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

No. BHE/PW/PUR/KLT-CHC/OJ-90

FOR

PROVIDING SERVICES FOR PRE BOILER FLUSHING AND CHEMICAL CLEANING OF 1x75 MW POWER PLANT

AT

KUTCH LIGNITE TPS EXTENSION

GUJARAT STATE ELECTRICITY CORPORATION LIMITED

PANANDHRO, LAKHPAT TALUKA

DISTRICT KUTCH, GUJARAT

PART - I

TECHNICAL BID SPECIFICATION, NOTICE INVITING TENDER & GCC

BOOK NO.:

BHARAT HEAVY ELECTRICALS LIMITED
(*A GOVERNMENT OF INDIA UNDERTAKING*)
POWER SECTOR : WESTERN REGION
345, KINGSWAY : NAGPUR 440 001

CONTENTS

LEGEND:

$: Attached at the end of hard copy of Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled **"NIT+GCC-OJ-90".**

@: Issued as separate hard copy booklet 'Tender Specifications Part-II (Price Bid)'. Hosted in BHEL web page (www.bhel.com) as file titled **"PRICE BID-OJ-90"**

Note:
Rest of the tender documents are included in Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled "**TECH BID-OJ-90"**

Bharat Heavy Electricals Limited

(A Government of India Undertaking)
Power Sector - Western Region
Shreemohini Complex
345, Kingsway - Nagpur 440 001

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GUJARAT STATE ELECTRICITY CORPORATION LIMITED

PANANDHRO, LAKHPAT TALUKA

DISTT. KUTCH, GUJARAT

Earnest Money Deposit: Rs.1, 00,000/- (Rs. one lakh only)

Last date and time for Receipt of offers Date 06.07.2004

These tender documents containing Part- I Technical Bid and Part- II Price Bid, are issued to:

M/s. ……

……

(These tender documents **are not transferable**)

for Bharat Heavy Electricals Limited

DGM (Purchase)

Place: Nagpur
Date :

Bharat Heavy Electricals Limited
(A Government of India Undertaking)
Power Sector - Western Region
345, Kingsway - Nagpur 440 001

Procedure for Submission of Sealed Tenders & Instructions to Bidders

The bidder must submit their tenders 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, supporting documents and details called for in the specification shall be enclosed in part-I "Technical Bid" only.

EARNEST MONEY DEPOSIT (EMD)

EMD of Rs 1,00,000/- shall be included in the Technical Bid. **EMD shall be paid by bidders only in the manner specified in Section-15 Special Conditions of Contract.** No other mode of payment of EMD shall be acceptable. Provisions under clause no. 1.4 of the General Conditions of Contract shall not be applicable for this tender.

Bidder may also opt to deposit "One Time EMD" of Rs 2,00,000/-. with this office (BHEL:PSWR:Nagpur) which will enable them to participate in the present and all the future tender enquiries in respect of Erection and Commissioning services issued from this office. Interested bidders may send their explicit consent for converting the present EMD into an "One Time EMD" in their offer.

Bidders who have already submitted such "One Time EMD" are exempted from submission of any EMD for this tender. However, bidder shall furnish details of payment of the "One Time EMD" in his offer including the Check List furnished herein.

Part-II (Price Bid) Cover-II:

All indications of price shall be given in this part-II "Price Bid". **EMD shall not be included in this cover.**

These two separate covers-I and II (part-I and part-II) shall together be enclosed in a third envelope (cover-III) along with requisite EMD as indicated earlier and this sealed cover shall be super scribed and submitted to DGM (Purchase) at the above-mentioned address on or before the due date as indicated.

The qualified bidder will be intimated separately about the status of their offer.

Bidder are requested to make specific note of the following conditions:

Contractor should have adequate resources including major T&P at his disposal for this job.

Contractor should have sound financial stability.

Bidder should meet quality requirement regarding workmanship, deployment of personnel, erection tools and necessary inspection, measurement & testing instruments.

All information as called for in various appendices and clauses of tender specification, should be furnished in completeness. Please refer the checklist.

Clarification on Tender Specifications, if any, shall be obtained by the bidder before submitting their offer.

Offers must be submitted without any deviation.

Offers received with any deviation or without relevant information as described above are liable to be rejected. Price bids received in the form other than specified in part-II (price bid) are liable to be rejected.

PROJECT INFORMATION

The Unit no. IV is located inside the boundary of the existing KLTPS near Panandhro Village of Lakhpat Taluka, Distt – Kutch, Gujarat. Nearest railway station and the airport is Bhuj which is about 140 Km South East of existing plant. The site is around 10 Km from state highway no. 45. Unit no. IV will be located by the side of existing Unit no. III. The site is approachable by road both from Dayapur village and Gadauli village.

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)				
1	Name of the Bidder with Postal Address for Correspondence			
2	Name of Contact Person with Telephone & Fax No.	Mr./Ms Tel No. Fax No.		
3	Nature of the firm	PROPRIETARY / PARTNERSHIP / LIMITED CO.		
4	Details of EMD Please Indicate whether 1) One Time EMD or, 2) Only for this Tender	DD No. ……. DD Date……. Name of Bank……... Amount: Rs…….		
5	Validity of Offer (BHEL's Requirement: 180 days from Due Date)	Validity _____ days		
6	Mobilization Time (Please refer Section-11 of SCC)	Mobilization Time _____		
7	Whether any conditions stipulated?	**Yes** (vide Document reference:		**No**
		Bidder to note that tender with conditions unacceptable to BHEL shall be rejected.		
8	Bidder has visited the project site and acquainted with the site conditions		Yes	No
9	Details of concurrent jobs are furnished (**Appendix-VII)**		Yes	No
10	Headquarters organization is furnished		Yes	No
11	Proposed site organization is furnished		Yes	No
12	Names and particulars of directors/partners are furnished		Yes	No
13	Financial status of the firm (**Annexure 'A' of GCC**) is furnished		Yes	No
14	**Copy of Audited Profit & Loss Account** for preceding three years duly authenticated on each copy by bidders Chartered Accountants		Yes	No

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)			
15	**Latest Certificate by Bidder's Banker for Overdraft & BG Limits** is Furnished (Certificate shall not be older than six months from the Last Date for offer submission)	Yes	No
16	Latest copy of **IT Return** along with copy of **PAN Card** are Furnished	Yes	No
17	Month-wise **Manpower Deployment Plan** (**Appendix – IV**) is furnished	Yes	No
18	**Analysis of Unit Rates** quoted (**Appendix-VI**) is furnished	Yes	No
19	**Month-wise deployment plan for major T&P** (**Appendix-V**) is furnished	Yes	No
20	Whether all the pages of the Tender Specification documents are read, understood and signed	Yes	No
21	**Power of Attorney** enclosed in favour of person making offer	Yes	No
22	Bidder has familiarized himself with all Relevant Local Laws & Local Conditions	Yes	No
23	Safety Requirement of this work in a Running plant Premises has been understood.	Yes	No
24	Erection and Commissioning programme furnished	Yes	No
25	**List of Jobs completed** in last seven years is furnished (**Appendix-VIII**)	Yes	No
26	Whether **copies of detailed Work Orders (with BOQ)** and **Completion Certificates** in support of above furnished	Yes	No
27	Whether contractor has left any job unfinished? If so, give reasons.	Yes	No
28	Whether any client has terminated the contractor's work before completion? If so, furnish reasons for the same	Yes	No

Note: strike off or tick **'yes'** or **'no'**, as applicable

Date: Signature of Bidder

Declaration by Bidder

I …… hereby certify that all the information and data furnished by me with regard to this tender specification No. BHE/PW/PUR/KLT-CHC/OJ-90 are true and complete to the best of my knowledge. I have gone through the specification, conditions and stipulations in detail and agree to comply with the requirements and intent of the specification. I further certify that I am duly authorised representative of the under mentioned bidder and a **valid power of attorney to this effect is also enclosed with the offer**.

Bidder's name and address

Authorised representative's signature with Name and Address

Date:

CERTIFICATE OF NO DEVIATION

TENDER SPECIFICATION No. BHE/PW/PUR/KLT-CHC/OJ-90

I/We, M/s ……..

HEREBY CERTIFY THAT NOTWITHSTANDING ANY CONTRARY INDICATIONS/CONDITIONS ELSEWHERE IN OUR OFFER DOCUMENTS, I/WE HAVE NEITHER SET ANY TERMS AND CONDITIONS NOR THERE IS ANY DEVIATION TAKEN FROM THE TERMS AND CONDITIONS OF THE TENDER SPECIFICATIONS, EITHER TECHNICAL OR COMMERCIAL AND I/WE AGREE TO ALL THE TERMS AND CONDITIONS MENTIONED IN BHEL'S TENDER SPECIFICATION WITH ASSOCIATED AMENDMENTS AND CLARIFICATIONS.

SIGNATURE OF THE TENDERER

DATE:

Section-3

Offer of the Contractor

To,
DGM (Purchase)
Bharat Heavy Electricals Limited
Power Sector - Western Region
Shreemohini Complex
345, Kingsway
Nagpur - 440 001

Dear Sir,

I/we hereby offer to carry out the work detailed in Tender Specification No. BHE/PW/PUR/KLT-CHC/OJ-90 issued by Bharat Heavy Electricals Limited, Power Sector-Western Region, Nagpur, 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 bidders
2. General conditions of contract
3. Special conditions of contract
4. Other sections, appendices, schedules and drawings.

I/we have remitted herewith the Earnest Money Deposit for a sum of Rs. 1,00,000/- (Rupees One lakh only). Details of EMD payment are furnished in the check-list.

EMD shall be refunded should our offer not be accepted / **EMD need not be refunded and the amount may be treated as "One time EMD" for Erection and Commissioning tenders of BHEL-PSWR, Nagpur**. Should our offer be accepted, I/we further agree to deposit Security Deposit for the work as provided for in the tender specification within the stipulated time as may be indicated by BHEL, Power Sector-Western Region, Nagpur.

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

Place: Signature of Bidder:
Date : address:

Witnesses with their address

	Signature	Name	Address
1.			
2			

SECTION-4

SPECIAL CONDITIONS OF CONTRACT

4.0.0 GENERAL

4.0. This NIT is for providing services for Pre-boiler flushing & Chemical cleaning at 1 x 75 MW Kutch Lignite Project. A typical procedure for Pre-boiler flushing is attached in Appendix I-A and for Chemical cleaning in Appendix I-B. These procedure are only for reference and is to be taken as a broad guideline for understanding the nature of the work involved. The basic scope of this tender are as under:

1. Pre-boiler flushing consists of detergent flushing of feed lines, condensate lines, drip lines, deaerator and heaters and the duration of the activity is generally 10 days.

2. Duration of chemical cleaning of boiler is generally 10 days.

3. The Bill of Material given vide Appendix I-C. The bill of material is tentative and the actual scheme of pipelines will be given at site. All the material as per the bill of material including supports are to be arranged by the vendor.

4. All the consumables (including but not limited to gaskets, cotton waste, etc.) are to be supplied by vendor.

5. Only the source of power will be provided by the owner. Cables from the source of power to distribution boards, Motor control centers and to individual equipments are to be provided and laid by the vendor. Earthing of individual motors are to be provided by vendor.

6. Chemicals required for pre-boiler flushing and chemical cleaning of boiler will be supplied by BHEL/owner free of charge. **They are to be handled by the vendor**.

7. 04 Nos. temporary sample coolers along with connecting lines for samples and cooling water are to be erected by vendor. 02 Nos. coolers will be used for samples from bottom ring header. These sample coolers will be located at ground level. 02 Nos. coolers will used for samples for drum water. Existing drum sampling lines may be used with some modifications. These coolers will be located at operating floor.

8. All temporary connections to the existing systems, all modifications in existing pipelines, valves and in civil works are to be normalized by the vendor after pre-boiler flushing and chemical cleaning of boiler. All temporary supports erected for these operations are to be removed by the vendor after completion of the operations.

9. Adequate number of safety equipments like goggles, masks, aprons, gloves, gum boots etc. are to be arranged by the vendor.

10. Laboratory equipments for testing of chemicals along with chemical reagents for testing are to be arranged by vendor. Testing personnel (chemists) are to be arranged by the vendor.

11. Electrical testing equipments like tong-tester, multimeter, megger etc. are to be arranged by the vendor. Ammeter for each motor is to be provided in its MCC.

12. Civil works related to pumping units, supports etc are to be carried out by the vendor.

4.0.1 Welding requirements.

1. Vendor must ensure that the welders involved in the job are qualified as per statutory requirement (preferably IBR welder to be used)

2. Vendor to procure and use only BHEL approved welding electrodes.

3. Vendor to ensure storage, drying facilities of the welding electrodes as per BHEL norms.

4. Suitable edge preparation is required to made prior to carryout the welding.

5. Vendor to ensure proper cleaning of welds between the beads

6. No visible cracks, pinholes or incomplete fusion are allowed.

7. Under cuts should not exceed 1 mm.

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

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

4.0.4 The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost failing which the job will be carried out by BHEL by engaging other agencies/ departmentally and recoveries will

be effected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.

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

(a) Provision of all types of skilled labour, adequately qualified and experienced supervisors, engineers, watch and ward as required, Tools & plants, Calibrated inspection, measuring & test equipments as specified and otherwise required for the work and consumables for fabrication, erection, testing and material for handling for the entire scope under this contract.

(b) Proper out-turn as per BHEL plan and commitment.

(c) Completion of work as per Schedule given by BHEL.

(d) Good quality and accurate workmanship for proper performances of equipment to the satisfaction of BHEL/ CUSTOMER.

(e) Repair and rectification as per instruction of BHEL engineer.

(f) Receipt, proper storage, preservation, Re-conservation of all chemicals.

(g) Keeping all the erection area neat and clean.

4.0.6 Contractor shall ensure following :

(A) Contractor has to maintain contact with local hospital having scanning & other ultra modern medical facilities required during emergency

(B) Contractor has to ensure pre employment medical check for all staff & workers.

(C) Contractor has to ensure that adequate First Aid facilities are available at work site for emergency purpose. This emergency set-up should include, but not limited to, the following

a) Oxygen set up
b) Breathing apparatus
c) Eye wash facility
d) Stretcher
e) Trauma blanket
f) Medicines.

4.0.7 **The contractor shall comply with following towards Social Accountability:**

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

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

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

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

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

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

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

4.1.0 PRILIMINARY and CIVIL WORKS

4.1.1 Before starting erection job contractor shall ensure that area connected to his scope of work is sufficiently enclosed against ingress of dust and water and all debris have been cleared of from the floor to a designated area as per instruction of engineer. The contractor shall arrange to get the working area and surroundings cleared daily to ensure the dust free atmosphere and free from seepage water for working and shall maintain sufficient labour and general cleaning of work areas. Delay of work on this account will not be acceptable.

4.1.2 The contractor shall cover all opening on floor and put temporary hand railing on all sides of the floor to avoid any accident to the working personnel.

4.1.3 **Any civil works required for safe and efficient operation of tools and tackles like grouting/ excavation/ casting of foundation/ anchor points for derricks, winches, guy ropes fastening scaffoldings etc. or any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement/ steel and required facilities will have to be arranged by contractor at his own cost.**

4.1.4 The contractor shall provide his tool stores for special tools and instruments at a convenient place near to the place of working area.

4.2. CONSUMABLES

4.2.1 The contractor shall provide within finally accepted price, all consumables. **The chemicals which are supplied by BHEL shall be issued to contractor for subject work only**. Contractor shall maintain proper records for all these.

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

4.2.3 It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding supplies of consumables such as welding electrodes/ filler wires/ gases lubricants etc. before procurement. On receipt of consumables at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform to BHEL all details regarding type of consumable batch No., Date of expiry etc. and produce test certificate for each lot/ batch with correlation

of batch/ lot no. with respective test certificate. No consumable will be allowed to be used without valid test certificate.

4.2.4 BHEL reserves the right to reject the use of any consumable including electrodes, gases, lubricants/ special consumables if it is not found to be of the required standard/ make/ purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained. Storage of all consumables including welding electrodes shall be done as per requirement/ instruction of the Engineer by the contractor at his cost.

4.2.5 In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first subsequent bill at cost plus the departmental charges of BHEL from time to time (30% at present). The decision of Engineer in this regard shall be final and binding on the Contractor.

4.2.6 Any wastage of above chemicals by the contractor shall be made good by him only. The consumption of chemicals shall be properly accounted for. Surplus material if any shall be properly stacked/ packed and returned to stores.

4.3.0 TOOLS AND PLANTS / IMTE's

4.3.1 T&Ps and IMTEs (Inspection, Measuring & Testing Equipment), which are required for successful and timely execution of the work covered within the scope of this tender, shall be arranged and provided by contractor. In the event of the failure of contractor to bring necessary and sufficient T&Ps/ and IMTEs, BHEL will be at liberty to arrange the same at the risk and cost of contractor and hire charges as applicable shall be deducted from contractor's bill. Decision of BHEL in this regard shall be final and binding on contractor.

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

4.3.4 Any loss/ damage to any part of BHEL T&Ps and IMTEs shall be to the contractor's account and any expenditure on these accounts by BHEL will be recovered from the contractor's bill in case the contractor fails to make good the loss. Replacement cost including BHEL overheads in respect of irreparable/ completely damaged/ non return of T&Ps and IMTEs shall be recovered from the contractor's running bills.

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

4.3.6 Re-testing/ re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer with in the contract price. The contractor will also have alternate arrangements for such IMTE so that work does not suffer when the particular instrument is sent for calibration. Also if any IMTEs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall i.e. repeat the readings taken by that instrument. Failing which BHEL may deploy IMTEs and re-take the readings at contractor's cost.

4.3.7 The contractor shall fabricate pipes, special bends, etc. threading and welding as required .

4.3.8 The servicing and realignment of skid-mounted equipment if required or if directed by BHEL shall be carried out by the contractor at no extra cost to BHEL.

4.3.9 The contractor shall completely erect & test all the piping systems, covered in the specification including sampling lines, hangers & supports, valves & accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines & elevation.

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

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

All vents and drains for piping equipment covered in the scope shall terminate in atmosphere and to pit as directed by BHEL.

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

4.3.11 Normally the valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings Ike `T' pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or overhauled in full or in part before erection after chemical cleaning and during commissioning.

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

4.3.12 Suspension for piping shall be as per site requirement

4.3.13 The adjustment of all supports erected for maintaining the proper slopes of piping wherever required is also included in the scope of the contractor.

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

4.3.15 All supports and anchors shall be installed to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and provided by the contractor. Contractor shall install piping in such a way that no excessive or destructive expansion forces exist under any condition. The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer.

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

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

4.3.18 void

4.3.19 Erection and welding of necessary instrumentation tapping points, valves to be provided on equipment, auxiliaries and pipe lines covered within the scope of this specification, will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer at no extra cost.

4.3.20 BHEL shall have lien on all T&P's, IMTEs & other equipment of the Contractor brought to the Site. BHEL shall continue to hold the lien on all such items throughout the period of Contract. No material brought to the Site shall be removed from the Site by the Contractor or his Sub-contractors without the prior written approval of the Engineer.

4.4. Void

4.5.0 PROGRESS REPORTING

Contractor is required to draw mutually agreed execution programmes in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed programme and shall also timely arrange additional resources considered necessary at no extra cost to BHEL

4.6.0 DRAWINGS AND DOCUMENTS

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

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

The contractor shall maintain a record of all drawings and documents available with him in a register as per format given by BHEL Engineer. Contractor shall ensure use of pertinent drawings/ data/ documents

The data furnished in various Annexures enclosed with this tender specification are only approximate and for guidance. However, the change in the design and in the quantity may occur as is usual in any such works.

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.

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

4.7.0 RATE SCHEDULE

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

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

4.8.0 INSTRUCTIONS TO TENDERER

4.8.1 Offers received without data/ information required to be submitted under tender clauses are liable to be rejected. Documentary evidences should duly support all these data/ information.

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

4.8.2 The tenderers are advised to actually visit the sites and fully acquaint themselves with site conditions, location of stores, transportation routes, quantum of work etc. before quoting their rates for this work. The tenderers are also advised to give the proof of visiting site along with the tender submission. BHEL shall not be responsible in any way for non-familiarisation of site conditions. Once the tenderer has quoted for the

work, it is implied that he has ascertained various site conditions and NO CLAIM whatsoever will be entertained by BHEL on any such account.

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

4.8.3 The equipments and materials deployed by the contractor may be subject to BHEL/Third party inspection/ verification prior to despatch.The test certificates of the equipments and materials shall be provided by the contractor prior to inspection/verification.

4.9 BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

4.10 PSUs shall be given Purchase Preference as per Govt. Guidelines.

4.11 Unsolicited rebate/discount shall not be accepted after bid opening.

Special Conditions of Contract

Section-5

5.0 Obligations of the Contractor

5.1.1 Tools and Tackles

The list of tools and tackles, standard calibrating equipments proposed for deployment for this work shall be submitted along with the offer (please refer **Appendix-III A)**. It may be noted that the contractor is required to provide all necessary Tools & Plants, measuring/testing instruments (MMD), calibrating equipments and handling equipments for handling, erection, calibration, testing and commissioning of equipments covered in this scope.

5.1.2

All the tools and tackles, IMTE etc. to be deployed for this work shall have range and accuracy level prescribed by BHEL and shall have valid calibration from approved agencies to be specified by BHEL.

5.1.3

The contractor shall provide all the necessary steel scaffolding materials, temporary structures and necessary safety devices etc. during pre-assembly, calibration, erection, testing and commissioning of the equipment.

5.1.4

In the event of contractor failing to arrange the required tools, plants, machineries, calibrating and testing equipments and non availability of the same owing to breakdown or otherwise, BHEL will resort to hiring out the same from outside agencies or may provide their own equipment, if available or may resort to buying of equipment at the cost of the contractor. Full cost of equipment/hire charges/ rental charges along with departmental overheads @ 30% will be charged to the contractor.

5.1.6

The T&P calibrating and testing equipments to be arranged by the contractor shall be in proper working condition. Their operation shall not lead to unsafe conditions.

5.1.7

Timely deployment and required quantity is the responsibility of contractor. Also he should be able to augment the erection equipments at short notice to match the planned programme every month and to achieve the milestone events.

5.1.8

5.2 Consumables

5.2.1

The contractor shall provide all consumables required for carrying out the work covered under this scope of work .

5.2.2

All consumables to be procured and used for the work shall have prior approval of BHEL in regard to brand, quality and specification. Tentative list is indicated in **Appendix-III B** (consumables to be provided by the contractor). Any other

consumables in addition to this suggestive list, required for the satisfactory completion of work, shall also be arranged by contractor at his cost.

5.3 Electrodes and Gases

5.3.1
The contractor shall provide all electrodes required for erection, etc. These are to be procured as per BHEL approved brand and quality.

5.3.2
All the required gasses like argon, oxygen, acetylene, liquid petroleum gas etc. will be provided by the contractor for the work covered under this scope.

5.3.3
If at any time during the execution of work, it is noticed that the work is suffering on account of non availability of consumables from the contractor's side like electrodes, gases and other materials, then BHEL will make alternate arrangements and the necessary costs with overheads as per prevailing rate at that time will be recovered from the running bills of the contractor.

5.5 Lighting

5.5.1
Contractor shall arrange suitable flood lighting arrangements at various levels of powerhouse for safety and proper working operations during night times and also in pre-assembly areas and his storage areas, during working hours.

5.5.2
All temporary wiring must comply with local regulations and will be subjected to engineer's inspection and approval before connecting to supply point.

5.5.3
It shall be the responsibility of the contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements.

5.6 Labour Colony

5.6.1
Contractor shall make his own arrangements for stay of his work force. It is the responsibility of the contractor to make his own arrangements, including lighting, water, etc. No land will be provided by BHEL for the purpose of construction of labour colony.

5.6.2
The contractor shall obtain independent licence under the contract labour (regulations and abolition) act 1970, from the concerned authorities based on the certificate (Form-V) issued by the principal employer /customer.

5.7 TAXES, DUTIES, LEVIES

Refer to Clause 2.8.4 of General Conditions of Contract. Notwithstanding anything contained therein, the following provisions shall be applicable for this contract.

5.7.1
The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

5.7.2 Service Tax & Cess on Service Tax
Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and deposit the same with the concerned tax authorities, such applicable amount will be paid by BHEL. Contractor shall submit to BHEL documentary evidence of Service Tax registration and remittance record of such tax immediately after depositing the tax with concerned authorities. Contractor shall obtain prior written consent from BHEL before billing the amount towards such taxes.

With introduction of Cenvat Credit Rules 2004, which came into force w.e.f. 10.09.2004, Excise Duty paid on Input Goods including Capital Goods and Service Tax paid on Input Services that are used for providing the output services can be taken credit of against the Service Tax payable on output services. However BHEL may opt for availing the abatement provision in which case cenvat credit may not be available on input duty.

5.7.3 VAT/WCT
As regards Sales Tax on transfer of property in goods involved in Works Contract applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

5.74 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.

5.7.5 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

Special Conditions of Contract

Section-6

6.0 Contractor's obligation in regard to employment of engineers, supervisory staff and workmen

6.1 SUPERVISORY STAFF AND WORKMEN

6.1.1 The contractor shall deploy all the skilled, semi-skilled and un-skilled workmen required for all the work under this specification. Only fully trained and competent persons with previous adequate experience on the job shall be employed. They shall hold valid certificates wherever necessary . BHEL reserves the right to decide on the suitability of the workers and other personnel who will be deployed by the contractor. BHEL reserves the right to insist on removal of any employee workman of the contractor at any time, if they find him unsuitable and the contractor shall forthwith remove him.

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

6.1.3 The work shall be executed under the usual conditions without affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall co-operate with other personnel/ contractor, co-ordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

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

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

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

6.1.7 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 wire, trees or any other property or to any part of erected components etc., the contractor shall make the same good at his own expense or in default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor. shall be removed and deposited at

location(s) specified by BHEL within the project premises (including weighment of the same within the project premises if required).

6.2 Safety aspects at site

6.2.1

The safety engineer/supervisor of contractor shall coordinate all aspects connected with this work. He shall be aware of the safety procedures, use of safety equipment, safe rigging and also in a position to enforce strict safety at site. He shall coordinate with the various contractors' engineers, supervisors working gangs to enforce safe working procedures, he shall also coordinate the timely arrangement of work permits required for hot works and cold works. He should be trained and qualified to give proper guidance and direction to other supervisors and workers. He shall also submit weekly accident report in the format required by BHEL.

Special Conditions of Contract
Section-7

7.0 Obligations of BHEL

7.1 Facilities provided by BHEL

7.1.1 BHEL shall provide limited open space for site office and store free of rental charge. It is the responsibility of the contractor to construct temporary sheds for his use, and to dismantle and clear the site after completion of work or as and when required, as a part of his scope of work.

7.1.2 BHEL shall not provide space for labour colony. Contractor shall have to build his own colony/ quarters for his workmen/ staff near the powerhouse on his own land or can take housing on rental basis in nearby places. Contractor shall be responsible for providing all necessary facilities to staff and workmen like construction of residential accommodation with electricity & water inside the rooms, proper sanitation, transport, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations.

7.1.3 The contractor shall submit to BHEL his electrical power requirements. BHEL shall provide supply of construction power at 415V, 3 Phase each at one point in Power House to enable smooth execution of works, free of cost. Further distribution shall be done by contractor at his cost. All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply.

7.1.4 BHEL shall provide water/air for construction at one point, free of cost. Any further distribution will also be the responsibility of the Contractor as a part of his work.

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

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

7.1.7 Adequate lighting arrangement such as flood lights, hand lamps and area lighting shall be arranged by the contractor at the site of construction, storage area etc within finally accepted rates.

7.1.8. On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, it will be got done by the Engineer and expenses incurred shall be recovered from the contractor along with prevailing overhead. The decision of BHEL Engineer in this regard shall be final.

Special Conditions of Contract

Section-8

8.0 Quality Control and Quality Assurance

8.1.1
BHEL gives lot of importance for this function. Contractor's engineers and supervisors shall be adequately qualified and inclined to do a quality job. The quality assurance engineer shall coordinate all aspects of quality control, inspection, implementation of quality assurance procedures laid down by BHEL. He shall also fill up all the quality assurance log sheets and submit for BHEL/customer for joint inspection and acceptance. Total quality is the watch ward of the work and contractor shall strive to achieve the quality standards/ procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and quality standards.

8.1.2
All the electrical/mechanical, testing, calibrating and all other measuring equipment/instruments for checking, testing, calibrating the equipments under the scope of this work shall be provided by contractor (refer clause 5.1.1).

8.1.3
All these instruments/equipments/gauges/tools etc. provided by the contractor shall be of brand, quality and accuracy specified by BHEL engineer and should have necessary calibration and other certificates as per the requirement of BHEL engineer. Decision of BHEL engineer regarding acceptance or otherwise of the measuring instruments/gauges/tools for the work under this specification, is final and binding on the contractor.

8.1.4
It is the responsibility of the contractor to prove the accuracy of the testing/measuring/calibrating equipments brought by him based on the periodicity of calibration as called for in the BHEL's quality assurance standards/BHEL engineer's instructions.

8.1.5
Total quality is the watchword of the work and contractor shall strive to achieve the quality standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and quality standards. Contractor shall provide for the services of quality assurance engineer as per the relevant clauses.

Section-9

SPECIAL CONDITIONS OF CONTRACT

Safety, Occupational Health and Environmental Management

BHEL PSWR has been certified for Environmental Management under ISO 14001:1996 standard and Occupational Health & Safety under OHSAS 18001. In order to comply with the above standards, it shall be the endeavour of BHEL and all its subcontractors to meet and implement the requirements by following the guidelines issued under Environmental, Occupational Health and Safety Management (EHS) manual a copy of which will be available with the BHEL Site-in-charge.

Contractor shall also enter into a "Memorandum of Understanding" as given in clause 9.9 in case of award of contract.

Responsibility of the Contractor in Respect of Safety of Men, Equipment, Material and Environment.

The Contractor Shall

9.1.1 Abide by the Safety Regulations applicable for the Site/Project and in particular as mentioned in the booklet "Safe Work Practices" issued by BHEL. Contractors are also to ensure that their employees and workmen use safety equipments as stipulated in the Factories Act (Latest Revision) during the execution of the work. Failure to use safety equipment as required by BHEL Engineer will be a sufficient reason for issuance of memo, which shall become part of Safety evaluation of the contractor at the end of the Project. Also all site work may be suspended if it is found that the workmen are employing unsafe working practice and all the costs/losses incurred due to suspension of work shall be borne by contractor. A comprehensive list of National Standards from which the contractor can draw references for complying with various requirements under this section is given under 9.10

Hold BHEL harmless and indemnified from and against all claims, cost and charges under Workmen's Compensation Act 1923 and 1933 and any amendment thereof and the contractor shall be solely responsible for the same.

Abide by the Procedure governing entry/exit of the contractor's personnel within the Customer/Client premises. All the contractors employees shall be permitted to enter only on displaying of authorized Photo passes or any other documents as authorised by the Customer/Client

Be fully responsible for the identity, conduct and integrity of the personnel/workers engaged by them for carrying out the contract work and ensure that none of them are ever engaged in any anti national activity

Prepare a signboard giving the following information and display it near work site:
Name of Contractor

Name of Contractor Site-in-charge & Telephone number
Job Description in short
Date of start of job
Date of expected completion
Name of BHEL Site-in-charge.

Abide by the rules and regulations existing during the contract period as applicable for the contractors at the Project premises.

Observe the timings of work as advised by BHEL Engineer-in-charge for carrying out the contract work.

SPECIAL CONDITIONS

Safety

Safety Plan

Before commencing the work, contractor shall submit a "safety plan" to the authorised BHEL official. The safety plan shall indicate in detail the measures that would be taken by the contractor to ensure safety to men, equipment, material and environment during execution of the work. The plan shall take care to satisfy all requirements specified hereunder.

The contractor shall submit "safety plan" before start of work. During negotiations, before placing of work order and during execution of the contract, BHEL shall have right to review and suggest modifications in the safety plan. Contractor shall abide by BHEL's decision in this respect.

The contractor shall take all necessary safety precautions and arrange for appropriate appliances and/or as per direction of BHEL or it's authorised person to prevent loss of human lives, injuries to men engaged and damage to property and environment.

The contractor shall provide to his work force and also ensure the use of Personnel Protection Equipment (PPE) as found necessary and/or as directed and advised by BHEL officials without which permission is liable to be denied.

Safety helmets conforming to IS 2925/1984 (1990)
Safety belts conforming to IS 3521/1989
Safety shoes conforming to IS 1989 part-II /1986(1992)
Eye and face protection devices conforming to IS 2573/1986(1991), IS 6994 (1973), part-I (1991), IS 8807/1978 (1991), IS 8519/1977(1991).
Other job specific PPEs of standard ISI make as may be prescribed

All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, cages, safety nets, ladders, equipment, etc used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorised BHEL official who shall have the right to ban the use of any item found to be unsafe

All electrical equipment, connections and wiring for construction power, its distribution and use shall conform to the requirements of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be

employed by the contractor to carryout all types of electrical works. All electrical appliances including portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed.

The contractor shall not use any hand lamp energised by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

The contractor shall adopt all fire safety measures as per relevant Indian Standards

Where it becomes necessary to provide and/or store petroleum products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provisions and/or storage in accordance with the rules and regulations laid down by the relevant government acts, such as petroleum act, explosives act, petroleum and carbides of calcium manual of the chief controller of explosives, Government of India etc. The contractor in all such matters shall also take prior approval of the authorised BHEL official at the site.

Proper means of access must be used e.g. ladders, scaffolds, platforms etc. No makeshift access such as oil drums or pallets shall be used. Design of these will be in accordance with relevant standards and certified by competent persons before use.

Temporary arrangements made at Site for lifting, platforms, approach access etc should be properly designed and approved before being put to use.

All excavations and openings must be securely and adequately fenced/barricaded and warning signs erected when considered necessary as per relevant code of practice.

No persons shall remove guard rails, covers or protective devices unless authorised by a responsible supervisor and alternative precautions have been taken

Access ways, means of escape and fire exits shall be clearly marked, kept clear and unobstructed at all times

Only authorised persons holding relevant license will drive and operate site plant and equipments eg cranes, dumpers, excavators, transport vehicles etc

Only authorised personnel are allowed to repair, commission electrical equipments.

Gas cylinders shall be handled and stored as per Gas Cylinder Rules and relevant safe working practices

All wastes generated at Site shall be segregated and collected in a designated place so as to prevent spillage/contamination/scattering at Site, until the waste is lifted for disposal to designated disposal area as advised by BHEL official.

The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working when natural day light is not adequate for clear visibility.

The contractor shall train adequate number of workers/supervisors for administering “FIRST AID”. List of competent first aid administers should be prominently displayed.

The contractor shall display at strategic places and in adequate numbers the following in fluorescent markings

Emergency telephone numbers
Exit, Walkways
Safe working load charts for wire ropes, slings, D shackles etc
Warning signs

The contractor shall be held responsible for any violation of statutory regulations (local, state or central) and BHEL instructions that may endanger safety of men, equipment, material and environment in his scope of work or other contractors or agencies. Cost of damage, if any, to life and property arising out of such violation of statutory regulations and BHEL instructions shall be borne by the contractor.

In case of a fatal or disabling injury/accident to any person at construction sites due to lapses by the contractor, the victim and/or his/her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and/or his/her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.

In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover cost of such damages from payments due to the contractor after holding an appropriate enquiry.

In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from payments due to the contractor after notifying the contractor suitably and giving him opportunity to present his case.

If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given a reasonable opportunity to do so, and/or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorised BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

Emergency Response

BHEL will have an Emergency Response Plan for each Project Site in consultation with the Owner as the case may be, detailing the procedure for mobilisation of personnel and equipment, and defining the responsibilities of the personnel indicated, in order to prepare for any emergency that may arise in order to ensure the priorities of

Safeguard of life

Protect assets under construction or neighbouring

Protect environment

Resumption of normal operations as soon as the emergency condition is called off

All Contractors shall also be part of the Emergency response Plan and the personnel so nominated shall be aware of their duties and responsibilities in an emergency response situation.

9.2.1.27 At least 5% Contractors supervisors and workmen shall undergo training in administering 'First Aid'. The trained persons should represent for all categories of work and for all areas of work. Adequate number of trained persons should be available for each shift. These first aiders shall be included in the emergency response team. Contractor employees and workmen are encouraged to participate in first aid training programmes whenever organised by BHEL.

OCCUPATIONAL HEALTH

Specific occupational health hazards will be identified through the hazard evaluation processes in consultation with BHEL engineers and the necessary prevention/reduction/elimination methods implemented.

All personnel working in an activity with a potential risk to health shall be made aware of all those risks and the actions they must take to reduce/control/eliminate the risk

Safety coordinator shall conduct periodic checks to ensure that every group of workers engaged in similar activities are aware of potential risks to health and the actions required to be taken to mitigate the risk

In order to protect personnel from associated health hazards, the following main areas will be focussed

Issue of approved Personnel Protective Equipment

Verification that the PPE are adequate/maintained and worn by all staff involved in operations that are potentially hazardous to their health

Ensure that the personnel deployed are physically fit for the operation/work concerned.

Provide hygienic and sanitary working conditions.

Contractor workers employees engaged in noise risk areas shall be issued with hearing protection aids and the use of the same will be enforced. Further, these workers will be educated on the hazards of noise

Contractor workers engaged in dust environment shall be issued with necessary dust protection aids and the use of the same shall be enforced

Workers engaged in exposure to bright light/rays as in welding or radiation shall be issued with eye protection devices and the use of the same shall be enforced

Adequate arrangements shall be made to provide safe drinking water

Health monitoring records on at least sample basis for contractor employees & workmen shall be maintained for persons engaged in specified categories of work. These shall include

Noise induced hearing loss
Lung Function test
Ergonomic Test
Eye Test for Welders, Grinders, Drivers etc

HYGIENE and HOUSEKEEPING

Good house keeping and proper hygiene is one of the key requirements of Occupational Health Safety and Environment management. Towards this the contractor shall encourage his workers and supervisors to maintain cleanliness in their area of work.

The Contractor shall arrange to place waste bins/chutes at convenient locations for the collection of scrap and other wastes. The bins shall be clearly marked and segregated for metal, non-metal, hazardous and non hazardous wastes.

BHEL may take up appropriate remedial measures at the cost of the contractors if the contractors fail good house keeping and if there is an imminent risk of pollution

ENVIRONMENT MANAGEMENT

BHEL has a sound environmental management system, which is to be maintained and implemented by all the contractors. The system allows for project specific objectives to be set and developed sensitive to client requirements, applicable environmental legislation and BHEL's own objectives and policy. BHEL engineers will assess and monitor the environmental impact of their work and lay out objectives for their minimisation. The contractors shall implement the objectives for continual improvement of environmental performance. BHEL shall regularly audit environmental impacts and their improvements.

WASTE MANAGEMENT

The objective of waste management is to ensure the safe and responsible disposal of waste, ensuring that it is correctly disposed of and being able to audit the process to ensure compliance.

Chemical wastes if any shall be collected separately and disposed of to BHEL designated refuse yard as per BHEL advise

No dangerous chemicals, noxious waste products or materials will be disposed off on or off site without approval obtained through BHEL.

All disposal of wastes generated during construction shall be in accordance with all relevant legislation.

Acid and alkali cleaning wastes shall be neutralised to acceptable norms before disposal to the designated area.

All necessary measures shall be taken to ensure safe collection and disposal of waste oils. In particular to ensure the prevention of their discharge into surface waters, ground waters, coastal waters or drainages

9.3 SUPERVISION

Contractor must provide at least one full time on site safety coordinator when the manpower engaged is in excess of 50 for the contract activities in the premises. If the manpower is less than 50, the on site safety coordination responsibilities shall be assumed by any one of the contractor's other supervisory staff; however in both the cases, the contractor must specify in writing the name of such persons to the BHEL Engineer in Charge.

Contractor's safety coordinator or his supervisor responsible for safety as the case may be shall conduct at his work site, and document formal safety inspection and audits at least once in a week. Such documents are to be submitted to BHEL Engineer in Charge for his review and record. Contractor must attend all schedule safety meetings as would be intimated to him by the BHEL Engineer in Charge.

Before starting work under any contract, the contractor must ensure that a job specific safety procedures/field practices as required over and above the safety permit conditions are prepared and followed .He should also ensure that all supervisors and workers involved understand and follow this procedures /field practices.

Contractor must ensure that in his work site appropriate display boards are put displaying signs for site safety, potential hazards and precautions required

TRAINING & AWARENESS

Contractor shall deploy experienced supervisors and other manpower who are well conversant with the safety and environment regulations of the Project. The electricians to be deployed on the job should have wireman license.

All Supervisors & Workmen of the Contractor shall undergo Fire safety training/demonstration whenever arranged by BHEL with the help of either Customer's Fire and Safety department or outside faculty so as to acquire knowledge of fire prevention and also to be able to make use of appropriate fire extinguishers.

Contractor must familiarize himself from BHEL Engineer in Charge about all known potential fire, explosion or toxic release hazards related to the contract. He in turn will ensure that same information has been passed to the supervisors and workmen

Contractor must ensure that all his supervisors are properly trained and each employee has received and understood from his supervisor necessary training and briefing about the safety requirement. Necessary document as a means to verify that employees have understood the training is to be maintained.

The contractor supervisors shall also give a small safety briefing to all the workmen under his charge before undertaking any new work and specially understand the safety requirements that are mandatory

REPORTING

The contractor shall submit report of all accidents, fires and property damage, dangerous occurrences to the authorised BHEL official immediately after such occurrence but in any case not later than twelve hours of the occurrence. Such report shall be furnished in the manner prescribed by BHEL and also to meet statutory requirement.

Any injury sustained by any of the contractor's employees within the Project premises must be reported to BHEL supervisor and FIRST AID should be immediately administered. The Contractor shall be responsible for keeping and maintaining proper records of Accidents to his personnel.

Contractor must arrange to immediately investigate, properly document and report any injury, accident or near miss involving any of his employees and take appropriate follow up action. He must furnish within 12 hours of the incident a written report to BHEL Engineer in charge and the Safety Section.

According to the Factory Act and the Employees state Insurance Act & regulation, any person sustaining any injury within the project premises and absenting himself from work for more than 46 hours, his accident report has to be sent to the respective Government Authorities. Therefore contractor shall inform the owner's representative such matter immediately for their needful action.

In addition, contractor shall submit periodic reports on safety to the authorised BHEL official from time to time as prescribed.

Before commencing the work, the contractor shall appoint/nominate a responsible officer to supervise implementation of all safety measures and liaison with his counterpart of BHEL.

AUDIT REVIEW AND INSPECTION

9.6.1 BHEL shall conduct audit on the contractor performance and compliance with the project specific requirements of the Environment and Occupational Health & Safety Management systems. The programme of audit shall cover all activities under the contract but will focus particularly on high-risk activities. The Construction Manager shall decide the schedule of audit. The audit findings shall be communicated to the contractors and necessary remedial action as advised by BHEL Engineers shall be under taken within the stipulated time.

9.6.2 Inspections shall be carried out regularly by the contractors and by BHEL Engineers on activities, facilities, equipment, documentation, to cover the following aspects.

Compliance with procedures and systems
Availability, condition and use of PPEs
Condition of maintenance tools, equipments, facilities
Availability of fire fighting equipments and its condition
Use of fire fighting equipments and first aid kit
Awareness of occupational health hazard
Awareness of safe working practices
Presence of quality supervision
Housekeeping

The Safety Co-ordinator shall visit and inspect work sites daily. All unsafe acts, unsafe conditions that have imminent potential for causing harm/injury/damage will be immediately corrected. He shall maintain a daily logbook giving details of unsafe acts or conditions observed and the corrective action taken and recommendations for preventing recurrence. Adequacy of corrective actions will be verified

The contractor shall take remedial measures as per the findings of each inspection

Besides the above, the contractor shall be required to carry out the following inspections

SN	Equipment	Scope of inspection	Inspection by	Schedule
1	Hand tools	To identify unsafe/defective tool	User	Daily
2	Power tools	To identify unsafe/defective tool	User	Daily
3	Fire Extinguishers	To check pressure and any defect	User Safety Coordinator	Daily Every month
4	Lifting equipment/ tackles	To check for defects and efficacy of brakes	User Third party	Daily Every Year
5	PPE	To check for defects	User	Daily

NON COMPLIANCE:-

NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND THE BHEL HAS RIGHT TO IMPOSE FINES ON THE CONTRACTOR AS UNDER **for every instance of violation noticed**:

SN	Safety Violation	Fine (in Rs)
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slinging property	200/-
07.	Using Damaged Sling	200/-
08.	Lifting Cylinders Without Cage	500/-
09.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	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 Electric Winches Which are Operated Dangerously	500/-
13.	Improper Earthing Of Electrical T&P	500/-

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected above will be utilised for giving award to the employees who could avoid accident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

9.8 **CITATION:**-If safety record of the contractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognise the safety performance of the contractor may be considered by BHEL after completion of the job

9.9 **Memorandum of Understanding**

After Award Of Work, Contractors Are Required To Enter Into A Memorandum Of Understanding As Given Below:

Memorandum of Understanding

BHEL, PSWR is committed to Health, Safety and Environment Policy (EHS Policy) as given in the booklet titled " Safe Working Practices" issued to all contractors.

M/s _____ do hereby also commit to the same EHS Policy while executing the Contract Number _____

M/s _____ shall ensure that safe work practices not limited to the above booklet are followed by all construction workers and supervisors. Spirit and content therein shall be reached to all workers and supervisors for compliance.

BHEL will be carrying out EHS audits twice a year and M/s _____ shall ensure to close any non-conformity observed/reported within fifteen days.

Signed by authorised representative of M/s----------

Name :

Place & Date:

9.10 Comprehensive list of National Standards for reference and use wherever applicable in the execution of Civil, Erection and Commissioning Contracts

IS No	YEAR	Amd upto	DESCRIPTION
IS 10204	1982		PORTABLE FIRE EXTINGUISHERS MECHANICAL FOAM TYPE
IS 10245	1994		SPECIFICATION FOR BREATHING APPARATUS
IS 10291	1982		SAFETY CODE FOR DRESS DRIVERS IN CIVIL ENGINEERING WORKS
IS 10658	1983		HIGHER CAPACITY DRY POWDER FIRE EXTINGUISHERS (TROLLEY MOUNTED)
IS 10662	1992		COLOUR TELEVISION
IS 10667	1983		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF FOOT AND LEG
IS 11037	1984		ELECTRONIC FAN REGULATORS
IS 11057	1984		INDUSTRIAL SAFETY NETS
IS 11451	1998		RECOMMENDATION FOR SAFETY AND HEALTH REQUIREMENT RELATING TO OCCUPATION EXPOSURE TO ASBESTOS
IS 1169	1967		PEDESTAL FANS
IS 1179	1967		SPECIFICATION FOR EQUIPMENT FOR EYE AND FACE PROTECTION DURING WELDING
IS 11833	1986		DRY POWDER FIRE EXTINGUISHERS FOR METAL FIRES
IS 11972	1987		CODE OF PRACTICE FOR SAFETY PRECAUTION TO BE TAKEN WHEN ENTERING A SEWARAGE SYSTEM
IS 1287	1986		ELECTRIC TOASTER
IS 13063	1991		STRUCTURAL SAFETY OF BUILDINGS ON SHALLOW FOUNDATIONS ON ROCKS
IS 13385	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE WHEEL MOUNTED WATER TYPE (GAS CARTRIDGES)
IS 13386	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50

IS No	YEAR	Amd upto	DESCRIPTION
			LITRE MECHANICAL FOAM TYPE
IS 13415	1992		CODE OF SAFETY FOR PROTECTIVE BARRIERS IN AND AROUND BUILDINGS
IS 13416	1992		RECOMMENDATIONS FOR PREVENTIVE MEASURES AGAINST HAZARDS AT WORKING PLACE PART 1 TO PART 5
IS 13430	1992		CODE OF PRACTICE FOR SAFETY DURING ADDITIONAL CONSTRUCTION AND ALTERATION TO EXISTING BUILDINGS
IS 13849	1993		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CONSTANT PRESSURE)
IS 1446	1985		CLASSIFICATION OF DANGEROUS GOODS (FIRST REVISION)
IS 1476	1979		REFRIGERATORS
IS 1641	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): GENERAL PRINCIPLES OF FIRE GRADING AND CLASSIFICATION
IS 1642	1989		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS- DETAILS OF CONSTRUCTION
IS 1643	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): EXPOSURE HAZARD
IS 1646	1997		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): ELECTRICAL INSTALLATIONS
IS 1904	1986		CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF FOUNDATIONS IN SOIL
IS 1905	1987		STRUCTURAL SAFETY OF BUILDINGS MASONARY WALLS
IS 2082	1985		ELECTRICAL GEYSERS
IS 2171	1985		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CARTRIDGE)
IS 2309	1989		PRACTICE FOR THE PROTECTION OF BUILDINGS AND ALLIED BUILDINGS AGAINST LIGHTENING
IS 2312	1967		EXHAUST FANS
IS 2361	1994		SPECIFICATION FOR BUILDING GRIPS - FIRST REVISION
IS 2418	1977		TUBULAR FLUORSCENT LAMPS IS 2418 (FT-1)
IS 2750	1964		STEEL SCAFFOLDINGS
IS 2762	1964		SAFE WORKING LOADS IN KGS FOR WIRE ROPE SLINGS
IS 2878	1986		FIRE EXTINGUISHERS CARBON DIOXIDE TYPE (PORTABLE AND TROLLEY MOUNTED)
IS 2925	1984		SPECIFICATION FOR INDUSTRIAL SAFETY HELMETS
IS 3016	1982		CODE OF PRACTICE FOR FIRE PRECAUTIONS IN WELDING AND CUTTING OPERATIONS- FIRST REVISION
IS 3315	1974		DESERT COOLERS
IS 3521	1989		INDUSTRIAL SAFETY BELTS AND HARNESS
IS 368	1983		IMMERSION WATER HEATERS
IS 3696	1991		SAFETY CODE OF SCAFFOLDS AND LADDERS PART 1 TO 2
IS 3737	1996		LEATHER SAFETY BOOTS FOR WORKERS IN HEAVY METAL INDUSTRIES
IS 374	1979		CEILING FANS INCLUDING REGULATORS
IS 3764	1992		EXCAVATION WORK - CODE OF SAFETY

IS No	YEAR	Amd upto	DESCRIPTION
IS 3786	1983		METHOD FOR COMPUTATION OF FREQUENCY AND SEVERITY RATES FOR INDUSTRIAL INJURIES AND CLASSIFICATION OF INDUSTRIAL ACCIDENTS
IS 3935	1966		CODE OF PRACTICE FOR COMPOSITE CONSTRUCTION
IS 4014	1967		CODE OF PRACTICE FOR STEEL TUBULAR SCAFFOLDING
IS 4081	1986		SAFETY CODE FOR BLASTING AND RELATED DRILLING OPERATIONS
IS 4082	1977	1996	STACKING AND STORAGE OF CONSTRUCTION MATERIALS AND COMPONENTS AT SITE
IS 4130	1991		DEMOLITION OF BUILDINGS - CODE OF SAFETY PART 1 TO 2
IS 4138	1977		SAFETY CODE FOR WORKING IN COMPRESSED AIR (FIRST REVISION)
IS 4155	1966		GLOSSARY OF TERMS RELATING TO CHEMICAL AND RADIATION HAZARDS AND HAZARDOUS CHEMICALS
IS 4209	1967		CODE OF SAFETY FOR CHEMICAL LABORATORY
IS 4250	1980		FOOD MIXERS
IS 4262	1967		CODE OF SAFETY FOR SULFURIC ACID
IS 4756	1978		SAFETY CODE FOR TUNNELING WORK
IS 4912	1978		SAFETY REQUIREMENTS FOR FLOOR AND WALL OPENINGS, RAILINGS AND TOE BOARDS
IS 5121	1969		SAFETY CODE FOR PILING AND OTHER DEEP FOUNDATIONS
IS 5182	1969	1982	METHODS FOR MEASUREMENT OF AIR POLLUTION
IS 5184	1969		CODE OF SAFETY FOR HYDROFLUORIC ACID
IS 5216	1982	2000	RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICE IN ELECTRICAL WORK PART I AND II
IS 555	1979		TABLE FANS
IS 5557	1995		INDUSTRIAL AND SAFETY LINED RUBBER BOOTS (SECOND REVISION)
IS 5916	1970		SAFETY CODE FOR CONSTRUCTION INVOLVING USE OF HOR BITUMINOUS MATERIALS
IS 5983	1980		SPECIFICATION FOR EYE PROTECTORS - FIRST REVISION
IS 6234	1986		PORTABLE FIRE EXTINGUISHERS WATER TYPE (STORED PRESSURE)
IS 692	1994		CRITERIA FOR SAFETY AND DESIGN OF STRUCTURES SUBJECTED TO UNDERGROUND BLASTS
IS 6994	1973		SPECIFICATION FOR SAFETY GLOVES
IS 7155	1986		CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8)
IS 7205	1974		SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK
IS 7293	1974		SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY
IS 7323	1994		GUIDELINES FOR OPERATIONS OF RESERVOIRS
IS 7812	1975		CODE OF SAFETY FOR MERCURY
IS 7969	1975		SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS
IS 8089	1976		CODE OF SAFE PRACTICE FOR LAYOUT OF OUTSIDE FACILITIES IN AN INDUSTRIAL PLANT
IS 8091	1976		CODE OF PRACTICE FOR INDUSTRIAL PLANT LAYOUT

IS No	YEAR	Amd upto	DESCRIPTION
IS 8095	1976		ACCIDENTS PREVENTION TAGS
IS 818	1968	1997	CODE OF PRACTICE FOR SAFETY AND HEALTH REQUIREMENTS IN ELECTRIC AND GAS WELDING, AND CUTTING OPERATIONS
IS 8448	1989		AUTOMATIC LINE VOLTAGE CORRECTOR (STABILISER)
IS 8519	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR BODY PROTECTION
IS 8520	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR EYE, FACE AND EAR PROTECTION
IS 875	1987		STRUCTURAL SAFETY OF BUILDING: LOADING STANDARD PART 1 TO 5
IS 8807	1978		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF ARMS AND HANDS
IS 8978	1985		INSTANTANEOUS WATER HEATERS
IS 8989	1978		SAFETY CODE FOR ERECTION OF CONCRETE FRAMED STRUCTURES
IS 940	1989		PORTABLE FIRE EXTINGUISHERS WATER TYPE (GAS CARTRIDGE)
IS 9457	1980		SAFETY COLOURS AND SIGNS
IS 9679	1980		CODE OF SAFETY FOR WORK ENVIRONMENTAL MONITORING
IS 9706	1997		CODE OF PRACTICE FOR THE CONSTRUCTION OF AERIAL RPEWAYS FOR THE TRANSPORTATION OF MATERIAL
IS 9759	1981		GUIDELINES FOR DEWATERING DURING CONSTRUCTION
IS 9815	1989		SERVO MOTOR OPERATED LINE VOLTAGE CORRECTOR (SERVO STABILISER)
IS 9944	1992		RECOMMENDATIONS ON SAFE WORKING LOAD FOR NATURAL AND MAN-MADE FIBRE ROPE SLINGS
IS 996	1979		SINGLE PHASE ELECTRIC MOTORS
ISO 3873	1977		SAFETY HELMET

Section-10

Special Conditions of Contract

10.0 Drawings and Documents

10.1

The detailed drawings, specifications available with BHEL engineers will also form part of this tender specification. Revision of drawings/documents may take place due to various considerations as is normal in such large project. Work will have to be carried out as per revised drawings/ documents. These documents will be made available to the contractor during execution of work at site.

10.2

One set of necessary drawings/documents to carry out the erection work will be furnished to the contractor by BHEL on loan that shall be returned to BHEL after completion of the work. Contractor's personnel shall take care of these documents given to them.

10.3

The data furnished in various sections and appendices and the drawings enclosed with this tender specification describe 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 scale of works.

10.4

If any error or ambiguity is discovered in the specification/information contained in the documents/drawings and tender, the contractor shall forthwith bring the same to the notice of BHEL before submission of offer.

10.5

In case an ambiguity is detected after award of work, the same must be brought to the notice of BHEL before commencement of the work/activity. BHEL's interpretation in such cases will be final and binding on the contractor.

10.6

In case of any conflict between General Instructions to Tenderers, General Conditions of Contract contained in sections 1 & 2 respectively and Special Conditions of Contract contained in sections 4 to 15 and Appendices, provisions contained in Special Conditions of Contract in sections 4 to 15 and Appendices shall prevail.

Special Conditions of Contract

Section-11

11.0 Mobilization, Time schedule, Contract Variation, Progress etc.

11.1 Mobilization Time and Contract Period TIME SCHEDULE

11.1.1 The contractor is required to commence the work within 15 days from the dates indicated in letter of intent unless BHEL decides to fix any other later date. However, BHEL Engineer will certify the actual date of start of work after adequate mobilisation of manpower and T&Ps by the contractor in their respective site.

11.1.2 The duration of pre-Boiler flushing is generally 10 days and Chemical Cleaning of Boiler is generally 10 days. Entire work as detailed in the tender specifications **shall be completed** within **6** weeks from the date of start of material handling/ erection work of the unit. **(the programme of works and period is to be decided along with BHEL engineer at site depending upon the work fronts availability)**

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

11.2.0 OVER RUN

11.2.1 In case due to reasons not attributable to the contractor, the work gets delayed and scheduled completion gets extended, the contractor shall not be entitled for any over run compensation for a period of two weeks after the contractual completion date. In case the scheduled completion time gets extended beyond two weeks as stated above, the contractor shall be considered for payment of fixed over run charges @ Rs. 10,000/- Per week (Rupees ten thousand per week only) on receipt of advance notice intending to claim over run & on fulfilment of following condition:-

a) The reasons for delay in completion of work are not attributable to contractor
b) The targets fixed during the over run period are achieved by contractor.

11.2.2 Once the claim of over run charges is admitted no other compensation whatsoever will be entertained.

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

11.8 Foreclosing of Contract

11.8.1 BHEL at its discretion may foreclose the contract at any time after the completion of contract period from the date of starting the work at site.

11.8.2 In case it is decided to withdraw any portion of work or foreclose the contract, the percentage value of the work withdrawn/left over shall be determined mutually. BHEL engineer's decision in regard to status of an item shall be final and binding on the contractor.

11.8 Definition of Work Completion

Contractor’s scope of work under the specifications herein shall deem to be completed in all respect, only when all the activities are completed satisfactorily and so certified by the contract awarding authority of BHEL. The decision of BHEL in this regard shall be final and binding on the Contractor.

Special Conditions of Contract

Section-12

12.1 Terms of Payment

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

12.1.2 Contractor shall submit bills for the work completed under the specification detailing work done . The format for billing shall be approved by BHEL before raising invoices.

12.1.3 Subject to any deduction which BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder:

THE PAYMENT SHALL BE RELEASED AS FOLLOWS;

I 90% of contract value shall be payable on completion of work as per contract.

NOTE:1) BHEL site in-charge, at his discretion can split this 90 % payment, to facilitate site operations.

II. Balance 10% of contract value shall be payable as under;

i). 5% of the above value shall be payable on completion of all pending work, reconciliation of material wherever required, area cleaning etc.

ii) The balance 5% of the above value will be payable after 3 months on contractors discharging his responsibilities as stipulated in this contract and on passing of final bill.

III. No separate payment shall be made for any temporary structures, lifting arrangements for testing and other NDT etc., as all these activities shall be performed as integral to work as per site requirement and as directed by Engineer.

Section-13

Extra Charges for Modification and Rectification

THIS SECTION IS NOT APPLICABLE

SECTION-14

SPECIAL CONDITIONS OF CONTRACT

14.0 INSURANCE

14.1

All contractors equipment will be insured by the contractor up to the time of completion of the contract. The Contractor shall take a workers' compensation insurance policy for all the workmen employed by him against accidents and injuries and all other insurance as per the statutory/customer requirements with no liability to BHEL or its customer.

14.2 Insurance by the Contractor and Indemnification of BHEL

14.2.1
BHEL/Client has obtained project insurance policy and CPM Policy

BHEL has taken third party liability insurance, indicating in the proposal for such insurance that sub-contractors will be taking part in the erection work detailed in this tender specification. However, the bidder has to bear any expenses/consequences over and above the amount that may be reimbursed to BHEL by such coverage of third party liability insurance taken by BHEL.

Such additional liability will be to cover and indemnify BHEL and its customer of all liabilities which may come up and cause harm/damage to other contractors / customer/ BHEL properties / personnel or all or anybody rendering service to BHEL/ customer or is connected with BHEL/ customer's work in any manner whatsoever. The bidders' specific attention is also invited to clause 2.10 of General Conditions of Contract.

14.2.2
Contractor shall obtain suitable statutory as well as non-statutory insurance policies for all the properties belonging to him and also for his personnel deployed at project for execution of the contract work.

SECTION-15

SPECIAL CONDITION OF CONTRACT

15.0 Earnest Money Deposit (EMD) & Security Deposit (SD)

15.1 Earnest Money Deposit:

Earnest Money Deposit for this tender will be Rs. 1,00,000/- (Rupees one lac only). One time EMD will be Rs. 2.0 lacs.

EMDshall be deposited in cash (as permissible under income tax act), pay order or demand draft (payable at Nagpur in favour of 'Bharat Heavy Electricals Limited') only. No other form of EMD remittence shall be acceptable to BHEL.

EMD by the tenderer will be forfeited as per tender documents if

i) After opening the tender, the tenderer revokes his tender within the validity period or increases his earlier quoted rates.

The tenderer does not commence the work within the period as per LOI / contract. In case the LOI / contract is silent in this regard then within 15 days after award of contract.

EMD shall not carry any interest.

15.2 Security Deposit

15.2.1 Security Deposit should be collected from the successful tenderer. The rate of Security Deposit will be as below:

Sn	Contract value	Security Deposit amount
1	Up to Rs. 10 lakhs	10% of contract value
2	Above Rs. 10 lakhs upto Rs.50 lakhs	1 lakh + 7.5% of the contract value exceeding rs. 10 lakhs.
3	Above Rs. 50 lakhs	Rs 4 lakhs + 5% of the contract value exceeding rs. 50 lakhs.

The security deposit shall be remitted <u>before start of the work</u> by the Contractor.

Security Deposit may be furnished in any one of the following forms

i) Cash (as permissible under the Income Tax Act)

ii) Pay order, demand draft in favour of BHEL.

Iii) Local cheques of scheduled banks, subject to realization.

Iv) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc.

(Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back).

Bank Guarantee from scheduled banks/public financial institutions as defined in the companies act subject to a maximum of 50% of the total security deposit value. The balance 50% has to be remitted either by cash or in the other form of security. The bank guarantee format should have the approval of BHEL.

Fixed deposit receipt issued by scheduled banks/public financial institutions as defined in the companies act. The FDR should be in the name of the contractor, a/c BHEL, duly discharged on the back.

Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the security deposit should be collected (Bank Guarantee or Demand Draft) before start of the work and the balance 50% may be recovered from the running bills.

EMD of the successful tenderer, excepting those who have remitted one time EMD, shall be converted and adjusted against the security deposit or specific request by the contractor.

The security deposit shall not carry any interest.

Note: acceptance of security deposit against Sl. No. (iv) and (vi) above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

Security deposit shall not be refunded to the contractor except in accordance with the terms of the contract.

General

Provisions of EMD and SD appearing in General Conditions of Contract stand withdrawn and shall not be applicable

APPENDIX I-A

PROCEDURE FOR PRE-BOILER FLUSHING

CONTENTS

1.0.0. GENERAL

In order to achieve trouble free, continuous operation of the power plant and also to maintain the water quality during the initial operation of the plant, it is very important that all the systems carrying DM water from condenser to boiler drum, must be cleaned thoroughly to remove dirt, oil, grease etc. or else presence of these undesirable matter will contaminate the system. For achieving the cleanliness, the detergent flushing by using the chemical EXTRAN MA01 is carried out in the pre boiler system consisting of Feed water system, Condensate system and the Heaters drip system.

2.0.0. PREPARATIONS

Prier to starting the detergent cleaning, the pre-boiler system , i.e. feed water system, condensate system and drip system is prepared for its completeness and temporary lines/looping connections etc. as described in the following manner;

2.1.0. All the systems should be complete in all respects. Erection of all pipelines (including valves)- feed water lines up to economizer, condensate lines and heaters drip lines, HP, LP heaters, deaerator should be complete along with their fittings such as stand pipes, gauge glasses etc. However, these fittings are to be isolated during the flushing.

2.2.0. Drain cooler vents to flash tank should be isolated.

2.3.0. Remove all safety valves and provide blanks on the stubs on the following;

2.3.1. HP heaters shell side and water side.
2.3.2. LP heaters shell side and water side.

2.3.3. Deaerator.

2.4.0. Hydro test of the entire system to be flushed should be completed.

2.5.0. Complete the temporary pipe line connection as shown (dotted lines)
In the enclosed scheme for the detergent flushing. The drains and vents at the proper locations are to be provided. Wherever possible, the drains/vents are to be connected to the system drain.

2.6.0. Ensure the readiness of mixing tank (including tank drain and overflow lines up to neutralization pit), its approach, platform, detergent filling arrangements, level indications etc.

2.7.0. Ensure the readiness of mixing pumps, motors, LT supply and motor starters. Motor trial run should be carried out.

2.8.0. Close tight all the gate valves of the steam extraction lines to heaters. Ensure that all the NRV's in these lines are also closed. Open the drains before these NRV's in atmosphere and observe for any passing (during flushing operation) . it should be ensured that detergent solution does not enter the turbine, condenser, heaters, gland steam condenser and drain cooler by any chance. Blank suction and discharge ends of BFPs and CEPs to prevent the entry of the flushing fluid into the pumps. Close all the valves in the steam lines to and from deaerator.

2.9.0. Complete all the instrumentation in the system;

2.9.1 Discharge pressure gauges of temporary mixing pumps.
2.9.2 Pressure gauges after the system inlet valve.
2.9.3 Pressure gauges before the system return valve.
2.9.4 Sampling points at system inlet and system outlet

2.10.0 Make sure that all the chemicals and laboratory reagents and apparatus for testing the samples, are available.

2.11.0 Ensure that the required quantity of DM water and raw water is available for the process.

2.12.0 BFP suction strainer elements are to be removed before flushing.

2.13.0 Ensure the completion of all instrumentation tapping points of the complete system, up to isolating root valves, before commencing the flushing. The instruments are however, to be isolated before the flushing. The temperature stub points are to be blanked.

2.14.0 Ensure that no cutting /welding work is carried out on any equipment after the flushing is completed.

2.15.0 Deaerator should be cleaned manually and boxed up. Deaerator nozzles and trays are not to be removed.

2.16.0 Remove all the orifices/flow nozzles and control valves in the system before flushing and put spool pieces instead. Remove NRV internals in all the lines.

2.17.0 Ensure that permanent hangers and supports, restraints are provided for all the pipelines and equipments, before starting the flushing.

2.18.0 Lighting arrangements at all the locations of the system and around the mixing tank is to be ensured.

2.19.0 Safety precautions, such as aprons, hand gloves, eye protection goggles, first aid boxes are to be ensured . Disposal of drained detergent to storm water drain ststem to ensured.

3.0.0. **PROCEDURE**

3.1.0. The flushing of the system is done in following sequence;

1. Mass flushing of the system.
2. Detergent Flushing –by using the alkaline detergent EXTRAN MA 01 OF 0.5 % concentration.
3. Rinsing operation.

3.2.0. **MASS FLUSHING.**

3.2.1. Mass flushing of the system is carried out with DM water. However, the first filling of the system may be done with raw water but, the subsequent fillings must be done with DM water only. The mixing tank is filled with raw water and the mixing pump is started. The system is completely filled with raw water and then drained completely.

3.2.2. Again fill the system with DM water and establish the circulation. Samples at inlet & outlet may be taken and compared visually and analyzed. The process of mass flushing is deemed to be complete when the turbidity and conductivity of water at system inlet and system return are same. Drain the complete system.

3.3.0. <u>DETERGENT FLUSHING</u>:

3.3.1 Fill the system completely with DM water. Keep the system on circulation and add the alkaline detergent (EXTRAN MA 01) to obtain the concentration of 0.5%. Circulation is continued and all the loops are included in the circulation one by one suitably operating the respective valves. During the process, the samples may be analyzed for oil content and pH only which should get stabilized at system inlet and system outlet by the time detergent flushing is declared completed. The detergent flushing is, in fact, time bound

process. The duration of circulation in each circuit can be from half to one and half hours depending upon the length of the circuit. After the detergent flushing is completed, drain the system completely. For the disposal of the detergent, only the dilution with water is required. As such, the detergent is bio-degradable.

3.4.0. **RINSING OPERATION**

Fill the mixing tank with DM water. Start the flushing pumps and fill the system, keep the loop on circulation for 15 to 20 min. Then open the drain by a little amount. Make up the level in the mixing tank by DM water. Try to drain max. Qty. of water from the system continuously throughout the operation. The samples are taken at outlet and inlet at the interval of ½ hour, and analyzed for pH. The rinsing process is deemed to be complete when the pH values are same at outlet and at the inlet. Drain the complete system.

3.5.0 All the drain valves in the system stand pipes etc should be opened for a while during and after each flushing to ensure removal of any blockage.

3.5.1. While carrying out the flushing of shell side of HP and LP heaters, care is to be taken for properly venting the heaters for proper filling. All the systems are also to be properly vented during flushing.

3.5.2. Mounting of level switches to be done later.

4.0.0. **SEQUENCE AND CIRCUITARY OF DETERGENT FLUSHING**

4.1.0. Make temporary connections as per scheme. The suction and discharge flanges of BFPs are to be blanked. Please note that suction and discharge of only one BFP is looped whereas suction of the second BFP is used as the return to mixing tank.

4.2.0. The circuitry of mass flushing /detergent flushing and the rinsing operation shall be as follows:

4.2.1. Mixing tank, mixing pump-point near Eco NRV- feed control station (one line at a time) – bypass of HP heater 6-bypass of HP heater 5 –BFP discharge line, suction line - booster pump, suction line-FST, second BFP-
Suction line through its BP suction line. Back to mixing tank. Afterwards through recirculation and through HP heater coil side to be included.

4.2.2. Mixing tank –mixing pumps –CEP discharge header-Gland steam condenser bypass/ through, deaerator control station-drain cooler, LPH bypass up to a point before deaerator –mixing tank. Afterwards LP Heaters coil side, excess return line and condensate recirculation line –mixing tank to be included.

5.0.0. **POST FLUSHING OPERATIONS**

5.1.0. Remove all the temporary lines/ looping in the system.

5.2.0. Remove the temporary lines of the system with the mixing tank and mixing pumps.

5.3.0. Make and check that all the pipelines and connections are normalized as per the final scheme of the normal operation.

5.4.0. Open the manhole of deaerator / FST and inspect it from inside for foreign substance and clean thoroughly. Box up after inspection.

6.0.0. **SAFETY PRECAUTIONS**

6.1.0. Ensure that the safety procedures for Alkaline flushing of the Pre-boiler System are followed.

6.2.0. Due precautions must be taken while tightening the flanges of temporary pipe joints of the loop so that they do not leak when the pump is started and thereby a spray of water /detergent leaks through these joints.

6.3.0. Before a person enters the deaerator for inspection, manhole may be kept opened for 8-10 hours and air may be forced in the deaerator during that period. 24 V lamps to be used inside any vessel.

6.4.0. No drilling, welding or cutting operations are allowed during the process.

7.0.0. COMPLETION CRITERIA

7.1.0. Samples at inlet & outlet are compared visually before declaring the Mass flushing complete. Turbidity of the samples should be the same.

7.2.0. Detergent flushing is declared complete when oil content & pH values of water at inlet & outlet are same.

7.3.0. Rinsing operation is declared completed when conductivity & pH values of water at inlet & outlet are same.

8.0.0. **REQUREMENTS OF MATERIALS**

1.	D. M. Water	3000 MT
2.	Detergent EXTRAN MA 01	2000 Lits
3.	Laboratory equipments & reagents For testing pH value, oil content Conductivity meter, Turbidity meter	
4.	Thermometer (0-200 deg C)	2 Nos.
5.	Pressure Gauges (0-20 Kg/cm^2)	7 Nos.
6.	Sampling Bottles	12 Nos.
7.	Mixing Tank	20 T capacity.
8.	Temporary Pipes, Flanged dummy dummy ends, valves etc.	As per schematic requirement.

APPENDIX I-B

PROCEDURE FOR CHEMICAL CLEANING

Format No. :

SP: 02-F07

Rev No. :01

PROCEDURE FOR CHEMICAL CLEANING OF BOILER WITH EDTA

DOC NO. : PW:TSX:	REV NO. : 00	EFF DATE
PREPARED BY	REVIEWED BY	APPROVED BY
ISSUED TO :		
COPY NO. :	ISSUED BY	
DATE OF ISSUE :	(SIGN.)	

BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR WESTERN REGION

PROCEDURE OF CHEMICAL CLEANING OF BOILER WITH EDTA	
1.0	**PLANT DETAILS**
2.0	**OBJECTIVE**
3.0	**PROPOSAL**
4.0	**SERVICES REQUIRED**
5.0	**EMERGENCY PROVISIONS**
6.0	**EMERGENCY PROCEDURE**
7.0	**STATE OF THE PLANT**
8.0	**PROCESS PROCEDURE**
9.0	**COMPLETION CRITERIA**
10.0	**CHEMICAL CLEANING WASTE TREATMENT & DISPOSAL**
11.0	**APPENDICES**
	A) DRAWING
	B) ANALYTICAL PROCEDURES
	C) LOG SHEET FORMATS

PROCEDURE OF CHEMICAL CLEANING OF BOILER WITH EDTA

	PLANT DETAILS	
1.0		**STATUS**
	The steam Generator is a control circulation boilers with rifled water wall tubes..	
	Boiler Design Data: SH outlet Pressure - 155 Kg/cm^2 (a) SH outlet Temperature - 540 ^0C Feed Water Temperature (at eco inlet) - 247 ^0C Maximum Continuous Rating - 315 t/h.	
	. **WATER HOLDING CAPACITY**	
	1. Water wall + Drum (full) - 200 m^3 **2. Economizer .. - 60 m^3** **3. Superheater .. - 140 m^3**	
	OBJECTIVE	
2	The objective of this procedure is to chemically clean and passivate the internal surfaces of the steam generating portion (water touched surfaces) and heating surfaces (Economiser) using specified chemicals employing a single step process. This will render the above mentioned surfaces free of mill scale ,and other deposits and form uniform & smooth protective layer of magnetite . With this protective layer, the generating surfaces are rendered passive to generate adequate negative potential under the operating pH to resist corrosion.	
	PROPOSAL	
3.0		
3.1	The objectives are achieved by carrying out the following proposals.	
3.2	By carrying out Alkali flushing, water rinsing to remove loose rust, debris, oil and grease, if any, left in the Boiler.	
3.3	Then, it is subjected to acid cleaning for the removal of patchy mill scale and adherent rust. The acid pickled surface is passivated for the formation of uniform and adherent magnetite layer. Both chemical cleaning and passivation process are completed in a single step.	
4.0	***SERVICES REQUIRED***	
4.1	Prior to the commencement of chemical cleaning, all the demineralised water storage tanks should be kept full and the demineralising units kept in regenerated condition. Approximately, 1400 m^3 of demineralised water will be consumed for the entire process. At any time of acid cleaning, a minimum of two boiler volumes (app. 400 Cu.m.) of demineralised water should be available in ready stock to facilitate rapid flushing of the system in the event of chemistry upset.	

4.2.	All the required quantities of chemicals as given below should be made available prior to the commencement of the process.	

SPECIFICATION OF CHEMICALS & QUANTITY — STATUS

NAME OF CHEMICALS	QTY/Each Boiler
1. Tri Sodium Phosphate (Purity, as P2O5 :17.5% Min)	175 kgs
2. Disodium Hydrogen Phosphate (99 % purity)	100 Kgs
3. Ammoniated EDTA, 40% wt/wt as **active EDTA** ammoniated solution pH = 9.8) (EDTA : Ethylene diamine tetra acetic acid) Density : 1.18	26 tons
4. Ammonia solution (20% Min as NH_3, sp gr:0.91) as per IS 799 / 1990	1000 Litres
5. Hydrazine Hydrate (80% Min.conc). To IS 12086/1991	800 Litres
6. Bhelmax	450 kg
7. Bhelsol	450 Litres

4.3 Temporary drum water level gauge glass and (tell-tale lamp indication) at control room and low point drain area should be made available.

4.4 220 AC/DC, 110V AC control supply to be available.

4.5 Instrument/service Air to be available.

4.6 Chemist/Express lab to be made available for testing during the process.

4.7 Flood lights / telephones / walkie-talkie are available.

4.8 For effluent treatment, compressed air facility and suitable perforated **Carbon Steel / polythene tubing arrangement shall be made available.**

STATUS

4.9 **SAFETY EQUIPMENTS:**

1. Gum boots (Various sizes)	4 Pairs
2. Rubber gloves	4 Pairs
3. Rubber or Polythene aprons	4 Nos.
4. Helmets	10 Nos.
5. Safety goggles plain glass	6 Nos.
6. Face mask (Transparent , plastic)	4 Nos.
7. First aid box (containing dilute ammonium hydroxide, 50% sodium	

	bicarbonate solution, eye lotion, bandages, tincture iodine, cotton, burnol etc)	
5.0	EMERGENCY PROVISIONS ***Flushing and washing water supplies***	
5.1 5.2	Ample supplies of tepid flushing and washing water supplies shall be provided at all possible points of discharge, spillage or escape of chemicals.	
5.3	Adequate provisions shall be made for emergency treatment of the eyes, comprising eye wash bottles, located conveniently to places where discharge, spillage or escape of chemicals can occur.	
5.4	Safety shower shall be provided.	
5.5	A suitable first aid treatment room with outside telephone facilities shall be provided within a reasonable distance of the place where chemicals are being used.	
5.6	The protective clothing and apparatus required for emergency use shall be made available near the acid cleaning area.	
5.7	**FIRST AID TREATMENT**	STATUS
5.7.1	Splashes of the eye	
5.7.2	Immediately flood the eye with water. To be effective the eyelids must be opened. The eyelids should be pushed apart using the thumb and index finger of the left hand. The casualty will probably not be able to open the eye himself because of painful spasms.	
5.7.3	If an eye wash bottle is used the jet should not be directed at the front of the eye. It should be directed in from the side, so that flow is over the surface of the eye.	
5.7.4	Irrigation should be continued for 5 – 10 minutes after which the casualty should be taken to the first aid room.	
5.7.5	Irrigation should be continued in the first aid room. Remember vision is saved by thorough irrigation, no other treatment can prevent damage if this is omitted.	
5.7.6	After thorough irrigation the eye should be covered with a pad; the patient should be referred for medical opinion.	
	Irritation of the skin	
5.8 5.8.1	If signs of skin irritation occur the persons should be removed from contact and referred for medical opinion. In the event of the splashing of the skin with chemicals the effected area should be washed thoroughly avoiding spreading contamination to the face and eyes.	
	GENERAL	
5.9 5.9.1	Test area will be cordoned off and unauthorized persons entry shall be prohibited . Suitable signboard shall be displayed.	
5.9.2	Whenever any inspection is made during the cleaning process, the location should be adequately ventilated.	

		STATUS
	B) Water wall metal temperature measurements as given below: At AB elevation, 4 number thermocouples shall be installed on corner water wall tubes (outside the furnace) and at EF elevation 2 numbers thermocouples shall be installed in the front and rear water wall (outside the furnace) at accessible locations. C). Two more thermocouples with pads one each at left and right side of ECO coil shall be welded at suitable locations, inside the boiler (or penthouse) to measure the metal temp. (Totally 6 Nos thermocouples will be used for measurement of water wall tube metal temperature and two Nos for economizer tube temperature) Peening type temporary thermocouples are to be provided in the temp measurement points on the water walls.. and economizer . Provision has to be made for monitoring temperature in the control room.	
7.3	SAMPLING DURING PROCESS To get representative samples of the process solution, sampling points with sample coolers are to be provided at the following locations: A) Drum water sample to be drawn from CBD sampling line and from a spare tapping point in water side through temporary sample coolers. B) Two numbers of sampling points are to be provided from bottom ring header, at left and right. Temporary sample coolers are to be used for these.	
7.4	For chemical cleaning and passivation processes, essential control and instruments viz. protections, interlock, alarms, measurement, annunciation etc. required for safe light-up of boiler are made available, as per mutually agreed list between M/S NSPCL and BHEL site.	
7.5	All the related boiler auxiliaries are made ready and available for boiler light up. This includes chemical dozing pumps, tanks, fans, oil pumps etc.	
7.6	Prior to the commencement of chemical cleaning of the boiler, detergent flushing of pre-boiler system is to be completed.	

		STATUS
7.7	The eco recirculation valve shall be kept open through out the chemical cleaning process.	
7.8	O & M instruction for the boiler and other auxiliaries are available well in advance of the commencement of the cleaning process.	
7.9	All the safety measures discussed and implemented in advance with suitable instruction/caution tags provided at strategic places/ equipment.	
7.10	Boiler water wall test tube coupons are placed at two ends inside the drum to see the effectiveness of the cleaning.	
7.11		
7.12	Proper effluent treatment arrangement is to be made available at site.	
7.13	All fabrication work to be completed as per scheme provided. MINIMUM OPERATIONAL REQUIREMENTS. 1. Ensure the commissioning of the following including their protections, interlocks, measurements, alarms and annunciations:- • ONE ID FAN • ONE FD FAN • ONE AIR PRE-HEATER • STEAM COIL AIR PRE-HEATER • LIGHT OIL FIRING SYSTEM • FSSS • SADC • SCANNER AIR SYSTEM • Measurements, alarms, annunciations pertaining to secondary air flue gas, feed water, steam & boiler metal temp.	

	2. Ensure free expansion of the furnace and duct and provision of expansion markers 3. Blowdown system of boiler 4. Proper drainage system of boiler area 5. Air in leak test of two passes of ESP 6. Mechanical readiness of two passes of ESP. 7. Adequate quantity of light oil & readiness of light oil handling system. 8. Completion of pre-boiler system detergent flushing. 9. Temporary sampling system along with the cooling arrangement for collecting samples from the header drain during chemical cleaning is ready. 10. Water and steam systems are ready for operation.	**STATUS**

	11. Air and flue gas system ready for operation. 12. Effluent treatment pit to hold approximately 450 cu.m is ready. 13. Drainage line to effluent treatment is ready. 14. Readiness of BFP and feed system (optional). 15. Drum water sampling system along with sample cooling arrangement. 16. Completion of pre-boiler system detergent flushing. 17. Temporary sampling system along with the cooling arrangement for collecting samples from the header drain during chemical cleaning is ready. 18. Water and steam systems are ready for operation.	
	19. DG set, DG switchgear, emergency switch gear and availability of emergency supplies for ♦ Scanner air fan ♦ Emergency lighting 20. UPS 21. Fire fighting system of concerned equipments 22. Equipment cooling water system shall be made ready. 23. Availability of adequate quantity of DM water. 24. Adequate capacity of instrument air and service air system 22. Emergency operating instructions viz. AC power failure, DC.power failure, APH fire etc. 25. Adequate lighting in operating areas. 26. Public address system at all operating locations, including telephone & walki talkies at all working areas 27. Readiness of staircases, hand railings and platforms 28. Personal safety equipment 29. Easy access and approaches to all the operating equipments. 30. SH metal temperature measurement shall be made ready for continuous monitoring in the control room. 31. Data logging printer at control room shall be made available to record the boiler parameters periodically.	**STATUS**

8.0	***PROCESS PROCEDURE* :** **ALKALI FLUSHING:**	**STATUS**
8.1		
8.1.1	The requisite quantities of (a) Tri-sodium Phosphate (TSP) & (b) Di Sodium Hydrogen Phosphate to be added to the mixing tank along with DM Water and the solution will be thoroughly mixed by recirculation so that final solution in the Boiler contains 0.1 % TSP and 0.05 % DSP. The solution will be injected into the boiler through the bottom ring header drains and economizer drain operating the chemical filling pump. Further DM water will be taken in the boiler up to normal level	
8.1.2	Light up the boiler as per O&M instructions and gradually raise the boiler water temperature to 130–140 deg C. Trip the boiler and keep the fans running for cooling.	
8.1.3	Drain the boiler at 90^0 C to the plant water disposal system, by keeping open the drain valves fully. (with out any throttling). The drain solution will be diluted with plenty of service water.	
8.2		
8.2.1	**HOT WATER RINSE**	
8.2.2	Once the draining is completed, refill the boiler with de-mineralized water. Light up the boiler. Gradually raise the boiler water temperature to 130-140^0 C. Trip the boiler and keep the fans running for cooling.	
	Drain the boiler in the hot condition to the plant's water disposal system by keeping open the drain valves fully (without throttling). The pH and PO_4 will be measured in the drain water. The pH and PO_4 are to be reduced to a level below 7.5 and 10 ppm respectively	

		STATUS
8.3		
8.3.1	**COLD WATER RINSES**	
8.3.2	Cold water rinses will be done by fill and dump method. During these steps, draining will be done to the plant's water disposal system. pH will be monitored during draining of each cold water rinse stage. The rinsing operation will be continued until the pH of the drain water is almost equal to pH of inlet water used for rinsing.	
	Flush all sampling and blow down lines. Check all temperature / pressure measurements relevant to the process for monitoring at UCB and ensure their reliability	
8.4		
8.4.1	The following guide line should be followed besides O & M instruction for boiler light up.	
8.4.2		
8.4.3	**LIGHT UP**	
8.4.4	The following guide line should be followed besides O & M instruction for boiler light up.	
	Drum air vents, SH air vents & start up Vents are to be opened before lighting up the boiler.	
	Initiate boiler light up as per O & M instructions.	
	Drum level is to be monitored closely and controlled below normal level by operating down comer blow down from UCB or draining and filling the boiler at drain header. Drum level Temporary indication shall be displayed at UCB and near drain header.	

		STATUS
8.5	**ACID CLEANING & PASSIVATION.**	
8.5.1	In this process the mixture of chemical solutions containing EDTA, inhibitor, ammonia and hydrazine in DM water is filled in the boiler . Boiler is fired and the temperature raised to 140 deg C and subsequently cooled. The removal of deposit constituents and subsequent passivation of the metal surfaces will occur during this single step.	
8.5.2	Keep ready the required quantity of ammoniated EDTA (40% wt / wt) solution in the EDTA storage tank.	
8.5.3	Keep ready the inhibitor “BHEL MAX” & “BHELSOL” for addition in the Chemical dissolving tank.	
8.5.4	Keep all the Boiler Blow down valves shut and drum vent valves & start up vent open during boiler filling.	
8.5.5	Draw 20 Cu.m of DM water in the dissolving tank. Start the temporary chemical fill pump and system put into recirculation. Transfer the required quantity of Ammoniated EDTA (40% wt/wt) solution from the EDTA storage tank to the dissolving tank. Check the EDTA concentration in the dissolving tank. Stop transferring the EDTA solution, when the EDTA concentration reaches around 3 $\pm$ 1%. Now add the required quantity of Hydrazine hydrate and inhibitors (BHEL Max & BHEL Sol). Recirculate till all the chemicals uniformly mixed up. With this one batch of EDTA Chemical solution is ready for filling into the boiler.	
8.5.6	The approx. quantities of various chemicals that are to be mixed per batch of 20 m^3 is given below: 1. EDTA ammoniated (40 %) concentrate: 2 to 3 m^3 2. BHELMAX : 40 kgs 3. BHELSOL : 40 lit 4. $N_2H_4H_2O$ (80%) : 30 litres Ammonia will be added if required to adjust the pH. DM water will be used to make up to 20 m^3 . This solution will be filled into the Boiler through LP drain header fill line with the temporary chemical fill pump.	

	STATUS
Repeat the preparation of Chemical solution and batch filling as explained in point no 8.4.5 till water level in the drum reaches the center line of the gauge glass. The composition of the filling solution shall be as below: EDTA content : 3 + 1% W/v Hydrazine : 1000 ppm (min) pH : 9.0 to 9.8 - Light up the boiler as per normal operating procedure with minimum firing rate (say 2 oil guns in AB elevation) - The drum and super heater vents are to be closed when steaming starts, say at 1 kg / sq.cm in the drum. - Keep the start up vent in SH in crack opened condition. - Note the time at which the temperature of boiler water reaches 110 deg C. - Continue raising the temperature of boiler water to a saturation temperature of 140 deg C. - Once the temperature of boiler water reaches 140 deg.C, control the firing rate in such a way that the boiler water temperature is maintained at 140 to 145 deg.C, for a min. period of 4 hours. - Then trip the boiler - Continue running the ID / FD fans to bring down the boiler water temperature quickly. - Samples have to be taken every 30 minutes from the sampling points at locations given as per 7.3, from the time when the temperature in the system has reached 110^0 C and analysed for pH, EDTA concentration, and Iron content . - Boiler water temperature & Water Wall metal temperature at the locations indicated as per 7.2 are to be measured and logged.	

		STATUS
	PROCESS COMPLETION CRITERIA - Cleaning process is to be continued till iron concentration in three consecutive samples show equilibrium status. - When the iron concentration in the cleaning solution is constant, it indicates that all the oxides have been dissolved. However, a minimum EDTA contact period of 6 hours from the time of attaining the required temperature (110 deg. C) shall be allowed. - If the iron concentration values do not level out and attain equilibrium status, regardless of analytical results, the EDTA contact period with temperature exceeding 110^0C shall not be allowed for more than 8 hours. - Declare the completion of pickling process once the EDTA strength and iron concentration level out and reach equilibrium. - After completion of pickling process as above, the system shall be allowed to cool with the ID & FD fans in operation. Open the drum air vents when the pressure reaches to 1 kg / sq.cm. - When the temperature comes down to 95 deg. C, the system shall be drained completely in hot condition to the effluent pit by opening all the drain valves .	
8.6	**TREATED DM WATER RINSING:** - Prepare a blended solution of ammonia & Hydrazine with calculated quantities in the Dissolving tank in order to achieve a solution pH 9.0 to 9.5 and hydrazine content 50 ppm in the DM water being filled in the boiler. - Fill the boiler with the above treated DM water through low point drains and economizer as practiced earlier, up to just above the centre gauge glass. - Light up the boiler as per O&M instruction. - Raise boiler water temperature up to 120 deg C and then shut down the boiler. Allow the boiler to cool down naturally.	

		STATUS
	- When the boiler water temperature comes down to 95 deg C. drain the boiler to the effluent pit and allow the system for natural aeration. - Open drum for inspection. Manually clean the drum if required.	
9.0	**INSPECTION CRITERIA:**	
9.1	The test coupons placed at identified locations will be taken out. All coupons shall be free of deposits and have uniform coating of the protective layer.	
9.2		
9.3	The drum surface shall be visually inspected for uniform smooth coating of protective layer.	
10.0		
10.1	The low point header will be inspected and loose debris if any, will be removed.	
10.2	CHEMICAL CLEANING WASTE TREATMENT & DISPOSAL. Hot DM water water flushings shall be drained into plant normal drain.	
10.3	The organic spent EDTA chemical solution after the cleaning process is drained into a pit. The pH of the effluent will be in the range of 8.5 to 9.0 and hence no treatment for pH adjustment is required as it would meet the pH requirement for disposal. Compressed air shall be used to destroy the residual Hydrazine & organics and the effluent shall be disposed after aeration for 10 days. (The organic chemical is completely bio-degradable). NOTE : 1. Drains to be provided at lowest points of temporary piping. 2. Service water supply should be available near the pump operating areas. 3. Additional Check lists / modifications in the lay-out, if found necessary, to be made at site in consultation with site Commissioning In-charge. 4. All the sampling points along with sample coolers and the temperature measurement points with necessary thermocouples shall be provided as indicated in 7.3 & 7.2 respectively.	

LOG SHEET

PROJECT : DATE : / /
UNIT NO. :

ACTIVITY : EDTA ACID CLEANING AND PASSIVATUION

I. ADDITION OF CHEMICALS:

Sl. No.	DATE	TIME	NAME OF CHEMICAL ADDED	QUANTITY

II. ANALYTICAL DATA:

Sl. No.	DATE	TIME HRS.	SAMPLE POINT	TOTAL EDTA %	IRON PPM	pH
1.						
2.						
3.						
4.						
5.						

Signatures

BHEL

1. PROCEDURE FOR DETERMINATION OF TOTAL EDTA CONCENTRATION IN PROCESS SOLUTION DURING CHEMICAL CLEANING.

A . PRINCIPLE OF THE METHOD :

EDTA reacts with Zirconium ions under strong acid conditions to form a chelate. Th e end point of the titration is indicated by a Xylenolorange indicator.

B . REAGENTS AND APPARATUS REQUIRED:

APPARATUS.

1. Erlenmeyer flask 300 ml capacity.
2. Pipettes
3. Hot plate
4. Magnetic stirrer

REAGENTS

1. Hydrochloric acid (conc.)
2. Standard Zirconium oxy chloride (ZrOCl2. 8H2O) 0.1 M solution in 1 N HCl. (Take a 1000 ml volumetric flask and add 32.23 gram of ZrOCl2.8 H2O and add DM water to about 500 ml. To this add 85 ml of conc. HCl. Make up to 1000 ml mark with DM water and mix well)
3. Ascorbic acid
4. Xylenolorange indicator.

C . TEST PROCEDUTE :

1. pipette out 10 cc of the water sample into a 300 ml Erlenmeyer Flask.
2. Add 10 ml of conc. HCl (the pH value is about 1.0)
3. Add a spatula of ascorbic acid.
4. Boil of the solvent on the heating plate for about 5 minutes.(The yellow colour of the ferric ion should disappear due to reduction to ferrous iron.
5. Immediately after the addition of 0.05 ml of 0.05 % xylenol orange indicator the sample is titrated with 0.1M $ZrOCl_2$ untill the colour changes from yellow to red violet; The colour changes from yellow to red violet. The colour change shall remain constant for at least 3 min.

D . CALCULATION :

The total EDTA concentration % = Volume of 0.1M ZrOCl2 consumed x 0.292

2. PROCEDURE FOR THE DETERMINATION OF TOTAL IRON CONCENTRATION IN PROCESS SOLUTION DURING CHEMICAL CLEANING.

A . APPARATUS REQUIRED:

1. HACH DR/890 CO LORIMETER
2. Volumetric flasks
3. Pipettes
4. Measuring cylinders

B . REAGENTS REQUIRED:

1. FerroVer reagent powder pouches (Supplied by HACH)

C . TEST METHOD:

2. Sample to be diluted with DM water so that the concentration of Iron will be less than 3.00 ppm in the test solution.
3. 25 ml / 10 ml of the diluted solution will be taken in the curette. This will be used as a blank.

4. Place the blank in the cell holder and cover the sample cell with the cap.
5. Zero the equipment and display will be showing 0.00 mg/L Fe.
6. Fill another sample cell with 25/10 Ml sample
7. Add the contents of one FerroVer Iron Reagent Powder Pillow to the sample cell (the prepared sample). Cap and invert to dissolve the reagent powder.
8. Start the timer for 3 mts period.
8. Place the prepared sample into the cell holder. Cover the sample cell with the instrument cap.
9. PressREAD
10. The conc will be displayed
11. Multiply with dilution factor and report the ppm/ g/Lit of Fe concentration.

3. ESTIMATION OF HYDRAZINE.

A.. REAGENTS .

a. Standard Potassium bromate 0.1 N

Dissolve 2.7836 gram of Potassium bromate (KbrO3) and 10 gram of Potassium bromide (KBr) in DM / Distilled water and make up to 1000 ml.

b. 0.1 % Methyl orange indicator solution.

c. Hydrchloric acid (conc.) AR.

B. PROCEEDURE.

a) place 10 ml of sample in a titration flask.

b) Add 10 ml of conc. HCl.

c) Add about 5 drops of Methyl orang indicator.

d) Titrate with standard KbrO3 titrant to the first appearance of yellow colour.

C. CALCULATION.

Hydrazine as N_2H_4, ppm = titre value X 80.

APPENDIX I-C

Tentative List of temporary Piping Material & IMTEs for Chemical Cleaning of Boiler and Pre-boiler Flushing at 1x75 MW Kutch Lignite Project.

Material (C/S)

Item Name	Size Nb (ODxThk)	Quantity In Mtrs / Nos	Type	Remarks
PIPE	Nb300mm/12 inch (323x6.35)	6.00	Seamless	
	Nb250mm/10 inch (273x6.35)	30.00	Seamless	
	Nb200mm/8 inch (219x6.35)	220.00 400.00	Seamless ERW	
	Nb150mm/6 inch (168x3.40)	10.00	Seamless	
	Nb100mm/4 inch (114x3.05)	200.00	Seamless	
	Nb50mm/2 inch (60.32x2.77)	100.00	Seamless	
	Nb40 (48.26x2.77)	450.00	Seamless	
	Nb25mm/1 inch (33.40x2.77)	150.00	Seamless	
	Nb15 mm (26.34x2.11)	150.00	Seamless	
TEE				
	Nb300 X 300 X 250	02 Nos	Seamless	
	Nb200 X 200 X 200	03 Nos	Seamless	
	Nb100 X 100 X 100	04 Nos	Seamless	
	Nb50 x 50 x 50	02 Nos	Seamless	
REDUCER	Nb100 / 50	02 Nos	Seamless	
	Nb200 / 150 Nb250 / 200	05 Nos 02Nos	Seamless Seamless	
	Nb200 /100	01 No	Seamless	
	Nb150 /100	01 Nos	Seamless	
	Nb100 / 80	03 Nos	Seamless	
ELBOW 90°	Nb250mm/10 inch	02 Nos	Seamless	
	Nb200mm/8 inch	25 Nos	Seamless	
	Nb150mm/6 inch	03 No	Seamless	
	Nb100mm/4 inch	24 Nos	Seamless	
VALVE Hand Operated, Butt welded / Socket welded, 150/300 Class				
	Nb 200	08 Nos	Gate	
	Nb 150	01 No	Gate	
	Nb 100	10 Nos	Gate	
	Nb 100	03 Nos	NRV	
	Nb 50	08 Nos	Globe	
	Nb 50	02 Nos	NRV	

	Nb 40	08 Nos	Globe	
	Nb 25	15 Nos	Globe	
	Nb 15	10 Nos	Globe	
FLANGE	Nb 200	04 Nos		
	Nb 150	02 Nos		

1. MS Tank(Covered) , rectangular, 30 Cu M with supporting structure for mixing the chemicals - QTY 01 No
2. MS Tank(Covered) , rectangular, 35 Cu M with supporting structure for storage of EDTA. QTY 01 No
3. Pump, 150 Cu M / Hr , 12 Kg / cm^2 with strainer, suction bellow, base frame and spares along with suitable drive Motor with starter , ammeter, cable etc. with MCC and distribution board (QTY 03 Sets)
4. Power Cable from source to distribution board (QTY 150 Meters)
5. Pump , 20 Cu M / Hr, 05 Kg/ cm^2 alongwith suitable drive Motor with starter , ammeter, cable etc. with MCC and distribution board (QTY 02 Sets)
6. PVC Hose Pipe, 50 mm dia approx. 50 Meters
7. Mineral Wool 40mm thick 400 nos

8. Instruments (IMTEs) :

a. Pressure Gauge, 0 - 16 Kg / cm^2 : 05 Nos
b. Pressure Gauge, 0 - 06 Kg / cm^2 : 03 Nos
c. Condensing Loop : 06 Nos
d. Peening Type MTM Thermocouples (K type) with pad and compensating cable upto control room : 10 Nos
e. Thermocouple(K type) , 1500 mm length with compensating cable upto control room 02 Nos
f. Temporary drum level indication at control room and near pump along with cable from drum floor : 02 Nos.
g. Safety appliances as indicated
h. Laboratory testing equipments including testing reagents.
i. Drum gauge glass with suitable end fittings (approx. 900 mm long) which can withstand pressure of 5 kg/sq cm & temp. of 200 deg cent : 02 Nos.

APPENDIX – II

CONSUMABLES TO BE PROVIDED BY BHEL FREE OF COST

ALL CHEMICALS REQUIRED FOR PRE BOILER FLUSHING AND CHEMICAL CLEANING SHALL BE ISSUED BY BHEL FREE OF COST. THIS DOES NOT INCLUDE ANY CHEMICALS SUCH AS RE-AGENTS REQUIRED BY THE CONTRACTOR FOR TESTING PURPOSES

APPENDIX-III A

Successful bidder shall deploy all necessary T&P required to carry out the work in scope of this tender specification. Deployment schedule and augmentation of the tools & plants shall be strictly as per actual requirement of the work as decided by BHEL from time to time.

SIGNATURE OF THE TENDERER

DATE:

Annexure-III B

The following materials/consumables are to be arranged by the Contractor for erection and commissioning as part of the scope.

SN	Description
1	Welding electrodes for welding AS/CS/SS pipe and other welding from BHEL approved vendors only
2	Filler wire for TIG welding
3	Argon, oxygen and acetylene gas
4	Provision for temporary scaffoldings.
5	Teflon tape and insulate on tape.

APPENDIX -IV

FORMAT FOR MONTH-WISE DEPLOYMENT PLAN OF MANPOWER

(CATEGORY-WISE NUMBERS TO BE INDICATED FOR EACH WEEK)

***USE ADDITIONAL SHEETS IF REQUIRED**

SL NO	CATEGORY OF MANPOWER	Deployment per week					
		1	2	3	4	5	6
01	RESIDENT MANAGER						
02	SUPERVISORS						
03	FOREMAN						
04	STOREKEEPER						
05	ELECTRICIAN						
06	WELDER						
07	ELECTRICIAN						
08	FITTER						
09 10	SARANG RIGGER						
11	CARPENTER						
12	UNSKILLED WORKER						
13	OTHERS (PLEASE SPECIFY)						
	MONTH WISE TOTAL						

DATE **SIGNATURE & SEAL OF BIDDER**

APPENDIX–V

FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

ONLY SOME T&Ps LISTED BELOW. HOWEVER TENDERER TO LIST ALL IMPORTANT T&Ps PROPOSED TO BE DEPLOYED IN THIS APPENDIX. USE ADDITIONAL SHEETS IF REQUIRED.

	DESCRIPTION AND CAPACITY OF T&P	Deployment per week					
	AS PER TENDER SPECS Capacity	1	2	3	4	5	6
01	Welding machines						
02	Chain Pulley Blocks						
03	SLINGS,						
04	'D'-SHACKLES,						
05	HYDRAULIC JACKS,						

DATE **SIGNATURE & SEAL OF BIDDER**

Appendix-VI

Analysis of unit rate quoted

Sl. No.	Description of Expense	Percentage of Unit Rate	Remarks if any
01	Fabrication of Chemical cleaning system as per scheme		
02	Depreciation on Material deployed such as pipes and fittings		
03	Cost of consumables such as welding rods, gases, safety items etc		
04	Depreciation / Hiring charges for Pumps to be used for chemical cleaning.		
05	Cost of chemists, supervisors and operators		
06	Depreciation on cost of Chemical cleaning pump, motor, valves etc.		
07	Mobilisation and demobilization of the system		
08	Boarding, Lodging and Transportation		
TOTAL		100%	

Signature of the tenderer with seal

APPENDIX –VII

CURRENT COMMITMENTS OF THE TENDERER

SL.NO.	FULL POSTAL ADDRESS OF CLINT & NAME OF OFFICER IN CHARGE	DESCRIP-TION OF WORK	VALUE OF CONTRACT	DATE OF COMMENCEMENT OF WORK	SCHEDULE OF COMPLE-TION	% OF WORK COMPLETED AS ON DATE	EXPECTED DATE OF COMPLETION	REMARKS

DATE

SIGNATURE OF TENDERER WITH SEAL

APPENDIX - VIII

SIMILAR WORK DONE DURING THE LAST SEVEN YEARS

SL. NO.	FULL POSTAL ADDRESS OF CLIENT & NAME OF OFFICER IN CHARGE	DESCRIP-TION OF WORK	VALUE OF CONTRACT	DATE OF AWARD OF WORK	DATE OF COMMENCE MENT OF WORK	ACTUAL COMPLETION TIME (MONTHS)	DATE OF ACTUAL COMPLETION OF WORK	REMARKS
1 2								
3								
4								
5								

BIDDERS SHALL ENCLOSE COPIES OF DETAILED WORK ORDER (GIVING BILL OF QUANTITIES AND SCOPE OF WORK) AND COMPLETION CERTIFICATE IN SUPPORT OF THIS STATEMENT.

DATE

SIGNATURE OF TENDERER WITH SEAL