovens.
- 3.5.6 In case of improper arrangement of 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.
- 3.5.7 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 V . 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 their 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 utilisation 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 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 the 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.
- 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 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 use of equipment. It shall be the contractor's responsibility to lay necessary sleepers. The required sleepers are to be arranged by the contractor at his cost. BHEL will not supply any sleepers for this activity.
- 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.,
- 3.6.18 The list of major T & P required to be deployed by the contractor is indicated in Section VII –Appendix –I The list is minimum and not exhaustive but anything required over and above these to suit the site condition / status of progress / nature of work shall be arranged by contractor at his own cost.
- 3.6.19 Contractor shall take into consideration the above clause and quote the rates as called for in the Rate Schedule.

3.7 SUPERVISORY STAFF AND WORKMEN

- 3.7.1 The Contractor shall deploy experienced Engineers, Supervisors all the skilled workmen like Welders (gas, and arc) Carbon steel welders, Gas cutters, electricians, Riggers, Serangs, Erectors, carpenters, fitters etc. in addition to other skilled, semi-skilled and unskilled workmen required for all the works of handling and transportation from site storage to erection site, transportation, erection, testing and commissioning contemplated under this specification. Only fully trained and competent men with previous experience of the job shall be employed. They shall hold valid certificates wherever necessary. BHEL reserves the right to decide on the suitability of the workers and other personnel who will be employed by the contractor, BHEL reserves right to insist on removal of any employee of the contractor at any time, if they find him unsuitable and the contractor shall forthwith remove him.

- 3.7.2 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. 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 bidder and his personnel shall co-operate with other personnel other contractor coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
- 3.7.5 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 instruction 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 bidder 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. The contractor shall make the same good at his own expense or in default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor.

3.8 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 quantity as may be needed by BHEL for areas covering their scope.
- 3.8.3 It shall be contractor's responsibility to arrange necessary cranes/tractors, trailer or trucks/slings/tools and tackles/labour including operators for loading the materials/Equipments from stores/storage yard, move it to erection site/pre-assembly yard and unload the same at pre-assembly yard/ erection site and the quoted rate shall include the same.
- 3.8.4 All equipment so used by contractor shall be of proven quality and safe in operation as approved by the statutory authorities as per the law in force.
- 3.8.5 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 if issued to the 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 maintain records.
- 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. 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 submit 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 above 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.
- 3.8.14.1 The work covered under this scope of work is of highly sophisticated nature requiring best quality / precision workmanship engineering and construction management. He 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.
- 3.8.15 All the necessary certificates and licenses required to carry out this scope of work are to arranged by the contractor then and there at no extra cost.
- 3.8.16 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.
- 3.8.17 The contractor shall be responsible for taking all safety precautions during the construction and keeping the site safe at all times. When the work is temporarily suspended he shall protect all construction materials, equipments and facilities from causing damage to existing property interfering with the operations of the station when it goes into services. The contractor shall comply with all applicable provisions of the safety regulations clean-up programme and other precautionary measures which the BHEL has in effect at the site.

- 3.8.18 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.
- 3.8.19 The contractor shall take delivery of equipment from storage yard/stores/sheds. He shall also make arrangements for verification of equipment, maintain records and keep safe custody watch and ward of equipment after it has been handed over to him till these are fully erected, tested and commissioned and taken over by BHEL's client. The stolen/lost/damaged goods shall have to be made good by the contractor at his own cost.
- 3.8.20 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 PRESERVATION OF COMPONENTS

- 3.9.1 It shall be the responsibility of the contractor to apply touch up painting on all equipment before erection. It shall be contractor's responsibility to arrange for required labour, brush and other consumables like cotton waste, cloth etc. for carrying out preservative painting. The quoted rate shall inclusive of above work. The required paint (red oxide) and thinner shall be arranged by BHEL at free of cost.
- 3.9.2 The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts, then and there for their protection.
- 3.9.3 Any failure on the part of contractor to carry out work according to above clauses will entail BHEL to carry out the job from any other party and recover the cost from contractor.
- 3.9.4 Due to atmospheric conditions erected materials are likely to get rusted more frequently. It is the responsibility of the contractor to preserve the erection materials drawn from stores for erection till these are commissioned and handed over to customer. The required paint (Red oxide) and thinner shall be arranged by BHEL free of cost. All other consumables like painting brush, emery paper, cotton waste, cloth etc. have to be procured by the contractor at his cost. The contractor should ensure that the materials are not rusted on any account till they are handed over to customer. The decision of the BHEL Engineer is final with regard to frequency of application of paint.

3.10.0 CIVIL WORKS

Civil works like earth work excavation, sand filling, concreting if any for encasement of pipe, back filling on completion of laying of buried pipe shall be done by the civil agency. However, in the areas of pipe joints, around 6 M cube per joint extra excavation to be done to facilitate for welding, testing etc., the same to be carried out by the bidder. Bidder to take care while quoting and no charges on this account will be paid separately.

- 3.10.1 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.
- 3.10.2 The Civil excavation for buried piping will be under the scope of the BHEL. However any water logging due to rain/land slides or water seepages in the erection area the bidder has to arrange for De watering the water to facilitate the Erection/Welding. Pl. see the relevant clauses on buried piping details.

3.11.0 DRAWINGS AND DOCUMENTS .

- 3.11.1 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.
- 3.11.2 One set of necessary drawings to carry out the erection work will be furnished to the contractor by BHEL on loan which shall be returned to BHEL Engineer at site after completion of work. Contractor's personnel shall take care of these documents given to them.
- 3.11.3 The data furnished in various appendices and the drawings 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.
- 3.11.4 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.
- 3.11.5 Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimensions/details without specific approval of BHEL.

3.12.0 SAFETY AND CLEANLINESS

3.12.1 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.

3.12.2 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	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/-

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

3.12.3 CONTRACTOR SHALL DEPLOY A SAFETY OFFICER EXCLUSIVELY TO HANDLE SAFETY REQUIREMENT

SPECIFIC REQUIREMENTS FOR ISO 9001 - 2000

3.13.0 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 / Levelling 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.
- 3.13.8 Heat Treatment details of HP Welds indicating minimum Temperature Recorded, Heating Rate, Cooling Rate, soaking Time, Etc., shall also be Recorded and documented by contractor as per BHEL Engineer's Instructions. High pressure Welder's performance Record shall be furnished every month. The performance Report of Welders shall indicate the percentage of Repair for each welder.
- 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 including the HP welders shall carry identity cards as per the proforma 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 Tests 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 Post 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 applicable.

3.15.0 STATUTORY INSPECTION

3.15.1 The scope includes Getting the Approvals from the statutory authorities (Like Boiler Inspector and labour officers). This includes arranging for inspection visits of Boiler Inspector periodically as per BHEL Engineer's instructions, submitting documents, 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.

3.16 HSE SPECIFIC REQUIREMENT

OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM

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

01. Sub-contractor to identify nearest hospital for Health check up of his staff and workers and intimate BHEL site office & PSSR HQ.
02. To arrange for occupational health check up / screening of contractor's staff and workers engaged in sub contracting activities. In this, category of workmen such as welders, gas cutters, grinders, radiographers, crane operators are to be given exclusive attention in respect of health screening.
- 03. Sub-contractor to arrange an ambulance vehicle or emergency vehicle on a continuous basis to meet any emergency situation arising at site work in which his staff and workers are engaged.**
04. To provide appropriate facilities for prompt first aid treatment of injuries and illness at work. One first Aider for each sub contractor to be provided. First Aider should undergo training on first aid.

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

3.16.2 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 electrical safety aspects as per relevant is standard.
06. ELCH's (Earth leak circuit breakers) at all electrical distribution points to be provided.
07. Red and white caution tape of proper width (1.5 to 2 inch) to be used for cordoning unsafe area such as open trench, excavated area, etc.
08. To provide sub-contractors company logo or clothing to all staff and workers for identification including identity cards with photographs approved by BHEL.
09. High pressure and structural welders to be identified with colour clothing and to display copy of welders certificate with photographs of welder at the work place. They also should be in possession of valid welding procedure.
10. To display safe handling procedure for all chemicals such as lube oil, grease, sealing compound, kerosene, diesel etc. At stores & respective work place.
11. Contractor should authorise a person at site to stop work if there is a unsafe work noticed as per his knowledge.
12. Fitness for use of erected scaffolding to be certified by the contractors approved scaffolder and the certificate should be displayed on the scaffolding itself. If the scaffolding is unsafe , the same will not be used. the certificate to be updated daily. The scaffolding to be made as per the relevant is standard.
13. For making platform on the scaffolding , proper thickness and size of the plank of required quality wood to be used. The safe working load of the platform to be displayed on the scaffolding itself. Proper use of platform to be explained to the user.
14. All plant equipment should have inspection report before put in to use.
15. All T&Ps should be of reputed brand and having quality certificates.

16. All IMTEs should have valid calibration certificate from recommended institution / testing lab and these should be in place.
17. All lifting tackle and plant equipment should have safe working load certificate.
18. The right worker should be deployed for right job and the resume of site in charge, supervisors, and key workers to be submitted before commencement of work..
19. Sub-contractor should submit inspection / testing matrix of all T&Ps and to be approved by BHEL.
20. Sub-contractor to display safety slogan, safety board, caution boards wherever required in consultation with BHEL.
21. Sub-contractor to provide gas detectors of reputed make at desired locations.
22. Sub-contractor to conduct emergency mock drills. one drill per 6 month and submit report to BHEL.
23. Safe handling and storing of all equipment with adequate space to be ensured.
24. Sub contractor to deploy safety supervisor till the completion of the project.
25. Sub contractor to comply the safety reporting procedure of BHEL as practiced at present and also additional requirements that may arise out of future improvements in the safety management system. This includes computation of safety indices such as frequency rate, severity rate & incident rate.
26. Sub contractor to identify probable emergency situations such as electric shocks to workmen , caving in of shored earth , fall from height, collapse of scaffolding fire etc., and should have clear action plan to overcome them. Sub contractor to take required guidance from BHEL in this regard.
27. Sub contractor to identify hazardous activities which he may carryout and should train his workmen in those activities with the relevant operation control procedures. Sub contractor to take required guidance from BHEL in this regard.
28. Safe work permit system to be followed while working in confined space / near electric systems.

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

1. HOUSE KEEPING : Sub contractor to carry out daily house keeping of work areas / stores through a check list prepared in consultation with BHEL.
2. Sub contractor shall adopt pollution prevention / reduce /control approach in all his site activities. this shall include:
 - a. Transporting of oil / chemicals from stores to site safely without causing spillage. in case of any spillage, the area shall be cleaned and the remanant spilled oil disposed off to a safe place, identified for such disposal.
 - b. To use required containers / cans / safety gadgets /appliances for transporting and for usage of oil / chemicals at site.
3. Sub contractor shall arrange for segregation / collection of scraps and dispose off to the identified place meant for scrap collection.
4. Sub contractor to adopt good erection practices / procedures with the objective of reduction of waste generation / rework

3.17 OTHER HSE REQUIREMENTS TO BE COMPLIED BY SUB CONTRACTOR

1. Sub contractor to clearly understand and accept the HCE policy of PSSR with a commitment to comply the requirements of the policy.
2. Sub contractors to arrange for daily meeting of their supervisors and work force before they disperse for their daily planned activities where in the relevant health , safety and environment aspects of the job and use of PPES are explained
3. Sub contractor to conduct monthly HSE meeting (internal) and submit the report to BHEL.
4. HSE slogans to be displayed in a proper board – hoarding at designated places in consultation with BHEL.

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

SECTION - VI

SPECIAL CONDITIONS OF THE CONTRACT

- 6.0.0. The scope of work under this specification covers, but not limited to the following:
- 6.1.0 Handling at store / yard, transportation to site, fabrication and welding of support, branch pipes, man holes, instrument tapping, flanges etc, (wherever applicable), laying pipe line for supply line & return line of main cooling water piping along with valves, alignment, welding and doing required, NDT, completion of permanent hangers & supports, wherever required conducting air test & hydro-test, assisting BHEL to carry out the required tests before the line is taken over by the customer of POWER CYCLE PIPING, HP & LP piping inclusive of CW piping supplied under SG and T.G. packages of all piping work in both units 1 & 2 of 2x 250 MW at Neyveli Thermal Power Project are in the scope of this contract. The civil work is excluded from the scope of contractor.
- 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 pipe line as per the sequence prescribed by BHEL at site. The sequence of erection and methodology will be decided by the BHEL Engineer 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 piping 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 & FABRICATION YARD**

- 6.2.1 Loading at storage yard and transporting to site, unloading at site / pre assembly area or at working area, is in the scope of work. Required cranes for loading & unloading of materials, trailer shall be in the scope of contractor. The contractor shall provide any fixtures, concrete blocks & wooden sleepers, sandbags which are required for temporary supporting of the components at site.
- 6.2.2 Contractor shall take delivery of the components 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 materials erected as well as the progress shall be submitted to the Engineer as directed.
- 6.2.3 The individual pipes of maximum diameter 2800 mm x 20 mm (approx) will be supplied with maximum length of 10 meters with bevel cut edge preparation. For bends pre fabricated mitre bends will be supplied.
- 6.2.4 All the pipes / components 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 pipes. The bare pipes shall be lifted with Teflon coated hooks with cranes then loaded / unloaded on / from trailers to avoid bevel damages. It is always safer for the pipes to be lifted at two points.
- 6.2.5 Pipes shall not be dropped to avoid impact or bump.
- 6.2.6 Bare pipes shall be stacked on a sand row / concrete sleepers. Like wise, coated pipes of different diameter and wall thickness shall be stacked in different sand rows. Between two layers of coated pipes, care should be taken to avoid contact between two pipes by putting sand dust bags.
- 6.2.7 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.
- 6.2.8 Contractor shall plan and transport equipments, components from storage yard to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the contractor's shed/work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.

6.3.0 ERECTION

- 6.3.1 Brief list of equipments / sub-assemblies to be erected by the contractor & approximate weight is given in weight schedule 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. They are to be cleaned, assembled in stage by stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.
- 6.3.2 ALL the consumables like welding electrode, wrapping material(Anti corrosive tapes, paints etc and equipments / T & Ps required for successful completion of the work is in the scope of contractor and the quoted rate shall be inclusive of all these, except specifically indicated as free supply by BHEL
- 6.3.3 All the equipments / material to be taken inside the plant building, shall be cleaned thoroughly before taking them inside and erected. The contractor shall clean, wherever necessary as per instruction of BHEL Engineer during erection at the quoted rate.
- 6.3.4 The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered.
- 6.3.5 Carrying out piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall with in the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate.
- 6.3.6 Contractor has to draw the material either from BHEL store yard or fabrication yard and transport to his working place.
- 6.3.7 Welders shall be qualified as per the welder qualification procedures of BHEL/ASME, applicable for this type of job. Only qualified welder shall be deployed for welding.

- 6.3.8 All dimensions / elevations refers to centerline of pipe unless otherwise specified and 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.
- 6.3.9 Normally weld neck valves will have prepared edges for welding. It may be occasionally necessary to prepare new edges, re-prepare the edges to suit site conditions, which shall be done by the contractor at no extra cost.
- 6.3.10 Wherever pre-fabricated pipes/bends are supplied, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.
- 6.3.11 Certain adjustments in length may be necessary while erecting pipelines to suit site condition, for which an extra length of piping is provided on each line. Contractor should remove the extra lengths to suit the final layout and prepare edges afresh is in the scope of work. It may also required to add extra lengths of pipes to suit final layout for contractor to put spools after edge preparation. All these works are to be carried out by the contractor with in the quoted rate.
- 6.3.12 Box cutting and excavation of earth up to the required depth and width, concreting etc., shall be carried out by Customer on phased manner as per the site requirement and decided by BHEL site in-charge. As and when the clearance for erection of piping is given, contractor shall carry out erection work promptly with out any delay and release for further civil in a phased manner as instructed be site in-charge.
- 6.3.13 Once the clearance is given for erection contractor, he has to lay the pipes immediately with out any delay and complete erection, alignment, welding & NDT as per the drawing / welding schedule. Pipes are to be lifted and placed only by cranes and should strictly follow the lifting procedure / instruction of BHEL Engineers.

6.3.14 SAFETY PRECAUTION DURING WELDING :

In the larger diameter pipes, welding is to be done from inside and outside the pipe, as per drawing. While doing inside pipe welding , adequate precaution is to be taken by contractor to exhaust the weld gases form affecting the welders doing the work. Suitable exhaust fans are to be

provided . Welders and helpers inside should have face mask and other safety equipments and safety ware. Suitable lighting and industrial type Exhaust fan are to be made. Manhole escape arrangement is to be identified. Welding inside pipe should be taken up only after getting clearance from safety engineer and after ensuring that Safety relief measures are made available nearer to work area.

A supervisor should be continuously made available in the area of welding through out.

- 6.3.15 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 procedure to be carried out with in the quoted rate.
- 6.3.16 Contractor shall arrange all the equipments, alignment bolts, tools, consumables like welding rods, etc. for welding of pipes and consumables like jute, cotton waste, hacksaw blades, petrol, Kerosene oil etc. are also in contractor's scope. All these shall be carried out with in the quoted rate.
- 6.3.17 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.
- 6.3.18 All the weld joints on equipments and piping shall be ground or filed on completion of welding as per instructions of BHEL Engineer so as to achieve smooth surface devoid of ripples, undulations etc.,
- 6.3.19 Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required.
- 6.3.20 Temporary lugs / structures meant for transportation is to be removed by the contractor as and when instructed by BHEL Engineer.
- 6.3.21 Flame cutting of piping and other equipment shall be strictly done as per BHEL Engineer's instructions and in his presence only.

- 6.3.22 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.
- 6.3.23 On completion of bottom layer of pipes, contractor has to conduct hydraulic test. For conducting hydro – test both ends of each lines are to be blanked suitably. Raw materials for blanking such as plate / structural items will be given BHEL on free of charges. Fabrication, welding of dummies and NDT and removal of dummies after successful completion of hydro – test and making edge preparation on the parent pipe after HT is in the scope of contract. For Hydro test to be conducted in stages or to be repeated , the same plates shall be used for blanking by suitably grinding.
- 6.3.24 Contractor at his cost shall lay all temporary piping, install the pumps, blanks valves required for the hydraulic test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL free of charges. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him once the work is over and return to BHEL.
- 6.3.25 The contractor has to arrange(low pressure) hydro-testing pump for conducting hydraulic test on his own with in the quoted rate. The servicing, installation, electrical connection, erection, testing and dismantling after completion of hydro-test shall be carried out by the contractor as part of this work without any extra charge.
- 6.3.26 Required water filling pump is to be arranged by the contractor.
- 6.3.27 All the above tests shall be repeated till all the equipment satisfy the requirement of BHEL to their customer. Any rectification required shall have to be redone by the contractor at his cost.
- 6.3.28 After completion of hydro test on bottom layer it is to be cleared for concrete to Civil agency, after de-watering and removing all temporary supports / scraps.
- 6.3.29 The BHEL supplied valves as part of CW system will have to be checked, lapped or overhauled in full or in parts before or after erection. Contractor shall arrange experienced valve technician at his own cost. Any special tools required for lapping only will be arranged by BHEL.

- 6.3.30 For other agencies, such as Civil works, LP 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.
- 6.3.31 All drains / vents/ relief line etc. from the stubs on the piping to be erected by the contractor, is completely covered in the scope of work.
- 6.3.32 Fixing / fitting / welding of thermo well stubs, tapping points, root valves for instruments etc is within the scope of work.
- 6.3.33 The contractor shall conduct non destructive tests (Radiography) on weld joints, castings, valve bodies and other equipments etc. as per BHEL Engineer's instructions / welding schedule.
- 6.3.34 Contractor shall arrange the clearance from the statutory authorities (Labour commissioners etc.,) as required for installation of the plant and equipment and render all assistance, service required in this regard.
- 6.3.35 All Operating / Approach platforms, cross over, canopies, ladders etc., shall have to be fabricated from raw materials supplied by BHEL and erected with in the quoted rate. No separate rate is payable on weight basis for supports, other than those indicated in PGMA or supplied by Units, which will be covered in the overall weight.
- 6.3.36 The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts, then and there for their protection till the upper end casing is done.
- 6.3.37 Any failure on the part 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.
- 6.3.38 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 with T & Ps 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.

6.4.0 HYDRAULIC TEST AND OTHER TESTS

- 6.4.1 Hydraulic testing, as required shall be carried out by the contractor. The servicing, installation, electrical connection, erection, testing and dismantling of Hydraulic Test pump, temporary pipelines, fittings, etc shall be carried out by the contractor as part of this work.
- 6.4.2 All cooling water piping systems shall be subjected to Hydraulic test as per the statutory requirements. The contractor shall supply necessary labour and other services to carry out the required tests as per the instructions and directions of the BHEL Engineers.
- 6.4.3 All the above tests shall be repeated till all the pipelines to satisfy the requirements / obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted to the satisfaction of BHEL / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost.
- 6.4.4 All temporary piping materials necessary for conducting hydraulic test, will be supplied by BHEL. However servicing, erection and dismantling of the same is the responsibility of the contractor. Those items that are issued along with main equipments / components specified under dispatch unit for temporary piping etc., supplied by BHEL or others or any other agency alone will be paid at the quoted rates for erection. Charges for dismantling of temporary lines etc., should be included in the quoted rates.

6.5.0 PRESSURE TEST FOR PIPING

- 6.5.1 Soundness of the welds shall be tested hydraulically under the supervision of the BHEL Engineer and Customer, to the pressure indicated in the drawing for cooling water piping system. Prior to the test, the piping system shall be inspected by the BHEL Engineer to the extent necessary to ensure compliance with clearance for the test, which will be obtained by the contractor from the Engineer.

6.5.2 The test shall be repeated till the BHEL and Customer are satisfied as applicable.

6.5.3 As a rule, pressure tests shall be performed after all eventual pipe branches have been completed and valves installed. Should it be required to hasten erection work, pressure tests may be performed by sections. For this scope of work, the erected pipe lines shall be Hydraulically tested in as per site requirement segments. For conducting hydraulic test, both ends of pipe lines shall be blanked by welding of plates. Only one or two set of plates and structural materials for blanking required for one segment will be provided by BHEL free of charge. After completion of hydraulic test in one segment, the same plates are to be cut and removed and utilized / welded on the other segment of the pipe lines, to carry out the hydraulic test for the respective segments. No separate plates for blanking for each segments will be provided. After completion of Hydraulic test, the required edge preparations shall be carried out on the end of pipe lines and to be welded with the respective pipe lines. In such cases joint connection shall be checked during a final and additional test, if required. The contractor shall note this aspect and quote accordingly.

6.5.4 The following specifications shall be completed with during hydrostatic test.

- a. Vent nozzles with valves shall be provided at the highest point of the runs, to eliminate air pockets. At the lowest point drain nozzles, with valves shall be provided to drain water from pipes. The nozzles and valves shall be of the same materials as the pipe.
- b. The lowest part of the pipe shall always be filled first with water.
- c. Pressure shall be slowly increased (without shocks) to the stipulated value and maintained as long as required to visually check all joints.
- d. Following the control specified above the pressure shall be slowly decreased to the design pressure after which the pipe shall be subjected to the peening test, applying knocks every 150 mm approx. especially in the welded joint areas, with a 0.5 – 1.5 kg. Hammer (depending on the pipe wall thickness). The hammer used shall be a round headed one.
- e. Following the peening test, the pressure shall be increased to the stipulated value and all welded joints shall be visually inspected.

- f. Following these test, the pipe shall be drained or pumped out to the other section to be hydro test using the drain out pump to be provided by Contractor and wherever necessary shall be flushed with air for all pipes.
- g. The pressure test is considered satisfactory if no cracks, unjustified pressure reductions, leakages, Weeping etc., appear.
- h. Should defects be found, these shall be repaired in the same manner as these during radiographic examination. Hydraulic test shall be repeated after defects have been repaired.

6.5.5 During hydraulic test, the pipes being tested shall be isolated from the equipments to which they are connected.

6.5.6 Openings on piping for pressure / temperature impulse connections shall be fully closed during the test to prevent dust or foreign matter from being introduced into the instrument piping inadvertently.

6.5.7 Test records shall be made of pressure testing for above piping system. These records shall contain the following information:

- a. Date of test
- b. Identification of piping tested
- c. Test fluid
- d. Test pressure
- e. Approval of the Engineer

6.6.0 **BURIED PIPING**

6.6.1 The pipe in general shall be laid with the top of the pipe minimum 1 metre below the finished general ground level or as specified in the drawing . Anti corrosive treatment for all buried pipes suitable for Sea- water application and Supply and 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, quantity & sizes of buried piping are given below :
- The buried pipe will be of around 90% of (Size of pipes 2800 x 20 mm and 1800 x 14 / 16 mm) Erection Field welding schedule is furnished in Appendix .
- 6.6.3 The civil works for the buried pipings are excluded for this scope of work. However 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 shall 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 is to be carried out by the contractor within quoted rates.

6.7.0 COATING & WRAPPING

- 6.7.1 The pipe line shall be thoroughly cleaned of all rust, grease, dirt, weld scales and weld burrs etc., moisture or other foreign matters, Grease or heavy oil shall be removed by washing with a volatile solvent such as gasoline. Kerosene will not be permitted for cleaning. Primer shall be immediately follow this cleaning operation with mechanical priming machine. Alternately , with the concurrence of BHEL / Customer the pipe line shall be adequately scrubbed manually with wire brush and scrapped wherever necessary.
- 6.7.2 The entire length of pipe shall be cleaned and should be wrap the Anticorrosive tape thickness of 4 mm confirming to the IS 10221 and also AWWA-C- 323 with recommended Primer leaving the end about 100 mm for joints, which shall be done manually at site after laying, welding and testing the pipe. The approximate area to wrap the anticorrosive tape around 4800 sq Meters. The bidder should arrange this material as per specification BHEL/NLC Quality Plan with in the quoted rates.
- 6.7.3 Contractor at his cost as approved by BHEL shall arrange all the required Anti corrosive Tape. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement regarding, suppliers, type of Anti corrosive Tape etc. On receipt of the wrapping material (Anti corrosive Tape) at site, it shall be subject to inspection and approval by BHEL/NLC. The contractor shall inform BHEL details regarding type of wrapping material, batch number and date of expiry

6.7.4 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 (Anti corrosive tap) and consumables required for cleaning operations as stated in 6.7.1 above are to be arranged by the contractor within the quoted rate.

6.7.5 The recommended test for wrapping material will be carried out by the site -Quality as per standard for the respective Batch of supply and there by Clarence will be given for further erection.

6.7.6 The materials used for coating and wrapping are

- a) Coating Primer
- b) Wrapping Materials

All primer / coating / wrapping materials and method of application shall conform to IS 10221 except asphalt /Bitumen material. However the scope of work for buried pipe only is indicated below :

The contractor has to carry out one coat of coal tar enamel (Lloyd T3 or equal) / asphalt or suitable resin based primer , approximate DFT 25 microns, around welding area , 100 mm on each pipe internal as well as external surface at both ends, after completion of pipe to pipe welding joints, before coal tar wrapping.

6.7.7 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 coal tar coating/wrapping shall not be less than 4 mm.

6.7.8 The anti corrosive protection can consist of anti corrosive protection tapes. 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.

6.7.9 The tapes can be applied directly on to the primed pipe surface by means of mechanical coating / wrapping equipment manually or by machine. The minimum overlap shall not be not less than 25 mm when a new roll of tape is started and the ends shall be overlapped at least 150 mm measured circumferentially. The overlap shall be smooth and shall be located to ensure the continuity of the inner layer coating.

6.7.9.1 **EXTERNAL SURFACE - OVER GROUND PIPING**

6.7.9.2 All the external surface of pipe shall be cleaned properly. After completion of cleaning, application of paints are to be carried out for over ground piping. This application of paints involves two coats of red oxide (zinc chromate) primer, each coat will be around 25 microns and two coats of finish paint of synthetic enamel paint of each coat will be of DFT 50 microns and the total dry film thickness of 150 microns.

6.7.9.3 The approximate quantum of work for above ground piping will be around 100 metre. The bidder to take note of this aspect and quote accordingly.

6.8. **PAINTING SCOPE**

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

6.8.1 **CODES AND STANDARDS**

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

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

IS:5 Colours for ready mixed paints and enamels

IS:1303	:	Glossary of terms relating to paints
IS:2379	:	Color code for identification of pipelines
IS:1477	:	Code of practice for painting of ferrous metals in buildings (Parts I & II)
IS:2524	:	Code of practice for painting of non-ferrous metals in buildings (Parts I & II)

**IS:2395 Code of practice for painting of concrete, masonry
and plaster surfaces (Parts I & II)**

IS:2338 : Code of practice for finishing of wood and wood based materials (Parts I & II IS:6278:Code of practice for white washing and colour washing

IS:3140 Code of practice for painting asbestos cement building products

IS:158 : Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali, water and heat resisting

IS : 2074 : Ready mixed paint, air drying, red Oxide Zinc Chrome, priming

IS : 104 Ready mixed paint, brushing, Zinc Chrome, priming

IS : 2932: Enamel , synthetic, exterior (a) undercoating (b) finishing specification.

6.8.2 PREPARATION OF SURFACES

All surfaces to be painted shall be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes shall be adopted to clear the surfaces. However, in certain locations where power tool cleaning cannot be carried out, sand scrapping may be permitted with steel wire brushes and/or abrasive paper. Cleaning with solvents shall be resorted to only in such areas where other methods specified above have not achieved the desired results. Cleaning with solvents shall be adopted only after written approval of the PURCHASER/CONSULTANT.

6.8.3 PRIMER PAINTS (P)

Primer paints shall be applied only on dry and clean surfaces:

Primer paint P1: (Epoxy based)

A two pack air drying epoxy polyamide resin based red oxide zinc phosphate (primer)

Epoxy content (% wt)	15 to 18
Air drying time	About 30 minutes (touch dry) Over night (hard dry)
Dry film thickness (DFT/coat)	30 microns (min)
Temperature resistance	Upto 120 deg.C dry heat

Primer paint P2 (Epoxy based)

A two pack air drying epoxy polyamide with zinc dust of at least 92% zinc dust on the dry film.

Epoxy content (% wt)	8 to 10
Air drying time	About 10 minutes (touch dry) 2 hours (hard dry)
Dry film thickness (DFT/coat)	40 microns (min)
Temperature resistance	Upto 300 deg.C dry heat

Primer paint P3 (Ethyl zinc silicate, EZS, based)

A two pack heavy duty zinc dust rich silicate primer:

Total solids (% wt)	84 + or - 2
Air drying time	16 hours
Density	3.07 +/- 0.005
Dry film thickness (DFT/coat)	60 microns (min)
Temperature resistance	Upto 450 deg.C dry heat

Air drying time	2 to 3 hours (touch dry)7 days (full cure)
Dry film thickness (DFT/coat)	40 microns
Temperature resistance	Upto 130 deg.C dry heat
Compatible with	Primers P1 and P2 Intermediate II
Colour	Generally all shades

6.8.4 Intermediate paints (I)

These paints shall be applied over primer coats as an intermediate layer to provide weather proof seal of primer coats.

Intermediate paint II

A two pack air drying high build epoxy resin based paint with MIO.

Air drying time	6 to 8 hours (touch dry) 7 days (full cure)
Dry film thickness (DFT/coat)	100 microns
Temperature resistance	Upto 180 deg.C dry heat
Compatible with	Primer P1 and P2

6.8.5 FINISH PAINT

Finish paint coats shall be applied over primer coats and intermediate coats after proper cleaning and touch up of primed coats.

Finish paint F1 -A two pack air drying epoxy polyamide enamel suitably pigmented.

Finish paint F2 A single pack synthetic rubber based enamel paint.

Air drying time	2 hours (touch dry) 24 hours (hand dry)
Dry film thickness (DFT/coat)	25 microns
Temperature resistance	Upto 200 deg.C dry heat

Compatible with	No primers
Colour	Generally all shades

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

Equipment no. and the name of the equipment shall be painted on the surface of the equipments on visible locations. Service of the Pipe/Line designation with arrow identification for the direction of flow shall be painted on all pipes at visible locations at an interval of 20 metres. Wherever pipe lines are insulated, the service of the piping and arrow mark shall be painted over the clad surface.

6.8.6 PAINT APPLICATION

Paint shall be applied in accordance with manufacturer's recommendations. The work shall generally follow IS 1477 (Part II) for jobs carried out in India and SSPC-PA-I or DIN 55928 or equivalent for jobs carried out outside India.

Paint shall not be applied when the ambient temperature is 5 deg. C and below. Also paint shall not be applied in rain, wind, fog or at relative humidity of 80% and above.

Each coat of paint shall be continuous, free of pores and of even film thickness without thin spots.

Each coat of paint shall be dry sufficiently before application of next coat.

The Contractor shall furnish paint manufacturer's test report or technical data sheet pertaining to the paint selected. The data sheet shall indicate among other things the relevant standards, if any, composition in weight percent of pigments, vehicles, additives, drying time, viscosity, spreading rate, flash points, methods of application quality of surface preparation required, corrosion resistance properties and color.

6.8.7 Painting scheme

Type of paint products like P1, P2, P3, I1, F1, F2 and F3 has been specified elsewhere in the specification.

For a complete painting scheme of any item being painted, all types of paints are to be procured from the same manufacturer as approved by the purchaser.

Legend

Sa - 2 .5 – The quality of surface cleaning, i.e 95 % of the surface area is free from all rust, mill scales and visible residues, foreign materials etc.

SP - surface preparation quality

2P1 - Two (2) coats of primer paint type P1

1I1 - One (1) coat of intermediate paint type I1

2F1 - Two (2) coats of finish paint type F1

DFT - Dry film thickness

CRT - Clean and retouch.

6.8.8 UNDERGROUND PROTECTION FOR PIPING

a. SCOPE

Pipeline wrapping tapes for the protection of external surface of underground carbon steel piping.

b GENERAL

The coating will consist of coal-tar enamel anti corrosive tape thickness of 4 MM confirming to IS 10221 And to AWWA-C- 203

Alternatively, if specified in Data Sheet-A, ready-made tapes available for underground protection will be used. Tape will be of approved make. The CONTRACTOR will furnish all the technical information, experience details etc. of the tapes proposed to be used for review.

The two ends of each length of pipe will be left bare of primer coating and wrapping for a distance of 100 mm from the end to facilitate field welding and subsequent field coating or wrapping.

The supply, application, characteristics of materials and testing requirements will be strictly as per IS 10221.

Type of coating system based upon the soil receptivity may be selected on the following basis :

	<u>SOIL RESISTIVITY</u>	<u>CORROSIVITY</u>	<u>COAL TAR COATINGS</u>	<u>WRAPPING TAPES</u>
(a)	≤ 1000 ohm-cm	Extremely corrosive	3 coats and 3 wraps of tape	3 layers
(b)	> 1000 ohm-cm	Corrosive & non-corrosive	2 coats and 2 wraps of tape	2 layers

If no specific choice is indicated in Data Sheet, system 2.5(b) using coal tar coating will be used.

c. SURFACE PREPARATION

Pipe surfaces to be provided with underground protection will be cleaned by shot or sand blasting. The cleaning will be so carried out that the piping surface is free from mill scale, rust, oil, welding scale and other foreign materials. Primer will be applied immediately after shot or sand blasting to prevent rust forming. Superficial rust formed will be removed by wire brushing or by the use of emery paper. If the rust formation is heavy, re-blasting may be necessary. Around field joints, the pipe surfaces may be cleaned by wire brushing prior to the application of anti-corrosive protection.

d. PRIMER COAT

The primer will be compatible with the grade of enamel used. It will be thoroughly mixed before using by stirring or by rocking the drum to provide uniformity of material. The primer coat will be applied over a thoroughly clean and dry surface within three (3) hours of the cleaning operation, and will be applied preferably immediately with a uniform thickness on the entire surface of the piping using appropriate quantity per unit area of surface as recommended by the manufacturer. The primer coating will be free of bubbles, globules, drips and runs. Pipes having a longitudinal seam will be carefully examined to determine that all excess primer has been brushed out of each side of the

welding seam. The primer will be thoroughly dry before the enamel is applied. If ready-made tapes are used, then primer, as suggested by the manufacturer, will be used.

Freshly-primed pipe will be handled carefully to prevent damage. The damaged area will be re-primed before applying enamel/wrapping tapes.

e ENAMEL AND WRAPPING MATERIALS FOR COAL TAR ENAMEL APPLICATION

Well-experienced personnel will be placed in charge of coating and wrapping operations. They will strictly follow the manufacturer's instructions regarding recommended temperature in the heating kettles and the temperature at which the hot coating is applied to the pipe. Clean dry enamel in lumps not exceeding 35 kg in weight will be heated slowly in clean kettles to the recommended temperature, and after reaching the required temperature, the heating flame will be controlled to prevent over-heating. Any enamel heated in excess of manufacturer's specifications will be discarded. Only batch heating of enamel will be permitted.

Kettles will be completely emptied of one batch and cleaned, if necessary, before preparing the next batch of enamel. The enamel will be stirred continuously with metal agitators. Enamel kettles will be equipped with indicating or recording thermometers having temperature range from 100 to 350°C. Enamel withdrawn from the kettles will be strained through a 1.5 mm strainer.

Enamel will be moisture - and dirt-free at all times prior to and at the time of heating and application. The primed surface will be dry and clean at all times and the enamel will be applied not later than three (3) days after the application of primer. Along with the first coat of enamel, a single spiral inner wrap of fibre glass will be applied overlapping at least 20 mm on pipes upto 250 mm diameter and 25 mm on larger diameter pipes. It will be ensured that fibre glass impregnates in the first coat. The second coat of enamel and the second outer wrap of enamel-impregnated fibre glass or enamel-impregnated kraft paper will be applied in the same way and will conform to IS 10221. The total thickness of the coating will not be less than 2.5 mm.

A third coat of enamel and wrapping will be applied wherever soil resistivity is below 1000 ohm-cm (extremely corrosive).

During cold weather, when the pipe surface temperature is below 7°C or during rainy and foggy weather when moisture tends to collect on the cold pipe, enamelling will be preceded by warming of the primed pipe. Warming will be done by any method that will heat the pipe uniformly to the recommended

temperature without damage to the primer. Temperature of the pipe will not exceed 70°C.

Each end of the pipe left bare for welding purpose will be hand-coated and wrapped after completion of field welding and satisfactory hydro testing of pipe.

f APPLICATIONN OF WRAPPING TAPES

After the surface preparation as per para 3.0, the primer will be applied by brush or spay so as to give a coating thickness is between 2 and 4 mils when wet. The primer will be allowed to dry to the touch prior to tape application. Primer and tape will be furnished by the same manufacturer. If application is done in cold weather, the surface of the pipe will be preheated until it is warm to the touch, and until all traces of moisture are removed and then the primer will be applied and allowed to dry.

The tape will be wrapped strictly in accordance with the manufacturer's recommendations in a manner that will meet the adhesion and holiday detection requirements of IS 10221. There will be a minimum overlap of 12 mm per single wrap. Each layer of tape will be of 2 mm thickness.

6.8.9 TESTING

.6.8.9.1 THICKNESS

The thickness of the pipe coating will be measured either by elcometer or by coating thickness gauge.

6.8.9.2 BOND

Bond test will be carried out by cutting 25 mm square at three locations of the coating on a sample test specimen to qualify the procedure. Coating will be pulled out by lifting one corner of the square. For a good coating, the section will not peel off easily.

The coating on the pipe will be carried out only after satisfactory completion of the qualifying test.

In case of doubt regarding the quality of coating, bond test will be carried out on any location of the pipe to the satisfaction of the OWNER. The tests indicated under clauses 7.1 and 7.2 are applicable for coal tar enamel applications only.

6.8.9.3 FIELD ADHESION TEST FOR WRAPPING TAPES

Adhesion test will be made to determine the proper bond between the tape and primed pipe. The temperature of the tape and pipe to be tested will be between 10 and 27 °C. If the temperature is outside this range, hot or cold water will be poured over the test area until this temperature range is attained. A test area will be selected by the inspector where the tape is smooth for 15 cm in the longitudinal direction of the tape. Two knife cuts that are 15 cm long and 5 cm apart will be made through the tape. A flat blade will be used to pry up 5 cm of the fabric. This 5 cm flap of fabric will be grasped firmly in one hand and will be pulled with a quick motion in the direction of the remaining 10 cm of the 15 cm knife cut. The adhesion is satisfactory if the tape tears at the point of stripping or the fabric strips from the underlying coal tar component, leaving exposed not more than 10% of the primer or metal.

6.8.9.4 HOLIDAY TEST

On completion of coating/wrapping, the quality of the coating will be tested using efficient high voltage holiday detectors, operating at a voltage high enough to jump an air gap, the length of which is equal to the thickness of the coating/wrapping. All holidays found will be repaired and the repairs will be retested with the holiday detector to ensure that adequate repairs have been made.

The suggested test voltage will be as follows :

$$V = 1250 (t)^{1/2} \text{ where}$$

$$V = \text{voltage, in volts}$$

$$T = \text{coating thickness in mils (1 mil = 0.001 in.)}$$

6.9 TIME SCHEDULE

- 6.9.1** The contractor has to mobilize in all respects within two weeks from the date of issue of fax letter of intent.
- 6.9.2 The entire work of erection, testing and commissioning HP/PCP and LP piping inclusive of CW piping as detailed under this tender specifications for Unit 1&2 Neyveli shall be carried out and completed within **20 months** from the date of actual commencement of erection work at site with a Phase shift of 2 Months between Unit 1 and Unit 2 Piping work and however for Buried piping like CW Piping work No phase shift is involved. In case BHEL desires to advance the commissioning as per customer requirement, contractor has to complete all the works within the quoted / accepted rate, to suit the advanced commissioning.
- 6.9.3 For the above purpose, the erection work shall be commenced as may be stipulated in the letter of intent and shall be deemed to have been completed in all respects only when the system is successfully tested and accepted by BHEL/Customer. The decision of BHEL in this regard shall be final and binding on the contractor.
- 6.9.4 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL so as to release the front for other works / other agencies.

6.10. TERMS OF PAYMENT

- 6.10.1 The tenderer shall quote rates for different items as per the Rate schedule appended. The contractor shall submit his running bills once in a month at the end of each month.
- 6.10.2 BHEL Engineer shall take measurement and certify regarding the actual work executed in the measurement books and bills for erection work.
- 6.10.3 Subject to any deduction which BHEL may be authorized to make under the contract, the contractor shall on the certificate of Engineer at site be entitled for Progressive Payment up to **90 % value on prorate basis** against monthly running bills as described below:

6.10.3.1 PCP - HP Piping (P91 and Alloy steel)

- | | |
|------------------------------------------------------------|-----|
| a. Transportation from store & Pre-Assembly | 10% |
| b. Placement in position wherever pre assembly is involved | 20% |

OR

- | | |
|-----------------------------------------------------------------------------------|-----|
| c. Transportation from store, Pre-assy & Placement Where pre-Assy is not involved | 30% |
| d. Completion of Alignment, Welding & Heat Treatment | 40% |
| e. Completion of UT / Radiography, NDT | 20% |

6.10.3.2 LP Piping

- | | |
|------------------------------------------------------------|-----|
| a. Transportation from store & Pre-Assembly | 15% |
| b. Placement in position wherever pre assembly is involved | 20% |

OR

- | | |
|-----------------------------------------------------------------------------------|-----|
| c. Transportation from store, Pre-assy & Placement Where pre-Assy is not involved | 35% |
| d. Completion of Alignment, Welding | 40% |
| e. Completion of UT / Radiography, NDT & Heat treatment (if any) | 15% |

6.10.3.3 HANGERS & SUPPORTS

- | | |
|-----------------------------------------------------------------------------------|-----|
| a. Transportation from store & Pre-Assembly & placement | 40% |
| b. Completion of Alignment, Welding | 35% |
| c. Removal of temp. support & Hanger setting logging cold value before & after HT | 15% |

6.10.3.4 TERMS OF PAYMENT FOR COOLING WATER PIPE WRAPPING APPLICATION:

Cleaning and pipe surface preparation applying primer	05%
Applying the Anti-corrosive Tape before welding And wrapping the tape)	70%
Applying the Anti-corrosive Tape in the welded area	10%
Holiday test	5 %

6.10.3.5 TERMS OF PAYMENT FOR STEAM BLOWING AND CHEMICAL CLEANING.

75% of the Lump sum value on successful completion of steam blowing / chemical cleaning.

15% of the Lump sum value on reconciliation of materials, T & P etc. issued for this work by BHEL.

6.10.3.6 5% of contract value will be paid as below for milestone completion.

Hydro Test (Piping System / Line)	1%
Completion of Steam Blowing	1%
Completion of Final Painting	1%
Rolling & Synchronisation	1%
Completion of all works including submission of Protocols / FQA checks and work completion Certificate by BHEL and on submission of final bill	1% # see Note

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

6.10.3.8 The **Balance amount of 5% of the contract value** will be paid after the guarantee period of 12 months is Completed.

However the above 5% payment can be released against submission of a matching Bank guarantee from a Nationalized / scheduled Bank in the prescribed Performa of BHEL valid for one year from the date of commencement of guarantee period.

Note: The contractor shall have the option to claim 5 % of the executed value for Unit 1 & 2 separately after fulfilling the conditions stipulated above. However 1 % of the contract value as above(#) shall be released after submission of protocols/FQA checks, reconciliation and acceptance of final bill for both the units only.

6.10.4 Field Quality assurance formats:

It is the responsibility of the contractor to collect and fill up the relevant FQA Log Sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL/Customer in token of their acceptance.

6.11 Guarantee Period

The entire work shall be guaranteed for a period of 12 months which shall commence from the date of completion of trial run of unit or 6 months from the date of first synchronization of the set whichever is earlier.

6.12 EXTRA CHARGES FOR MODIFICATION AND RECTIFICATION WORK

- a) BHEL may consider payment for extra works on man day basis for such of those works which require major revamping / rework/rectification/modification which is totally unusual to normal erection or commissioning work which are not due to contractor's faulty erection.
- b) The decision of BHEL in this regard shall be final and binding on the contractor. The contractor may submit his work claim bills (Specifically agreed by BHEL Engineer) along with the labour sheet duly certified by BHEL Engineer at site. But BHEL also got the option to get these work done through other agencies if they so desire.

- 6.12.1 All the extra work, if any, carried out should be done by a separate gang which should be identified prior to start of work for certification, of man hours. Daily labour sheets should be maintained and should be signed by contractor's representative and BHEL Engineer. Signing of the labour sheets does not necessarily mean the acceptance of extra works. Only those works which are identified as not usual to normal erection and certified so by the Project Manager, and accepted by designer/supplier or competent authority only will be considered for payment.
- 6.12.2 The decision of BHEL in this regard shall be final and binding on the contractor.
- 6.12.3 The following man hour rates will be applicable for ification/rectification work.
- 6.12.4 Average single man hour rate including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, including consumables for carrying out any rework, re-vamping as may arise during the course of erection Rs.40/- man hour.
- 6.12.5 Average single man hour rate including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals excluding consumables for carrying out any rework/revamping as may arise during the course of erection Rs.25/- per man hour.

6.12.6 EXTRA WORK DOES NOT INCLUDE

- 6.12.6.1 Nominal dressing of foundations, holes, bases, nuts and bolts, in case of abnormal conditions, this can be mutually discussed before starting of such work.
- 6.12.6.2 Extra works are broadly defined as below:
Design changes which will be intimated to the contractor after the start of erection and same refers to dismantling of erected components rectification of components which have been received in damaged conditions during transit, rectification of components wrongly manufactured at work, any other works which do not fall in the scope of this contract.
- 6.12.6.3 The decision of BHEL in this regard shall be final and binding on the contractor.

6.13.0 OVER RUN CHARGES

- 6.13.1 In case due to reasons not attributable to the contractor, the work gets delayed and completion time gets extended beyond Twenty (20) months from the date of commencement of the work, the contractor shall not be entitled for an over run charges (ORC) after the expiry of Twenty (20) months.
- 6.13.2 In case of ORC arise the same will apply at Rs.50,000/- (Rupees Fifty Thousand only) per month for extension to the completion period beyond 20 months as stated above duly taking into account the balance work at the end of that period.
- 6.13.3 The period of overrun will have to be ascertained before the completion of contract period.
- 6.13.4 During the period of over run targets will be fixed on month to month basis, which have to be adhered to. In case of any shortfall due to the reasons attributable to the contractor, ORC amount will be proportionately reduced.

6.14.0 PRICE ESCALATION

- 6.14.1 The following P.V.C. is applicable from the date of commencement of work.

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

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

F0 = New all India average consumer price index published by Labour Bureau, Simla, Government of India for Industrial workers (Base 1982 = 100) applicable for the month of commencement of work.

F1 = All India average consumer price Index published by labour Bureau, Simla, Government of India, for Industrial workers (Base 1982 = 100) applicable for the months under consideration.

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

P0 = Billing amount calculated on the accepted contract rate.

6.14.2 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.

6.14.3 With the provision of price escalation as per the above clauses 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 including extended period, if any.

6.14.4 Payment of PVC will be restricted to 10 % contract value.

6.15.0 Taxes and Duties

6.15.1 Value Added Tax (VAT) for the works

Price quoted shall be inclusive of VAT 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., inter alia indicating the name of the supplier, address and VAT Registration No. and VAT paid for the purchases,etc

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

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

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

6.15.2 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.

6.15.3 Other Taxes & Levies

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.

6.15.4 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 actual on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract.

6.15.5 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 are to be suitably 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.

6.15.6 Direct Tax

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.

6.15.7 IMPORTANT CONDITIONS FOR PAYMENT

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

1. PF Regn. No.
 2. Labour Licence No.
 3. Workmen Insurance Policy No.
 4. Un Qualified Acceptance for Detailed L.O.I.
 5. Initial 50% Security Deposit.
 6. Rs. 100/- Stamp Paper for Preparation of contract agreement
- 6.15.8. All payments due to the contractor shall be made either through "e-Payment" or Account Payee cheque only . The tenderer has to furnish details of his Bank account as certified by the concerned Banker in the format furnished to enable e-payment.

FORM TO BE FILLED BY VENDORS FOR REGISTERING FOR E-PAYMENT

Details of Bank Account details of Contractor for remittance of e-Payment

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)	:
8	MICR NO.	:
9	IFSC CODE	:

Note : THE ABOVE DETAILS ARE TO BE FURNISHED IN THEIR LETTER HEAD BY THE CONTRACTOR / SUPPLIER, DULY ATTESTED BY THEIR BANKERS.

6.16.0 PROVIDENT FUND & MINIMUM WAGES

- 6.16.1 The contractor is required to extend the benefit of Provident Fund to the labour employed by you in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, you are hereby required to get yourself registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to you by the Provident Fund authorities within one month from the date of issue of this letter of intent. In case you are exempted from such remittance an attested copy of authority for such exemption is to be furnished. Please note that in the event of your failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to us by the customer or paid to statutory authorities by us, such amount will be recovered from payments due to you.
- 6.16.2 The contractor shall ensure the payments of minimum labour wages to the workmen under him as per the rules applicable from time to time in the state.
- 6.16.3 The final bill amount would be released only on production of clearance certificate from PF/ESI and labour authorities as applicable.

6.17.0 OTHER STATUTORY REQUIREMENTS

- 1) The Contractor shall submit a copy of Labour License obtained from the Licensing Officer (Form VI) u/r25 read with u/s 12 of Contract Labour (R&A) Act 1970 & rules and Valid WC Insurance copy or ESI Code (if applicable) and PF code no alongwith the **first** running bill.
- 2) The contractor shall submit monthly running bills along with the copies of monthly wages (of the preceding month) u/r78(1)(a)(1) of Contract Labour Rules, copies of monthly return of PF contribution with remittance Challans under Employees Provident Fund Act 1952 and copy of renewed WC Insurance policy or copies of monthly return of ESI contribution with Challans under ESI Act 1948 (if applicable) in respect of the workmen engaged by them.

- 3) The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of Wages. 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.
- 4) The Contractor shall submit copies of Final Settlement statement of disbursement of retrenchment benefits on retrenchment of each workman under I D Act 1948, copies of Form 6-A(Annual Return of PF Contribution) along with Copies of PF Contribution Card of each member under PF Act and copies of monthly return on ESI Contribution – Form 6 under ESI Act 1948 (If applicable) to BHEL along with the Final Bill.
- 5) In case of any dispute pending before the Appropriate authority under I D act 1948, WC Act 1923 or ESI Act 1948 and PF Act 1952, BHEL reserve the right to hold such amounts from the final bills of the Contractor which will be released on submission of proof of settlement of issues from the appropriate authority under the act.
- 6) In case of any dispute prolonged/pending before the authority for the reasons not attributable to the contractor, BHEL reserves the right to release the final bill of the contractor on submission of Indemnity bond by the contractor indemnifying BHEL against any claims that may arise at a later date without prejudice to the rights of BHEL.

**SCOPE AT A GLANCE
SECTION VII – APPENDIX I
SITE FACILITIES**

PROJECT : NEYVELI

RATING: 250 MW

Units – 1 & 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	
G	Fencing of storage area, office, canteen etc of the bidder		Yes	
1.1.2	FOR LIVING PURPOSES OF THE BIDDER			
A	Open space			
B	Living accommodation		Yes	
1.2.0	ELECTRICITY			
1.2.1	<u>Electricity For construction purposes</u>			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	

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

SI.No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.5.0	LIGHTING			
1.5.1	For construction work (supply of all the necessary materials) 1. At office storage area 2. At the preassembly area 3. At the construction site /area		Yes	
1.5.2	For construction work (execution of the lighting work/ arrangements) 1. At office storage area 2. At the preassembly area 3 At the construction site /area		Yes	
1.5.3	Providing the necessary consumables like bulbs, switches, etc during the course of construction		Yes	
1.5.4	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
1.6.0	COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER			
1.6.1	Telephone, fax, internet, intranet, e-mail etc		Yes	
1.7.0	COMPRESSED AIR SUPPLY			
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
SITE FACILITIES**

PROJECT : NEYVELI 2 X 250 MW

Units- 1 & 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	
2.1.3	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	
2.1.4	Shipping lists etc for reference and planning the activities	Yes		
2.1.5	Preparation of site erection schedules and other input requirements		Yes	
2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	
2.1.7	Weekly erection schedules based on 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	
2.2.0	SUGGESTED LIST OF TOOLS AND PLANTS (BHEL should indicate the proposed number of items considered as free issue)			
2.2.1	75 T crawler crane	1 No	1 No	For BHEL cranes operator/fuel by bidder
2.2.2	18/20 T tyre mounted crane one	1 No	1 No	

SI.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.3	8T Escort crane		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.4	30T gantry crane			
2.2.5	15 T gantry crane			
2.2.6	10T gantry crane			
2.2.7	30T tractor trailer			
2.2.8	20T trailer			
2.2.9	10 T trailer / truck			
2.2.10	Electrical winches 15 T with / wire ropes (2 Nos)			
2.2.11	Electrical winches 10T with / without wire ropes			
2.2.11 A	Electrical winches 5 T with / without wire ropes			
2.2.12	Electrical winch 3 T with wire rope			
2.2.13	Electrical winches with/without wire ropes			
2.2.14	Pneumatic winches 1 T			
2.2.15	Welding generators			
2.2.16	Welding rectifiers			
2.2.17	Welding transformers air cooled			
2.2.18	Welding transformers oil cooled			
2.2.19	Chain pulley block 10T			
2.2.20	Chain pulley block 5 T			
2.2.21	Chain pulley block 3T			
2.2.22	Chain pulley block 1T /2T			
2.2.23	Pulling & lifting machines 5T			
2.2.24	Pulling & lifting machine 3T			
2.2.25	Pulling and lifting machine 2T / 1T			
2.2.26	Multi sheave pulley block 50T			
2.2.27	Multi sheave pulley block 30T			

SI.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.28	Multi sheave pulley block 20T		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.29	Multi sheave pulley block 5T			
2.2.30	Single sheave shackle pulley block 20T			
2.2.31	Single heave shackle pulley block 10T			
2.2.32	Single sheave shackle pulley block 5 T			
2.2.33	25Vtransformer with sufficient spare bulbs			
2.2.34	Gas cutting torches with regulators			
2.2.35	Torque wrench			
2.2.36	Pipe vice			
2.2.37	Bench vice			
2.2.38	Anvil			
2.2.39	Baking oven for welding electrodes			
2.2.40	Portable drying oven for baked welding electrodes			
2.2.41	GQA grinding machine			
2.2.42	FF2 grinding machine			
2.2.43	Angle grinders AG7			
2.2.44	TIG welding sets			
2.2.45	Air conditioners 1.5 T			
2.2.46	Sheet bending machine			
2.2.47	Sheet rolling m/c			
2.2.48	Sheet grooving m/c			
2.2.49	Pedestal drilling m/c			
2.2.50	Drilling m/c 31 mm			
2.2.51	Drilling m/c 20mm			

SI.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.52	Drilling m/c 10 mm		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.53	Hand drilling m/c 6 mm			
2.2.54	D shackles 30 T			
2.2.55	D shackles 20T			
2.2.56	D shackles 15 T Drum lifting			
2.2.57	D shackles 10T			
2.2.58	D shackles 5T/3T			
2.2.59	Wire rope sling 6x36 12mmx6m			
2.2.60	Wire rope slings 12mmx10m			
2.2.61	Wire rope slings 16mmx4m			
2.2.62	Wire rope slings 16mmx6m			
2.2.63	Wire rope slings 16mmx10m			
2.2.64	Wire rope sling 19mmx15 m			
2.2.65	Loose wire rope 16mm			
2.2.66	Loose wire rope 19 mm			
2.2.67	Loose wire rope 25mm			
2.2.68	Loose wire rope 32mm			
2.2.69	Wire rope clamps for the above sizes sufficient			
2.2.70	Manila ropes of sufficient quantity in different			
2.2.71	Hydraulic jacks 25 T			
2.2.72	Hydraulic jacks 10T			
2.2.73	Concrete blocks for pre assembly at site			
2.2.74	Hydro test pump 250 bar -			
2.2.75	Hand operated hydro test pump			
2.2.76	Pressure gauges 100 bar			
2.2.77	Hydraulic pipe bending machines to suit up to 80mm dia and 11 mm thick			

SI.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.78	Electric driven pipe chamfering machines up to 100 mm dia tubes with necessary cutting tools and other consumables		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.79	Electric driven pipe chamfering m/c to suit pipes from dia 100 mm to 500/600 mm			
2.2.80	Radiographic equipments with suitable isotopes/ x ray machines			
2.2.81	MPI test kit			
2.2.82	Ultrasonic flaw detector			
2.2.83	Dye penetrant test kits (as required)			
2.2.84	Moving platforms Sky Climber			
2.2.85	Passenger cum goods lift (1)			
2.2.86	Dip lorries			
2.2.87	Rails and sleepers for dip lorries, both supply and installation			
2.2.88	Calibrated steel tapes of different sizes			
2.2.89	Plumb bobs			
2.2.90	Micro meters of different sizes both inside and out side			
2.2.91	Vernier calipers of different sizes			
2.2.92	Surface plate			
2.2.93	Straight edges of different lengths			
2.2.94	Feeler gauges of different lengths			
2.2.95	Inside and out side calipers			

SI.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.96	Bolt heating equipments including thermo		TO BE ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.97	Dial gauges with magnetic base			
2.2.98	Magnifying glass			
2.2.99	Piano wires			
2.2.100	Precision water level micrometer			
2.2.101	Parallel blocks			
2.2.102	Taper wedges			
2.2.103	Micro jacks			
2.2.104	Lead wires			
2.2.105	Dial bore micro meter			
2.2.106	Thermo meters of different ranges			
2.2.107	Depth gauges			
2.2.108	"GO & "NO GO" gauges			
2.2.109	Drill sets			
2.2.110	Taps and die sets			
2.2.111	Spirit levels			
2.2.112	Master spirit level			
2.2.113	Spring balance			
2.2.114	Hg manometer			
2.2.115	Vibro meter			
2.2.116	Noise level meter			
2.2.117	Litmus paper			
2.2.118	Portable gas purity meter			
2.2.119	Dead weight tester			
2.2.120	Temp bath for calibration			
2.2.121	250V/500V megger			
2.2.122	Mano meters			

SI.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.123	Elko meter to measure paint thickness		ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.124	MIG welding machines			
2.2.125	Files of different sizes			
2.2.126	Socket wrenches			
2.2.127	Spanner and pipe wrenches sets			
2.2.128	Hammers of different sizes (soft &hard)			
2.2.129	Allen keys sets			
2.2.130	Fire proof tarpaulins			
2.2.131	Steel scaffolding materials			
2.2.132	Pipe cutters			
2.2.133	Magnetic base for drilling machines			
2.2.134	Vibrator for grouting			
2.2.135	Mixing m/c (grouting and concreting)			
2.2.136	Tube expanders(expansion and flaring)			
2.2.137	Mercury plumb bob			
2.2.138	Band saw machines			
2.2.139	Copper rods			
2.2.140	Needle vibrators			
2.2.141	All consumables including :			
2.2.142	Ordinary cement			
2.2.143	Grouting cement			
2.2.144	Any special cement			
2.2.145	Sand, bricks etc			
2.2.146	TIG wires			
2.2.147	Electrodes			
2.2.148	Brazing rod, flux etc			
2.2.149	Soldering			

SI.No	Description PART II ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.2.150	DA, oxygen, argon		ARRANGED BY THE BIDDER AS PER SCOPE OF WORK	
2.2.151	Paints along with thinner, brushes, cleaning materials etc			
2.2.152	Paints including thinner, brushes, cleaning materials etc for final painting , as per specifications			
2.2.153	WELDING			
2.2.154	All welding works			
2.2.155	All radiography and other testing works like NDT			
2.2.156	All connected works like preheating, post heating, stress relieving,			
2.2.157	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.			
2.2.158	The accessories required for the welders to be arranged by the bidder			
2.2.159	Effluent disposal system			
2.2.160	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
SECTION VII – APPENDIX I
SITE FACILITIES**

PROJECT : NEYVELI

RATING:250 MW

Units- 1&2

SI.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1.0	SCOPE OF WORK			
3.1.0.1	Handling at site stores/ storage yard		Yes	
3.1.0.2	Transportation within the site		Yes	
3.1.0.3	Erection testing & commissioning		Yes	
3.1.0.4	Final painting of erected materials including supply of paints, thinners etc		Yes	
3.1.0.5	Carrying out P.G.test			
3.1.1.0	HANDLING & TRANSPORTATION			
3.1.1.1	Stores/storage yard to preassy area/ erection site		Yes	
3.1.1.2	Pre assembly area to site of installation		Yes	
3.1.1.3	Erection site to pre assembly area / stores/ storage area if required		Yes	
3.1.1.4	Touch up painting wherever required till final painting.(please refer the relevant clause for supply of paints, thinners etc)		Yes	
3.1.1.5	Preparation storage at site for proper stacking of materials		Yes	
3.1.2	ERECTION TESTING & COMMISSIONING			
3.1.2.1	Erection drawings/documents/working instructions etc	Yes		
3.1.2.2	Welding schedules	Yes		
3.1.2.3	Engineering drawings for construction methods		Yes	
3.1.2.4	Organizing the resources required for erection, testing & commissioning of the materials covered under the scope and executing the work as per instruction of BHEL engineer		Yes	
3.1.2.5	Final painting of all the materials erected		Yes	
3.1.2.6	Demobilization of the erection site		Yes	
3.1.2.7	Cleaning of / upkeep of erection / preassembly /storage areas		Yes	

SI.No	Description PART III ERECTION TESTING & COMMISSIONING	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1.2.8	Return of excess materials drawn to BHEL stores/ customer		Yes	
3.1.2.9	Reconciliation of all the consumables, T&P drawn from BHEL / customer ` s store		Yes	
3.1.2.10	Filling up quality log sheets		Yes	
3.1.2.11	Providing all temporary arrangements like platforms, scaffoldings etc for execution		Yes	
3.1.2.12	Assistance for P.G test		Yes	
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	
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	

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

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

The following information is furnished only for information to give the idea of the size and length of pipes estimated for this work. Actual quantity during erection may vary as per drawings and materials to be supplied. Work will be done and regulated on agreed Tonnage Unit rates only

SECTION VII – APPENDIX II –WEIGHT SCHEDULE –(FOR EACH UNIT)

S.no	Package	Weight (Kgs)/UNIT
P91 PIPING		
01	SG PACKAGES	23000
	TG /PCP Packages	117000
	TOTAL	140000
LP PIPING		
02	SG Packages	75,000
	TG/ PCP Packages	490,000
	Total	565000
HP / PCP		
03	SG Packages	70000
	TG PCP Packages	450000
	Total	520000
Hangers ,Supports & Vessels/ Tanks		
04	SG Packages	200000
	TG PCP Packages	
	Miscellaneous Tank by PEM	50,000
	Total	250000
Valves		
05	Trichy Scope	45,000
	PEM Scope	80,000
	Total	125,000
06	Steam blowing and Chemical cleaning	100,000
	Grand Total (1+2+3+4+5+6)	1700000
	Total Weight (approx) PER UNIT	1700 MT

SECTION VII –APPENDIX III -LIST OF PGMA TO BE ERECTED (APPROX)

SLNO	MATL	PGMA	DESCRIPTION	IBR	Weieght
1	P91	80300	MS FROM SUPERHEATER TO BOILER STOP VALVE	I	17000
2	P91	80301	MS FROM BOILER STOP VALVE TO ESV	I	100300
3	AS	80303	MS HEADER TO AUX PRDS	I	7200
4	P91	80304	MS HEADER TO HPBP VALVE	I	6120
5	AS	80307	HP & LP BYPASS WARM UP	I	990
6	AS	80310	HRH FROM REHEATER TO INTERCEPTOR VALVE	I	113600
7	AS	80311	HRH FROM INTERCEPTOR VALVE TO TURBINE	I	13600
8	AS	80312	LPBP VALVE UPSTREAM & DOWNSTREAM	I	24650
9	AS	80320	CRH FROM TURBINE TO REHEATER	I	56100
10	AS	80321	HPBP VALVE TO CRH PIPING	I	5525
11	CS	80322	CRH PIPING TO DEAERATING HEATER	I	4590
12	CS	80324	CRH HEADER TO AUX.PRDS	I	990
13	CS	80330	EXTRACTION STEAM TO LP HEATER-1	I	6210
14	CS	80331	EXTRACTION STEAM TO LP HEATER-2	I	3150
15	CS	80332	EXTRACTION STEAM TO LP HEATER-3	I	4230
16	CS	80335	EXTRACTION STEAM TO DEAERATING HEATER	I	11050
17	AS	80336	EXTRACTION STEAM TO HP HEATER NO.1	I	2700
18	CS	80337	EXTRACTION STEAM TO HP HEATER-2	I	1530
19	CS	80340	AUX STEAM HEADER	I	1170
20	CS	80341	AUX STEAM HEADER INTERCONN BETWEEN UNITS	I	29750
21	CS	80342	AUX STEAM TO SCAPH	I	2880
22	CS	80343	AUX STEAM TO AH SOOT BLOWERS	I	900
23	CS	80344	AUX STEAM TO FO SYSTEM TP	I	13600
24	CS	80345	AUX STEAM TO DEAERATING HEATER	I	1350
25	CS	80347	AUX STEAM TO SJAЕ – TG SCOPE	I	990
26	CS	80349	AUX STEAM TO GLAND SEALS – TG SCOPE	I	459
27	CS	80355	STEAM TRACING PIPING	I	3600
28	CS	80364	CBD TANK VENT TO SYSTEM	I	1350
29	CS	80365	CBD TANK VENT/SV EXHAUST TO ATMOSPHERE	N	666
30	CS	80366	IBD TANK VENT TO ATMOSPHERE	N	6660
31	CS	80369	HP DRAIN FLASH TANK VENT TO SYSTEM	I	1530
32	CS	80373	AUX STEAM HEADER SV EXHAUST	N	1170
33	CS	80379	HPH SV EXHAUST TO FLASH TANK	N	1800
34	CS	80395	AUX STEAM TO FUEL OIL ATOMISING	I	900
35	CS	80398	TURBINE WASHING STEAM	I	3420
36	CS	80401	CD FROM PUMP TO LPH1	N	8585
37	CS	80402	CD FROM LPH1/DC INLE	N	5760
38	CS	80408	CONDENSATE DUMP FROM	N	2070
39	CS	80412	CONDENSATE TRANSFER	N	3330
40	CS	80417	BOILER FEED DISCHARGE PIPING	I	7200
41	CS	80418	ERECTION MATERIALS FOR INSTRUMENTS	N	297
42	CS	80419	DERATOR SAFTY VALVE EXHAUST TO ATM	N	2700

43	CS	80420	BOILER FEED PUMP SUCTION	N	8500
44	CS	80421	BOILER FEED PUMP RECIRCULATION	I	7650
45	CS	80423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	I	36720
46	CS	80424	BFD BETWEEN HTRS & GROUP PROTECTION VLV	I	14658
47	CS	80425	BFD FROM FINAL HPH TO SG TP	I	66652
48	CS/SS	80429	BOILER FILLING PIPING	N	3000
49	CS	80430	SPRAY WATER TO HPBP	I	1260
50	CS	80431	SPRAY WATER TO AUX PRDS	I	2160
51	CS	80432	SPRAY WATER TO BOILER DESH UPTO SG TP	I	2880
52	CS	80446	DEAERATING HEATER OV	N	2700
53	CS	80450	CBD AND EMERGENCY DRUM DRAIN	I	4950
54	CS	80451	BOILER INTEGRAL PIPING DRAINS	I	1080
55	CS	80452	HP PIPING DRAINS - SG SCOPE	I	7200
56	CS	80453	LP PIPING DRAINS - SG SCOPE	I	2070
57	CS	80454	SCAPH DRAINS	N	873
58	CS	80455	DRAIN FROM UNLISTED EQPTNESSEL-SG SCOPE	N	1620
59	CS	80457	MANIFOLDS FOR HP FLASH BOX & CONDENSER	N	1080
60	CS	80459	HP FLASH TANK DRAIN TO CONDENSER	N	900
61	CS	80460	SG AUX COOLING WATER UNIT SYSTEM	N	38250
62	CS	80463	TG AUX COOLING WATER	N	72250
63	CS	80468	MAIN CIRCULATION WATER PIPING	N	360000
64	CS	80471	BOILER WATER WASH TO & FROM UNIT	N	3510
65	CS	80473	DEMINERALISED WATER SYSTEM	N	7200
66	CS	80477	SERVICE WATER PIPING	N	4230
67	CS	80478	DRINKING WATER PIPING	N	2970
68	CS	80480	FIRE WATER-OTHER AREAS	N	3150
69	CS	80494	LP FLASH TANK VENT TO CONDENSER	N	1170
70	CS	80495	LP FLASH TANK DRAIN TO COND	N	1080
71	CS	80600	HIGH PRESSURE DOSING PIPING	N	594
72	CS	80612	SERVICE AIR FOR INDIVIDUAL UNITS	N	10200
73	CS	80616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	N	11900
74	CS	80650	FUEL OIL SUPPLY AND RETURN PIPING	N	42500
75	CS	80901	SUB DELIVERY VALVES FOR LIGHT UP	N	900
76	CS	80905	BHEL VALVES FOR LIGHT UP	N	8500
77	CS	80907	BHEL VALVES FOR SYNCHRONISATION	N	450
78		80920	H&S FOR HYDRO TEST	N	3600
79		80921	H&S FOR LIGHT UP STEAM LINE	N	8500
80		80922	H&S FOR LIGHT UP - NON STEAM LINES	N	92000
81		80923	H&S FOR STEAM BLOWING	N	55250
82		80924	H&S FOR SYNCHRONISATION-STEAM LINES	N	7200
83		80925	H&S FOR SYNCHRONISATION-NON STEAM LINES	N	540
84		80933	H & S FOR LP PIPING	N	25500
85		80992	IMPORTED ELECTRODES	N	1350
86	CS	81003	CONTINUOUS BLOW DOWN EXPANDER-D1500 MM	I	2160
87	CS	81009	INTERMITTENT BLOW DOWN EXPANDER-D2500 MM	N	6390
88	CS	81018	MIXING TANK FOR CHEMICAL DOSING	N	900

89	CS	81128	HP Dosing kit	N	3500
90	--	-----	Temp Piping & Valves and structure for mile Stone Activities	I/N	300000
TOTAL					1,723,369

NOTE FOR WEIGHT SCHEDULE

The weight indicated above is approximate and liable to vary. However the total weight will vary between (-) or (+) 15% in total. The payment will be made to the contractor for the tonnage actually erected at the respective category as per the quoted/accepted tonnage rate.

There may be variation or addition of PGMAs, description, weights, material specification 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.

The temporary piping for Chemical Cleaning & steam Blowing will be issued as and where conditions in cut pieces. The scope includes cutting and edge preparation and erection as per the site condition & dismantling after the process is over and return to store with identification mark as instructed by the BHEL/Engineer. The quoted lump sum rate shall be inclusive of all this

Section VII – Appendix IV -LIST OF PIPING SYSTEMS TO BE ERECTED

A. Power Cycle Piping :

1. Main Steam Piping (from Boiler Super heater outlet header to turbine including ESV to Turbine)
2. Hot Reheat Piping
3. Cold Reheat Piping
4. Aux Steam Headers & Aux PRDS
5. Hangers and Supports for the above systems
6. Valves and accessories

B. SG Integral Piping :

1. Aux Steam Piping to SCAPH, Soot blowers
2. Aux Steam Piping to Fuel Oil System terminal points
3. Stream tracing piping
4. CBD / IBD tanks – vents & drains , Exhaust piping
5. Aux Steam to fuel oil atomizing
6. Steam blowing piping, boiler filling line piping
7. SCAPH drain tank vents / SV exhaust piping
8. HP / LP drains, boiler integral piping drains, SCAPH drains
9. Miscellaneous Piping and drains & vents
10. HP dosing piping
11. Hangers & supports of all the systems referred above
12. Instrument air piping (note : instrument air piping of sizes 25 mm dia and below 25 mm dia will be erected by the C & I contractor)
13. Service air piping
14. Valves and accessories
15. Temporary piping for acid cleaning and steam blowing
16. Hangers and supports for yard piping etc.,
17. CBD / IBD expanders
18. Drain flash tanks, tanks for chemical dosing, condensate tanks, CW storage tanks etc.,
19. Dosing pumps, CW pumps (PART)
20. Fuel oil piping from fuel oil pump house to boiler including the pipe rack.

LIST OF PIPING SYSTEMS TO BE ERECTED - TG PACKAGE

1. Boiler feed system piping
2. Spray water system piping
3. Extraction steam systems piping to LPH,HPH ,deareating Hater etc.,
4. Condensate system piping
5. Auxiliary steam piping, CRH piping
6. All drains and vents
7. LP dosing piping
8. Service air piping / compressed air piping
9. Instrument air piping (note : Instrument air piping of sizes 25 mm dia and below 25 mm dia will be erected by the C & I contractor
10. Lub oil piping for central lub oil system
11. Hangers & supports for above systems (boiler light up , steam blowing & synchronization)
12. Exhaust piping
13. Flash tanks
14. Condenser air evacuation piping , suction etc.,
15. Gland steam cooler drains
16. TG cycle piping drains and vents
17. Pipes for flow nozzles and orifice assemblies
18. Miscellaneous piping etc.,
19. Valves and accessories
20. PCP valves, Extraction valves Trip / block valves, HP By pass valves and miscellaneous valves etc., (Trichy scope)
21. HP & LP dosing system (PEM 's scope of supply)
22. LP valves, air traps, air release valves etc., (PEM's scope)
23. Control valves, Annubar, Flow nozzles, Orifice assemblies steam traps etc., (PEM scope)
24. Misc pumps-raw water pumps, Filter water pumps, AHP wash pumps, ACW /BCW pumps, Boiler fill pumps, Service water pumps, Drinking water pumps, Sump pumps (PEM scope)
25. Travelling water screens

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

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

Section VII – Appendix V - LIST OF T&P TO BE PROVIDED BY BHEL

S.No	Description	Qty
01	Induction Heating M/c With Complete Accessories	As Reqd
02	Spot Welding M/c	01
03	Diesel Generator(As standby supply for P91 Welding only)	01
04	75 T Crane (For Erection Purpose only)	01
05	18 T Crane (For Erection Purpose only)	01
05	Chemical Cleaning Pumps with Accessories	As Reqd
07	Hydro Test pumps(400/600Kg/Cm ²)	01

1. List of Tools & Plants to be made available by BHEL to contractor on free of hire charges on sharable basis. **For the cranes, the contractor shall arrange for necessary trained operator ,fuel and lubricant at his cost.**
2. T&Ps shall be issued on free of hire charges on need basis for erection/pre-commissioning activities only and to be shared with other contractors. Allotment will be made by BHEL Site I/c depending on the requirement
3. For handling at store and transportation, contractor shall make his own arrangement
4. For the DG set provided by BHEL (As standby supply for P91 Welding), contractor has to arrange operator, Fuel, Lubricants, power cables etc., at his cost
5. Consumables for P91 welding, BHEL will only provide the facility indicted in ANNEXURE Other consumables and facility required to complete the work shall be arranged by the contractor with in the quoted rate.
6. Fill pump shall be arranged by the contractor, wherever required. For testing LP lines necessary HT pumps/Hand pumps are to be arranged by the contractor
7. Any Loss/Damage of tools by the contractor shall have to replace or other wise cost thereof shall be recovered from the contractor.
8. All the above T&Ps shall be issued on free of hire charges on need basis for erection/pre-commissioning activities only and to be shared with other contractors. Allotment will be made by BHEL Site I/c depending on the requirement.

9. For handling at store and transportation, contractor shall make his own arrangement
10. 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
11. Any Loss/Damage of tools by the contractor shall have to replace or other wise cost thereof shall be recovered from the contractor.
12. 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.
- 13. Contractor has to arrange at his own cost all other balance T & P s like cranes, chain pulley blocks, winches, welding generators etc., Contractor has to further arrange all testing and measuring equipments required for carry out for piping erection works.**
- 14. The contractor shall arrange minimum the following cranes at his cost including crane operator, fuel, lubricants,etc for erection .**

75 T Crawler crane	- 1 No.
18 T Crane	- 1 No.

LIST OF CONSUMABLES TO BE PROVIDED BY CONTRACTOR

1. SEALING MATERIAL
2. PRESERVATIVE & CONSERVATIVE MATERIAL DURING STORAGE
3. ABRASIVES
4. CLEANING MATERIALS LIKE PETROL, DIESEL AND OTHERS AS PER REQUIREMENT
5. PAINTS, VARNISHES & THINNERS FOR FINAL/ PRESERVATION/TOUCH UP PAINTING
6. WELDING AND AUXILIARIES MATERIALS
7. IRON AND STEEL SECTION FOR MAKING SCAFFOLDING AND OTHER RELATED JOBS
8. Anti-Corrosive tapes

Section VII -Appendix –VI -FACILITY TO BE PROVIDED BY BHEL FOR P91 Welding.

Required no of Induction Heating Machine with accessories.

The following consumables
Annealing cables
Compensating Cables

Welding Electrodes for P91 Welding

Spot Welding M/s for fixing thermocouple.

Digital Temperature Indicator

DG Power supply any where around 500 Mtrs from boiler. The contractor shall provide necessary cables & switches.

The induction heating equipments and other equipments shall be drawn from BHEL stores, transported and installed & commissioned wherever required. For routine maintenance & attending all type of brake-down maintenance, contractor shall deploy sufficient manpower, tools and plant with in the quoted rate.

The contractor shall provide electrical cables & Switches required. All the equipments shall be protected by providing covers or sheds at site by the contractor with in the quoted rate.

FACILITY TO BE PROVIDED BY THE CONTRACTOR FOR P91 Welding

Required no of operators / technicians / Electrician for installation, commissioning & operating continuously.

Gas Burns arrangement with required gas for maintaining temperature in the vent of power failure.

Ultrasonic Flaw detector with recording device & complete accessories (Digital Type – Krauthramer Model USN 50 or equivalent) capable of storing calibration data. All recordable indications will be stored in memory of digital flaw detector and in PC (to be provided by the contractor) for review at latter period.

EQUOPTIP or MICRODUR make or equivalent portable hardness tester.
MPI / LPI Kits with required consumables.

Section VII – Appendix VII - INSTRUCTION FOR PIPELINE ERECTION

The work will comprise of but not be limited to the following:

All pipelines shall be erected as per elevation shown in the respective erection drawings.

Erection of piping system shall be coordinated by the contractor as required, with the erection group of the turbine, generator, condenser, boiler, boiler feed pumps and other major equipment. Approval must be obtained from the construction managers and the equipment manufacturer' field engineering representative prior to making piping interface connection to equipment mentioned above. Sequence of work shall be carefully planned to minimise interference with other groups working in the same area. Actual sequence to be followed shall be subjected to the approval of the engineer and the engineer may, at any time, direct the contractor to reschedule his work as per status of the site work.

All workmanship shall be accomplished using accepted method and procedures of the highest recognised pipe fabrication and erection standards and must be done in a neat manner, in accordance with IBR and other standards and as per the direction of BHEL engineers. While laying of piping, precaution / care must be taken for avoiding fouling between site routed piping / fabricated and other piping.

Modification of shop-fabricated pipes prior to installation to accommodate site alterations in pipe routing shall have to be carried out by the contractor at no extra charges to BHEL.

Pipes of size NB 80 mm and below shall be field run as per general routs, which will be indicated to the successful tenderer. They will be supplied with straight pipes in running meters and are to be bent, edge prepared, welded, heat treated, radio-graphed, to suit the routing requirement.

While erecting the field run pipes, the contractor shall check the accessibility of valves, instrument tapping points and maintain minimum headroom requirement and other necessary clearance from the adjoining work areas.

All field welding, stress relieving and heat treatment shall be done as per the drawing and welding procedure that will be furnished to the contractor during the execution of the contract.

All pipelines shall be given proper slopes towards the drain points, during erection at site as per drawing.

All pipelines shall be provided with suitable vent and drain points with valves on the highest and lowest points of the pipe run although may not be specifically mentioned in the drawing.

For instrument connection, the contractor shall install pipe stubs including the instrument tubing up to the root valves. The erection of instruments is not however included in the scope of this specification.

All vents and drains for piping and equipment whether shown in the drawing and not, shall terminate on the ground floor at a suitable point unless otherwise noted.

Wherever piping erected by the contractor is connected to piping or equipment or counter flanges of equipment's erected by some other agencies, the joint at the connecting point including erection of counter flanges supplied along with equipment's, valves etc. shall be done by the contractor.

The contractor shall be responsible for the correct orientation of all valves so that seat, stem and hand wheels will be in desired locations. Information regarding orientation of valves, not fully located on drawings, may be obtained from BHEL engineers.

Setting of limit switch of actuators of valves and its calibration is not in the scope of work. However, assistance for commissioning of valves viz. Mechanical readiness, making approach to valves like temporary scaffolding etc., replacement etc. is in the scope.

The piping system, coming under the purview of IBR should generally meet the requirements of IBR. However, BHEL will have the option of changing of standard or specifications in this regard, depending upon site condition. The decision of BHEL shall be final and binding on the contractor.

All piping shall be routed so as to avoid undertaking routs of other pipes and their hangers and supports, electrical cable trays, ventilation ducting, structural members, equipment etc.

Adequate clearance shall be ensured with respect to the above to accommodate insulation and pipe movements. While routing the field run piping the following requirement should be taken into account by the contractor.

All piping shall be grouped wherever practicable and shall be routed to present a neat appearance.

The piping shall be arranged to provide clearance for the removal of equipment for maintenance and for easy access to valves, instruments and other piping accessories required for operational maintenance.

Overhead piping shall have a minimum overhead clearance of 2/3 meters above walkways and working areas and 6 meters above roadways unless otherwise approved by the BHEL engineer.

Drains shall be provided at all low points and vents at all high points as per actual layout regardless of whether same have been shown in respective drawings or not. The pipelines shall be sloped towards the drain points. All the drains shall be terminated to the drain pit as per the instruction of BHEL engineer.

For field run piping the contractor shall fabricate and erect all hangers and supports as required with due regard to general arrangement layout of other pipes, hangers, cable trays, ducting, structural members etc. and in consultation with and to the approval of BHEL engineer.

Before performing the welding, all corrosion products, grease, dirt and other foreign matter shall be removed from the surface to be joined and all valves shall be opened full. Tack weld shall be ground or chipped to remove all objectionable projections and all weld splatter shall be removed prior to welding the joint. Piping on both sides of any joint shall be adequately supported throughout the preheating, welding and stress relieving operations to avoid possible cracking of tack welds and initial beads. Temporary supports if used shall be so designed that the joint is relieved of all stress due to weight of the pipe while subject to stress relieving temperature. Whereas joint is subject to cold springs during this operations, the adjacent pipes should be clamped together so as to prevent straining of the metal spacing between joints shall be in accordance with code requirements.

When "C" clamps are tack welded to pipe for the purpose of alignment of a joint, the pipe shall be locally pre-heated in the area where such tack welding is performed, provided such tack welds are adjacent to a joint that will be stress-relieved. However, if preheating is not specified for the adjacent joint, preheating for the above tack weld may be omitted. After the joint is completed all tack welds used for this purpose shall be removed flush with the adjacent surface of the pipe by chipping and/or grinding areas where "C" clamps were attached, shall be included in scope of stress relieving, where required.

Pre-fabrication can be carried out in the fabrication shop to be established at site by the contractor to ensure quality of work and to minimise work on the field. Such pre-fabrication /pre-assembly of piping should be based on isometrics and piping arrangement drawing supplied. However, it shall be borne in mind that there may be variations in dimensions between those stated in isometrics and those actually obtained at site due to slight variations in the location of equipment, location of inserts etc. The contractor shall therefore, provide appropriate field joints and fit in sections permitting the pre-assembled pipe work to be installed without major modifications. In any case no extra claim shall be entertained on this account.

All piping shall be routed and located in accordance with the piping arrangement drawings/ isometrics. No deviations will be allowed.

Before laying the piping on supports, the co-ordinates and elevations of all supports shall be checked by the contractor for correctness. Discrepancies of the execution drawings, if any, shall be promptly brought to the notice of the engineer in writing and correction shall be carried out as per his instruction.

When fitting up mating flanges, the pipe shall be properly aligned and the flanges checked to determine that the forces are parallel and that they can be pulled up without inducing stress into the piping and equipment. The bolt holes of the flanges in the vertical plane shall straddle the vertical centre line of the pipe line in the erected portion and for flange in the horizontal plane; the bolt holes shall straddle the plant north-south axis unless otherwise shown on the drawings.

Flange connection to pumps, fans, turbine etc shall be such as not to induce stress on the equipment/ machinery due to misalignment, excessive gap etc. The final tightening shall be done as per the instruction of BHEL engineers only when the machines are made available for final piping connection.

Supports shall be fabricated and erected as per the erection drawings and as per the instruction of BHEL engineer. The auxiliary steel shall be of size as indicated in the drawing. Supports shall be erected with sufficient margin for turn buckle threads for future adjustments.

Erection of permanent & temporary approach platforms for taking readings time to time for H&S for hot and cold valves, the valves / equipment's / drains / vents / instrumentation points wherever required to be done as per the drawing / as per instruction of engineer. Also, it may be required to make some platforms/Ladders (not envisaged in any drg/doc) for operation / maintenance of valve actuators. The total tonnage will approx. be 30MT. The steel material for platform, ladder, railings will be given by BHEL free of cost.

Flash box, Flash tank shall be fixed on foundation provided by BHEL. Necessary chipping, leveling and grouting of foundation is to be done by the contractor at his cost.

All assembly of fittings, gauges, valves etc. on flash tanks shall be carried out by the contractor at his cost to make it complete in all respect.

All small pipes / tubes shall be carefully routed according to site condition and to avoid fouling with equipment/ other pipelines. BHEL engineer shall be consulted before starting the activities on small bore lines, whose decision shall be final and binding on the contractor.

For commissioning of the unit, if any contingency schemes are planned in addition to normal PGMA's identified, the same contingency pipelines may be included in the scope of contractor without any extra cost for which materials only will be supplied by BHEL. All T&P, consumables are in the scope of contractor. Subsequently, restoration with piping, valves etc. will be in the contractor's scope.

The applicable PGMA list and welding schedule given in the annexure is indicative only. In generally the 80 – xxx and other applicable PGMA is covered in the scope. In this also any additions and deletion of sub assy group is the desecration of BHEL. During execution of work contractor should follow FWS/Drawing/field quality plan. For P91 filler wire and special electrode alone will be supplied by BHEL for all other piping the where ever applicable area the filler wire alone will be supplied by BHEL. All other electrode / consumable should be arranged by the contractor.

Contractor shall provide necessary services for updating the material records, progress reports at no extra cost.

For maintaining the slopes as given in the drawings for larger thickness and larger diameter pipelines, edge preparation for welding may have to be altered suitably to achieve the slope. This shall also form part of the work and the contractor's quoted rate shall include this work also.

In case the supplies of some items are delayed, the contractor has to make temporary spool pieces for the flow control valves, HP bypass valves, flow measurement devices and the pipes are to be prepared for erecting the same temporarily in order to reduce the erection cycle time.

If the contractor is not meeting safety requirements, necessary safety appliances will be provided by BHEL on chargeable basis.

Temporary piping for pre-commissioning activities like, chemical cleaning, alkali flushing, hot water flushing, oil /steam flushing, etc. shall be carried out as part of work.

In addition to above temporary lines, any other contingency lines required due to non-availability of regular pipe materials shall also be erected to meet the commissioning target at no extra cost.

All temporary / contingency pipeline materials shall be arranged by BHEL free of cost. However, consumables like electrodes, gases etc and T&P required are to be arranged by the contractor at his cost. Platform materials for permanent approach platform will be issued free of cost by BHEL.

All the instrumentation tap off points like thermo wells, root valves, impulse lines upto root valves etc. shall also be erected and welded by the contractor, irrespective of whether such materials are supplied by BHEL or any other agency.

The root valves, thermo wells, instruments will be located in the convenient location/place as required by the customer to facilitate easy operation as per the decision / instruction of BHEL engineers.

In pipelines like MS, CRH, HRH lines, extraction lines etc., the NRVs / ESVs/ IVs, Strainers etc will be erected by the Contractor as per drawings and instruction of BHEL.

The applicable connection of flanged / welded joints with equipment like deaerator, turbine, condenser, pumps, strainers etc. shall also be carried out by the contractor as part of the job.

Rerouting / modification of pipelines due to revisions in the drawings received before physically taking up the job shall be carried out by the contractor within the scope of work. No extra claim shall be permitted on this account. The contractor shall check up before taking up erection of any pipelines regarding the availability of the latest revision drawings.

All temporary lines like alkaline flushing, steam blowing etc. shall be supplied in "as is where is" condition. The contractor shall arrange to carry out the required dressing, grinding, cleaning etc. while carrying out erection. No extra claims on this account will be entertained.

It is likely that dressing set-up of joints in critical piping and LP piping, grinding of the shop prepared edges will require to be done by the contractor to maintain the desired slopes and all these jobs will be treated as normal erection work.

All turbo-supervisory pick ups and temperature elements (to be installed inside bearings) for turbine, generator and equipment etc are to be installed by the vendor as per drawing within the quoted rates. The above items may have to be removed for servicing, calibration and then refitted by the vendor.

HYDRAULIC TEST AND OTHER TESTS

Hydraulic testing pumps and chemical cleaning pumps along with starter as required shall be provided by the BHEL. However, supply of cables, DBs, resistance boxes, fuses etc. required for hydraulic test / chemical cleaning operations will be in the contractor's scope of work. The servicing, installation, electrical connection, erection, testing and dismantling shall be carried out by the contractor as part of the work.

All pressure parts and some of low pressure parts shall be subjected to hydraulic test as per statutory requirements. In addition gas tightness test of generator has to be carried out. The contractor shall supply necessary labors and other services & arrangements to carry out the required tests as per instruction and direction of BHEL engineers, and is included in the scope of work.

The contractor shall carry out the air tightness test on generator stator to the satisfaction of BHEL engineers. The necessary arrangement of testing with clean dry air shall be made by the contractor. This may have to be repeated on later date as per requirement of BHEL. Arrangement of hot air with drier is to be done by vendor with thermostat. Purging of Air/H₂/Co₂ in first time & subsequent times till handing over is under the scope.

Contractor shall lay all necessary temporary piping, install the pumps, blanks, valves, pressure gauges etc. required for the test. Temporary piping, valves, flanges, blanks etc. will be supplied by BHEL on loan basis, free of hire charges. After the test is over all temporary piping, valves, flanges, blanks etc. shall be removed by him and returned to BHEL.

The hydraulic testing of the equipment and piping covered in this scope of work including vacuum system testing by water filling has to be carried out by the contractor as per instructions of BHEL engineer. The contractor shall provide all facilities required for hydraulic testing.

All valves coming in the gas system shall have to be hydraulically tested and cocks shall have to be checked for gas tightness before installation in the presence of BHEL engineer.

All the weld joints of steam inlet pipelines to LPT shall have to be subjected to non-destructive test viz., magnetic particle test, dye-penetration test, and Hardness test in addition to radiography as and when applicable.

All above tests shall be repeated till all the equipment/ system satisfy the requirement, obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted to the satisfaction of the BOILER INSPECTORATE /CUSTOMER /BHEL. Any rectification required shall have to be done / redone by the contractor at his cost.

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 including 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.

PRESSURE TEST FOR PIPING

Soundness of the weld shall be tested hydraulically under the supervision of the BHEL engineer / customer, to the pressure indicated in the drawing for each piping system as per requirement. Prior to the test, the piping system shall be inspected by the BHEL engineer to the extent necessary to ensure compliance with engineering design with respect to material, and the contractor shall obtain erection clearance for the test.

BHEL will supply the necessary pipes, valves etc for test. The erection of pumps, temporary piping, valves, pressure gauges and their subsequent removal and return to BHEL after successful completion of the test shall be done by the contractor at his own cost.

The test shall be repeated till the boiler inspector, BHEL and customer are satisfied.

Pressure test for piping systems under the purview of IBR shall be carried out according to the relevant clause of IBR and the requirements of boiler inspector.

For piping system not under the purview of IBR, testing shall be carried out as per the instruction of BHEL engineer.

The following specifications shall be complied with during hydraulic test :

Vent nozzles with valve shall be provided at the highest point of the runs, to eliminate air pockets. Drain nozzles with valves shall be provided to drain water from pipes. The nozzles and valves shall be of same materials as the pipe.

The lower part of the pipe shall always be filled first with water.

The pressure shall be slowly increased (without shocks) to the stipulated value and maintained for ten minutes or as long, as required to visually check all joints.

Following the control specified above, the pressure shall be slowly decreased to the design pressure after which the pipe shall be subjected to a peening test, applying knocks every 150 mm approximately especially in the welded joint areas, with a 0.5 to 1.5 kg Hammer (depending on the pipe wall thickness). The hammer used shall be a round headed one.

During hydraulic test, the pipes being tested shall be isolated from the equipment, which they are connected to.

Openings for pressure / temperature impulse connections shall be fully closed during and after the test to prevent dust and foreign matter.

The test records shall be made for pressure testing of each piping system. These records shall contain the following information.

DATE OF TEST, IDENTIFICATION OF PIPING TESTED, TEST

FLUID, TEST PRESSURE, APPROVAL OF ENGINEER ETC.

Contractor will supply labour and other services for following also, free of cost as part of the contract:

For transportation, installation, servicing, running of chemical cleaning pumps /test pumps and after completion to dismantle, service and return to BHEL, contractor will provide required manpower at his cost.

Contractor has to provide required manpower at his cost for erection of piping, valves etc required for alkali flushing / water flushing from mixing tank and pumps of boiler

side to TG system, to drain pit, to neutralising pit, and then dismantling & return to BHEL after completion of cleaning.

For blanking of pipes at suitable point / installation of blanking devices, laying of temporary pipes for steam blowing, installation and their dismantling and return to BHEL store, contractor will have to provide manpower at his cost.

For transportation, handling, filling, emptying and refilling etc of flushing oil, fresh oil and lubricants for turbine and other main rotating auxiliaries, contractor will provide required manpower at his cost.

Contractor has to provide required manpower at his own cost for transportation of carbon di-oxide gas cylinders for filling / pumping from plant store and filling of gas as and when required till the unit is commissioned and handing over of the same.

Section VI Appendix – VIII - WELDING SCHEDULE

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE WIRE /				MIN Recom NDE
							Specn	Tig/Arc	size	Qty	

PGMA 80 - 300

1	SA335P91	323.9	35	7000	9 NO	10	RT-2¼Cr,1Mo	TIG	Φ2.40	100% UTI 100%MPI
							E9018-B9	ARC	Φ2.50	
							E9018-B9	ARC	Φ3.25	
							E9018-B9	ARC	Φ4.00	
2	SA335P91	323.9	31	192	RM	40	RT-2¼Cr,1Mo	TIG	Φ2.40	100% UTI 100%MPI
							E9018-B9	ARC	Φ2.50	
							E9018-B9	ARC	Φ3.25	
							E9018-B9	ARC	Φ4.00	

PGMA 80 – 301

1	SA335P91	323.9	42	6500	4	5	RT-2¼Cr,1Mo	TIG	Φ2.40	100% UTI 100%MPI
							E9018-B9	ARC	Φ2.50	
							E9018-B9	ARC	Φ3.25	
							E9018-B9	ARC	Φ4.00	
2	SA335P91	323.9	42	7000	1	2	RT-2¼Cr,1Mo	TIG	Φ2.40	100% UTI 100%MPI
							E9018-B9	ARC	Φ2.50	
							E9018-B9	ARC	Φ3.25	
							E9018-B9	ARC	Φ4.00	
3	SA335P91	559	54	6000	42RM	9	RT-2¼Cr,1Mo	TIG	Φ2.40	100% UTI 100%MPI
							E9018-B9	ARC	Φ2.50	
							E9018-B9	ARC	Φ3.25	
							E9018-B9	ARC	Φ4.00	

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE WIRE /			MIN Recom NDE	
							Specn	Tig/Arc	size		Qty
4	SA335P91	564	64	5000	3	4	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	100% UTI 100%MPI	
5	SA335P91	564	64	6500	6	7	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	100% UTI 100%MPI	
6	SA335P91	MISC DU's				10	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	100% UTI 100%MPI	
PGMA 80 - 304											
1	SA335P91	273	39	6000	8	9	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	100% UTI 100%MPI	
2	SA335P91	273	30			3	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	100% UTI 100%MPI	
PGMA 80 - 303											
1	SA106GRB	323.9	6.35-		18 RM	4	RT-1/2 Mo E7018-B9 E7018-B9	TIG ARC ARC	Φ2.40 Φ2.50 Φ3.25	600 GMs 150NOs 100NOs	10 % RT
2	SA106GRB	323.9	12.7--		2 RM	2	RT-1/2 Mo E7018-B9	TIG ARC	Φ2.40 Φ2.50	180 GMs 72NOs	10 % RT

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE / WIRE				MIN Recom NDE
							Specn	Tig/Arc	size	Qty	
							E7018-B9	ARC	Φ3.25	65NOs	
3	SA335P22	323.9	9.53		3 RM	2	RT-2¼Cr,1Mo E9018-B9 E9018-B9	TIG ARC ARC	Φ2.40 Φ2.50 Φ3.25	230 GMs 54NOs 82NOs	100 % RT
4	SA335P22	355.6	62		2 RM	2	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	230 GMs 62NOs 96NOs 362NOs	100 % RT
5	SA335P22	219.1	40		20 RM	5	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	750 GMs 120NOs 216NOs 420NOs	100 % RT
6	SA335P22	163.3	30		4 RM	2	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	180 GMs 72NOs 66NOs 42NOs	100 % RT
7	SA335P22	MISC DU's				23	RT-2¼Cr,1Mo E9018-B9 E9018-B9 E9018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	780 GMs 126NOs 240NOs 480NOs	10 % RT
PGMA 80 - 320											
1C	SA106GR	323.9	40		1 RM	2	RT1/2 Mo E7018-B9 E7018-B9 E7018-B9	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	210 GMs 62NOs 96NOs 336NOs	10 % RT

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE / WIRE				MIN Recom NDE
							Specn	Tig/Arc	size	Qty	
	SA106GR 2C	457.2	12.7	6000	108 RM	18	RT1/2 Mo E7018 - 1 E7018 - 1 E7018 - 1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	2566 GMs 586NOs 952NOs 272NOs	10 % RT
	SA106GR 3C	711	20	8000		8 10	RT-2¼Cr,2Mo E7018 - A1 E7018 - A1 E7018 - A1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	2500 GMs 540NOs 880NOs 650NOs	10 % RT
	4SA335P22	711.2	32	7000		3 5	RT-2¼Cr,1Mo E9018 - A1 E9018 - A1 E9018 - A1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	1000GMs 270NOs 560NOs 580NOs	100% RT
	5SA335P22	MISC DU's				20	RT-2¼Cr,1Mo E9018 - A1 E9018 - A1 E9018 - A1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	1000GMs 52NOs 860NOs 920NOs	100% RT

PGMA 80 - 321

	1SA335P22	457.2	25	6000	24 RM	5	RT-1/2 Mo E7018 - 1 E7018 - 1 E7018 - 1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	700GMs 152NOs 256NOs 320NOs	100% RT
	2SA395P22	273	36	4100		1 2	RT-1/2 Mo E7018 - A1 E7018 - A1 E7018 - A1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25	158GMs 40NOs 61NOs 140NOs	100% RT

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE / WIRE				MIN Recom NDE
							Specn	Tig/Arc	size	Qty	
	3SA395P22	MISC DU's					RT-1/2 Mo E7018 - A1 E7018 - A1 E7018 - A1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	1245GMs 320NOs 186NOs 466NOs	100% RT
PGMA 80 - 335											
1	SA106GRB	219.1	6.35		3 RM	2	RT-1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	54GMs 68NOs	10 % RT
2	SA106GRB	323.9	6.35		1 RM	2	RT-1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	244GMs 53NOs	10 % RT
3	SA106GRB	406.4	9.53		35 RM	9	RT1/2Mo E7018 -1 E7018 - 1	TIG ARC ARC	Φ2.40 Φ2.50 Φ3.25	1245GMs 320NOs 486NOs 2	10% RT
4	SA106GRB	MISC DU's				8	RT1/2 Mo E9018 - A1	TIG ARC	Φ2.40 Φ2.50	54GMs 68NOs	10 % RT
PGMA 80 - 364											
1	SA106GRB	219.1	6.35		30 RM	8	RT1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	216GMs 272NOs	10 % RT
PGMA 80 - 365											
1	SA106GRB	273.3	6.35		20 RM	6	RT1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	180GMs 240NOs	10 % RT
PGMA 80 - 366											
1	S3589	830	8		75 RM	20	E7018 E7018	ARC ARC	Φ2.50 Φ3.15	2100 NOs 1050 NOs	

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE / WIRE				MIN Recom NDE
							Specn	Tig/Arc	size	Qty	
PGMA 80 - 395											
	1SA106GRB	114.3	6.02		50 RM	12	RT1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	195GMs 290NOs	10 % RT
PGMA 80 - 417											
	1SA106GRB	88.9	15.24		40 RM	10	RT1/2Mo E7018 - 1 E7018 - 1 E7018 - 1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	245GMs 80NOs 86NOs 52 Nos	10% RT
	2SA106GRB	168.3	21.95		30 RM	8	RT1/2Mo E7018 - 1 E7018 - 1 E7018 - 1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	392GMs 112NOs 192NOs 104 Nos	10% RT
	3SA106GRB	MISC DU's				4	RT1/2Mo E7018 - 1 E7018 - 1 E7018 - 1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	192GMs 92NOs 112NOs 86 Nos	10% RT
PGMA 80 - 429											
	SA3121P3 104H	73	5.16		32 RM	6	S S WELDING				
	SA3121P3 204H	114.3	4.5		150 RM	33					
	SA3121P3 304H	MISC DU's				18					
PGMA 80 - 432											
	SA106G 1RC	88.9	15.24		130 RM	28	RT1/2Mo E7018 - 1 E7018 - 1 E7018 - 1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	392GMs 112NOs 192NOs 104 Nos	10% RT

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE / WIRE				MIN Recom NDE
							Specn	Tig/Arc	size	Qty	
	SA106G 2RC	168.3	21.95		40 RM	10	RT1/2Mo E7018 -1 E7018 -1 E7018 -1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	720GMs 202NOs 298NOs 152Nos	100% RT
	SA106G 3RC	MISC DU's				20	RT1/2Mo E7018 -1 E7018 -1 E7018 -1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	270GMs 80NOs 160NOs 88Nos	10% RT
PGMA 80 - 450											
	SA106G 1RC	88.9	11.13		30 RM	8	RT1/2Mo E7018 -1 E7018 -1 E7018 -1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	72GMs 42NOs 58NOs 32 Nos	10% RT
	SA106G 2RC	MISC DU's				4					
PGMA 80 - 451											
	SA106G 1RC	88.9	11.13		160 RM	35	RT1/2Mo E7018 -1 E7018 -1 E7018 -1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	260GMs 168NOs 212NOs 128 Nos	10 % RT
	SA106G 2RC	168.3	21.95		80	18	RT1/2Mo E7018 -1 E7018 -1 E7018 -1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	1220GMs 456NOs 602NOs 306Nos	100% RT
	SA106G 3RC	MISC DU's				25	RT1/2Mo E7018 -1 E7018 -1	TIG ARC ARC	Φ2.40 Φ2.50 Φ3.25	250GMs 152NOs 192NOs	10 % RT

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE / WIRE				MIN Recom NDE
							Specn	Tig/Arc	size	Qty	
							E7018 - 1	ARC	Φ4.00	100 Nos	
PGMA 80 - 455											
	SA106G 1RB	273	9.27		3 RM	2	RT1/2Mo E7018 - 1 E7018 - 1 E7018 - 1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	212GMs 132NOs 172NOs 96 Nos	10 % RT
	SA106G 2RB	323.9	36		3 RM	2	RT1/2Mo E7018 - 1 E7018 - 1 E7018 - 1	TIG ARC ARC ARC	Φ2.40 Φ2.50 Φ3.25 Φ4.00	240GMs 152NOs 252NOs 2 Nos	10 % RT
	SA106G 3RB	114.3	6.02		30 RM	8	RT1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	108GMs 124NOs	10 % RT
	4IS3589	273	6		25 RM	6	RT1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	180GMs 240NOs	10 % RT
PGMA 80 - 459											
	SA106G 1RB	320	3.9	6.357	RM	3	RT1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	38GMs 114NOs	10 % RT
	SA672G 2RB	914	10		6 RM	2	RT1/2 Mo E7018 - A1	TIG ARC	Φ2.40 Φ2.50	124GMs 336NOs	10 % RT
PGMA 80 - 460											
1	IS1239	100	5.4		200 RM	40	E 7018	ARC	Φ2.50	2200 Nos	

S.NO	MATL SPEC	SIZE OD	THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE WIRE /				MIN Recom NDE
							Specn	Tig/Arc	size	Qty	
2	IS1239	150	5.4		120 RM	26	E 7018	ARC	Φ2.50	3800 NOS	
3	IS1239	406.4	6		50 RM	12	E 7018	ARC	Φ2.50 Φ3.15	650 Nos Nos	330
4	IS1239	558.8	8		40 RM	8	E 7018	ARC	Φ2.50 Φ3.15	400 NOS Nos	576
5	IS1239	273	6		120 RM	26	E 7018	ARC	Φ2.50 Φ3.15	880 Nos Nos	270
6	IS1239	323.9	6		30 RM	6	E 7018	ARC	Φ2.50 Φ3.15	300 NOs Nos	125
7	IS1239	219.1	6		80 RM	20	E 7018	ARC	Φ2.50	1100 Nos	

PGMA 80 - 463

1	IS 5389	100	5.4		88 RM	18					
2	IS 5389	150	5.4		140 RM	30					
3	IS 5389	406.4	6		403 RM	80					
4	IS 5389	457	6		8 RM	2					
5	IS 5389	508	8		32 RM	5	E 7018	ARC	Φ2.50 Φ3.15	2000 NOs Nos	2880
6	IS 5389	610	8		245 RM	75					10 % RT
7	IS 5389	273	6		555 RM	125					
8	IS 5389	323.5	5		60 RM	15					
9	IS 5389	355.6	6		360 RM	85					
10	IS 5389	711.2	10	SPIRAL	69 RM	15					

PGMA 80 - 468

1	IS 3589	150	5.4		60 RM	12					
2	IS 3589	406.4	6		38 RM	10					
3	IS 3589	813	10		102 RM	30					
4	IS 3589	323.5	6		5 RM	2					

S.NO	MATL SPEC	SIZE		THICK	LENGTH	QTY	NO OF JOINTS	RCOMMENDED ELECTRODE WIRE /				MIN Recom NDE
		OD						Specn	Tig/Arc	size	Qty	
5	IS 3589	355.6	6		115 RM	35			Φ2.50 Φ3.15 Φ4.00	3500 Nos 4200 Nos 3500 Nos	10 % RT	
6	IS 3589	711.2	10	SPIRAL	55 RM	12						
7	IS 3589	840	20		2 Nos	4						
8	IS 3589	1829	16	SPIRAL	160 RM	16						
9	IS 3589	2850	20	SPIRAL	240 RM	25						

PGMA 80 - 471

1	IS3589	273	6		100RM	22			Φ2.50 Φ3.15	880 Nos 270 Nos	10 % RT
2	IS3589	219.1	6		150RM	32			Φ2.50 Φ3.15	1100 Nos	10 % RT

Note For Welding Schedule:

1. The Joint details indicated in the welding schedule covers only for the category PCP-HP Piping, PCP-LP piping and are butt welds and tentative for estimation purposes only.
2. Most of the Pipe lines Sizes "2" covered under this scope are normally site routed, contractor has to execute as per the site condition. No additional payment will be made on this account in case of variation.
3. There may be variation/addition in PGMA, No joints, Size, Material Specification, % RT, category etc., and contractor has to carry out the work with in the quoted rate; however the variation in number of joints and additional payment for extra joints is covered under separate note.
4. It does not cover the joints coming under Temporary Piping for Chemical cleaning, Steam blowing, temporary piping for hydro-test of all category and attachment/fillet/socket welding on all category. Contractor shall estimate the volume of work based on his previous experience & the details indicated in the weight schedule and shall carry out with in the quoted rate and no additional payment will be made on this account.
5. TIG wires supplied under PGMA will be issued on free of charges. All other TIG wires, Electrodes and consumables shall be arranged by the contractor with in the quoted rate.
6. For Pre-Heating& Post weld heat Treatment shall be as per BHEL welding schedule/WPS & Practice.
7. LPI/MPI, UT shall be carried after PWHT, wherever applicable.
8. Statutory Clearance from IBR etc., shall be arranged by the contractor and the quoted rate shall be inclusive of this.

1. Additional Payment for Extra joints

The welding joints indicated in the above welding schedule shall be grouped category wise as indicated below on the basis of volume of weld metal deposit for each joint.

Volume of weld metal deposit for each joint	Categories	
Do	Upto 100 CC	category A
Do	101 CC TO 300 CC	" B
Do	301 CC TO 1500 CC	" C
Do	1501 CC TO 3000 CC	" D
Do	3001 CC TO 4500 CC	" E
Do	4501 CC TO ABOVE	" F

If the total volume of metal deposit of all the joints actually carried out in each category exceeds +25% of the total volume of metal deposit of all the joints in each category indicated in the above welding schedule, the contractor shall be paid extra for the additional volume over and above +25% of the each category as per the rate schedule irrespective of the material whether carbon steel or alloy steel / stainless steel.

The weld volume deposit calculation graphs which indicate the volume of weld metal deposited in cc for Various diameters and thickness with edge preparation for ANSI standard type and "P" type and as well as the rate schedule in terms of cost per cc are attached herewith Tender specification

The weld volume types involved above are GTAW/SMAW/SOCKET weld. For socket welds, the weld volume shall be 50% of that shown in the chart for butt welds.

The all joints are to be welded as per the drawings / site routing within the quoted rates by the bidder. The extra rates indicated in point 1 of this note shall not be applicable for the site routed piping. All the site routed joints are to be welded within the quoted rates.

The number of joints to be welded as mentioned in the list consists of only butt welds. All the other welds viz. attachment welds on pressure parts / non-pressure parts, fillet welds non-pressure welding in the piping, piping supports etc. has to be carried out by the bidder within his quoted rates.

All the butt welds / socket welds shall be carried out root run by TIG welding and subsequent run by ARC welding or TIG welding as per the decision of BHEL Engineer at site. The decision of BHEL Engineer regarding the welding process to be followed at site is final and binding on the contractor. The contractors quoted rates shall be inclusive of all such contingencies. Full TIG welding wherever necessary as mentioned in the drawing / documents shall be carried out within the quoted / accepted rate.

The welding process, weld joint details, joint configuration and material specification may change to suit the site design requirements. The contractors quoted rates shall be inclusive of each contingencies.

All welds involved in the erection of temporary pipe lines for hydraulic test, acid cleaning, alkali flushing and steam blowing etc. are not included in the above mentioned lists. Contractors shall carry out all the temporary piping welding also within the quoted rates.

All the joints in piping up to Nb.65 mm will be supplied mostly in running meters. The contractors should carry out the cutting of the pipes to the required size, edge preparation / bend fabrication and welding at site as per the drawing within the quoted value. For these joints no extra payment will be made. The contractors quoted / accepted value shall be inclusive of this. However for the purpose of estimation and guide line for the tenderers the approximate quantum of joint / no . of joints likely to be welded are also indicated in the welding schedule. No additional payment for extra welds shall be applicable.

Welding of hangers and supports stubs are not indicated in the weld joints indicated above. These welding' are to be carried out within the quoted value as per drawings and specifications and as per BHEL Engineers instruction whose decision is final and binding on the contractor.

All attachment of welding required for supporting of the piping and instrument tapping points and all the attachment welds involved both in pressure / non-pressure parts of the boiler has to be carried out by the contractor within their quoted rates.

Pre -heating, PWHT/Stress relieving have to be carried out for piping, higher thickness pipes / tubes and alloy steel tubes / pipes as per the welding schedule or as per the directions / instructions of BHEL Engineer within the quoted rates.

**RATE SCHEDULE IN TERMS OF COST
PER C.C. AS DETAILED BELOW**

	Edge prepared Joints (WDEP)	Fabricated Joints (WEP)	
Upto 100 cc	10.00	12.00	Category - A
101 – 300 cc	8.00	10.00	Category - B
301 – 1500 cc	4.50	6.00	Category - C
1501 – 3000 cc	4.00	5.50	Category - D
3001 – 4500 cc	3.50	4.25	Category - E
4501 & above cc	2.50	3.00	Category - F

The weld type involved above are GTAW/SMAW/Socket weld. For socket welds the weld volume shall be 50% of that shown in the chart for butt welds.

The contractor shall consider the above rates while submitting his offer.

**DETAILS OF ELECTRODES
(To be provided by Tenderer)**

SNo	Type of Electrodes	Name of Electrodes	General Sizes in mm
1	E6013	Overcord, Philips – 45 Normal, Gircon Black	2.50, 3.15 & 4.00
2	E 6013 IBR	Overcord S Media	2.50, 3.15 & 4.00
3	E 7016	Universe, Philips – 56, Ferroweld, Indotherme	2.50,3.15 & 4.00
4	E 7018	Supertherme, Supercito, Ferroweld-II, Philips – 36H,ModiArc(E 7018)	2.50, 3.15 & 4.00
5	E 7018 IBR	Supertherme (special), Tenacito	2.50, 3.15 & 4.00
6	E 7018 A1	Molycord, Molytherme	2.50, 3.15 & 4.00
7	E 7013 A1	Moloycord Ti , Medio-Mo	2.50
8	E 8018 B2	Cromocord, Cromotherme I	2.50, 3.15 & 4.00
9	E 9018 B3	Cromocord C, Cromotherme - I	2.50, 3.15 & 4.00
10	E 310	Inox Cw, RS 310, D & H-310, Cromoid 5, Cromotherm 25/20	2.50, 3.15 & 4.00
11	E 347	Philips RSS-BC, Rutok – A (stap) Superinox – IB, Chromoweld – 347	2.50
12	E 308	Superionox – 1A Rutox A	2.50 & 3.15
13	E 309	Inox D2, Philip RS-309, Cromoweld R 309	2.50, 3.15
14	E 9013 B3	Cromocord CTI	2.50, 3.15 & 4.00

NOTE:

The specifications are subject to variation depending upon the site conditions. They should not be taken as final.

1. If any other type and size of electrodes not specified above, but considered suitable by BHEL Engineer for erection work, the contractor shall purchase at his cost and use the same as per BHEL's instructions.

Use of 6013 Electrodes

It is to be noted by the tenderer that E 6013 electrodes are not to be used in pressure parts, columns, ducts and other works. Unless otherwise specified in the drawing. All welding has to be done as specified in the detailed drawing using E 7018, E 8018 and E 9018 electrodes as the case may be.

PAINTING SCHEME FOR CW PACKAGE

The bidder should arrange at his cost for the following Paints & wrapping Material

Description	Surface preparation & surface profile	Primer Coat		Intermediate coat		Finish coat	
		Paint	No of coat	Paint	No of coat	Paint	No of coat
CW BURIED PIPING Dia>1000mm	SSPC-SP3 Power tool Cleaning	ROZP IS 12744 DFT30μ	1			Anti corrosive tape 4MM	
CW over ground PIPING Dia>1000mm	Blast clean to Sa 2½	Epoxy polyamide resin- based ROZP DFT30μ	2	High build resin-based MIO paint DFT100μ	1	Epoxy polyamide Enamel DFT40 μ	2
over ground PIPING Dia<1000mm	Blast clean to Sa 2½	Epoxy polyamide resin- based ROZP DFT30μ	2	High build resin-based MIO paint DFT100μ	1	Epoxy polyamide Enamel DFT40 μ	2

SECTION VIII

APPENDIX – I

DECLARATION SHEET

I, _____ hereby certify that, all the information and data furnished by me with regard to this Tender Specification No.BHEL:PSSR:SCT:1300 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 VIII

APPENDIX – II

TENDER SPECIFICATION NO BHEL:PSSR:SCT:1300

**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

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) In case 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 site organization and start of work : YES/NO
10. Whether list of tools and Plants available with the contractor and proposed to be deployed for this work enclosed : YES/NO
11. Whether all the Pages are read understood and signed. : YES/NO
12. Deviations, if any Pointed out :
13. Whether PF exemption No. is allotted by RPFC of your area if so, indicate number : YES/NO

SIGNATURE OF THE TENDERER

TENDER SPECIFICATION

BHEL:PSSR:SCT: 1300

FOR

Handling at Site Stores / Storage yard,
Transportation to Site of Work, Erection, Testing
and Commissioning of HP/PCP and LP Piping
inclusive of CW piping including supply and
application of Protective Coating (Anti-Corrosive
tapping), Painting for Units 1 & 2 of 250 MW
set

at

Neyveli TS –II Expansion

(for Neyveli Lignite Corporation)

Neyveli, Cuddalore Dt, Tamilnadu

PART – PRICE BID

BOOK NO :



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)

Power Sector – Southern Region

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

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

TENDER SPECIFICATION NO:BHEL:PSSR:SCT: 1300

NAME OF WORK

Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of HP/PCP and LP Piping inclusive of CW piping including supply and application of Protective Coating (Anti-Corrosive tapping), Painting, etc for Units 1 & 2 of 2x 250 MW set at Neyveli TS –II Expansion, (for Neyveli Lignite Corporation) Neyveli, Cuddalore Dt, Tamilnadu.

(PRICE BID)

PART II

Issued to
M/s.

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED

Addl. General Manager/Contracts

(This tender document is not transferable)

Place: Chennai-600 035.
Date:

**SECTION VII APPENDIX VIII
RATE SCHEDULE FOR BOTH UNITS**

SNo	Description	Approx. weight in MT(For Both Units)	Unit Rate (Rs)	Amount (Rs)
1A	Power Cycle piping / HP piping materials including valves for Alloy Steel P91 Material	280		
1B	Power Cycle piping / HP piping materials including valves for Alloy Steel	1200		
1C	LP Piping Inclusive of CW buried piping including Valves	1212		
1D	For Hangers & supports required for all pipings indicated under S No 1A & 1 B of above, Aux steel for the above piping ,including fabrication if required, Erection, Testing and commissioning of Tanks & vessels and other miscellaneous items	500		
1E	Piping with SS Welding	08		
2	Applying Anticorrosive Tape including supply of material	4800 Sq M		

Signature of the Tenderer

S.No	Description	Approx. Wt.	Rate	Amount (Rs)
3	Handling at site stores, storage yard, transportation to site of work, erection of temporary piping required for chemical cleaning including connected valves and carrying out the chemical cleaning operation of the system, including dismantling, transportation and handing over of the temporary piping to BHEL stores after completion of chemical cleaning (50 MT for each unit)	Lump sum Per Unit -2 sets		
4	Handling at site stores, storage yard, transportation to site of work, erection of temporary piping required for chemical cleaning including connected valves and carrying out the Steam Blowing operation of the system, including dismantling, transportation and handing over of the temporary piping to BHEL stores after completion of Steam blowing (50 MT for each unit)	Lump sum Per Unit -2 sets		

TOTAL CONTRACT VALUE Rs. _____

In Words.....)

Signature of the Tenderer

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

3. Additional Information :

Note : In case VAT (Value Added Tax) is included to the above price. Please indicate the following
(If no VAT is added please indicate as NIL)- Refer also relevant clause of Section VI.

(i) Value of VAT added in the quote Rs.....

(ii) The Rate of VAT adopted Rs.....

(iii) On what value VAT is worked out Rs.....

Signature of Tenderer