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

No. BHE/PW/PUR/HZI-CLE/527

FOR

HANDLING AT SITE STORES/STORAGE YARD, TRANSPORTATION TO SITE OF WORK, COMPLETE ERECTION, CHECKING OF CALIBRATION, TESTING, ASSISTANCE FOR COMMISSIONING, TRIAL OPERATION, FINAL PAINTING AND HANDING OVER OF CONTROL & INSTRUMENTATION AND ELECTRICAL WORKS FOR 1x80 MW CAPTIVE POWER PLANT.

AT

Zawar, Zinc Ore Mines, Village-Zawar, Tahasil-SARADA,

Dist.- Udaipur, Rajasthan

PART: I
TECHNICAL BID SPECIFICATION

And

NOTICE INVITING TENDER, REVERSE AUCTION PROCEDURE and GCC

BHARAT HEAVY ELECTRICALS LIMITED
(A Govt. of India Undertaking)
POWER SECTOR - WESTERN REGION
345, KINGSWAY - NAGPUR 440 001

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LEGEND:

$: PLACED AT THE END IN HARD COPY. HOSTED IN BHEL WEBSITE AS A SEPARATE FILE TITLED “NIT+RA+GCC-527”.

@: ISSUED AS SEPARATE BOOKLET IN HARD COPY AS **PRICE BID (PART-II). HOSTED IN BHEL WEB SITE AS SEPARATE FILE TITLED “Price Bid-527”**.

REST OF THE TECHNICAL BID SPECIFICATIONS IS HOSTED IN BHEL WEB SITE AS FILE TITLED “Tech Bid-527”

Bharat Heavy Electricals Limited

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

TENDER SPECIFICATION No. BHE/PW/PUR/HZI-CLE/527

JOB : Electrical and CI Works for 1 x 80 MW Unit for Hindusthan Zinc Limited AT

Zawar, Zinc Ore Mines, Village-Zawar, Tahasil-SARADA, Dist.-Udaipur, Rajasthan

Earnest Money Deposit: Please see Special Conditions of Contract.

Last date and time for Tender Submission: Please obtain updated information from web page **www.bhel.com → Tender Notifications → View Corrigendum.**

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

M/s. ……

……

PLEASE NOTE:

1) **THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.**
2) **BIDDER SHALL NOTE THAT THEIR OFFER WILL BE CONSIDERED SUBJECT TO THE APPROVAL OF BHEL'S CUSTOMER.**

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.

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 is requested to make specific note of the following conditions:

1. Contractor should have adequate resources including major T&P at his disposal for this job.
2. Contractor should have sound financial stability.
3. Bidder should meet quality requirement regarding workmanship, deployment of personnel, erection tools and necessary inspection, measurement & testing instruments.
4. All information as called for in various appendices and clauses of tender specification should be furnished in completeness. Please refer the checklist.
5. Clarification on Tender Specifications, if any, shall be obtained by the bidder before submitting their offer.
6. Offers must be submitted without any deviation.
7. 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.
8. **Bidder shall note that their offer will be considered subject to the approval of BHEL's customer.**

PROJECT INFORMATION

BHEL's Client M/s Hindustan Zinc Limited (HZL) is already having their 2x77 MW and 1x80 MW Pulverised Coal based Captive Power Plant at their Hindustan Zinc Ltd., Chanderiya, Dist.-Chittorgarh (Rajasthan) project. Customer further as part of their expansion plan is setting up 1x80 MW (as fourth unit) Capacity Coal based Captive Power Plant at Zawar, Zinc Ore Mines, Village-Zawar, Tahasil-SARADA, Dist.- Udaipur, Rajasthan project.

The Project site is located at about 1Km distance from Zawar-Village which is under Tahasil-SARADA, Dist.-Udaipur of Rajasthan state. The distance of Zawar village from nearest town-Udaipur is about 44Km. Udaipur Town is connected with National Highway (NH8) Road. The Captive Power Plant is about 12 Km from TIDI (sort of village) and TIDI is at a distance of about 32 Km towards Ahmedabad on National Highway NH8 from Udaipur Town.

The nearest railway station-UDAIPUR is on Ahmedabad-Udaipur (Meter Gauge) Rail line. Nearest Airport is Udaipur is about 60Km. The nearest Port-KANDALA is about 600 Km.

Geographical position of the project premises is at 24^0 18'50" to $24^0$22'47" Latitude and $73^0$40'20" to $73^0$45'8" Longitude.

The climatic conditions of the project are as under.

Maximum ambient Temperature : 46.6 Degree Centigrade

Minimum ambient Temperature 3 Degree Centigrade

Relative Humidity : 46.12%
Average Rainfall : 650 mm
Wind Speed 2.6 to 11.7 KM Per Hour

The information furnished above are indicative and the bidders are requested to visit the site in order to get themselves acquainted with the prevailing conditions and situations before preparing their offer.

No claims on account of non-familiarity with the site conditions, working conditions etc. shall be entertained at any point of time.

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

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)			
13	Financial status of the firm (**Annexure 'A' of GCC**) is furnished	Yes	No
14	Profit & Loss Account for preceding three years is furnished	Yes	No
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 c**opy of IT Return along with copy of PAN Card** are Furnished	Yes	No
17	Month-wise Manpower Deployment Plan (**Appendix – IV A**) is furnished	Yes	No
18	Analysis of unit rates quoted (**Appendix-V**) is furnished	Yes	No
19	Month wise deployment plan for major T&P (**Appendix-IV B**) 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
	List of Jobs completed in last seven years is furnished (**Appendix-VI**)	Yes	No
25	Whether copies of detailed Work Orders (with BOQ) and Completion Certificates in support of above furnished	Yes	No
26	Whether contractor has left any job unfinished? If so, give reasons.	Yes	No
27	Whether any client has terminated the contractor's work before completion? If so, furnish reasons for the same	Yes	No

Note: strike off yes or no, as applicable

Date: Signature of Bidder

Declaration by Bidder's Authorized Signatory

I …… hereby certify that all the information and data furnished by me with regard to this tender specification No. BHE/PW/PUR/HZI-CLE/527 is 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/HZI-CLE/527

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 CONDITIONS OF BHEL'S 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 Bidder

Date:

Section-3

Offer of the Contractor

To,
The Deputy General Manager (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/HZI-CLE/527 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 Scope of work involving Erection, Testing, Commissioning Assistance, Checking of Calibration etc.

4.1.1
The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship, engineering and construction management. The contractor should ensure timely completion of work. The contractor must have adequate quantity of tools, measuring instruments, calibrating equipment etc. in his possession. He must also have on his rolls adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployment identified by contractor should match requirement of sophistication involving microprocessor-based systems.

4.1.2
The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

4.1.3
All the work shall be carried out as per the instructions of BHEL engineer. *BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.*

4.1.4
The services, tests and support to be provided by the agency for the work mentioned in the various sections of this tender are indicative and not exhaustive, but not limited to these for the completion of the work in all respects.

4.1.5
Contractor shall calibrate, erect and commission all the equipment, cabinets/panels, instruments and cabling etc. as per sequence prescribed by BHEL at site. The sequence of erection / commissioning methodology will be decided by the BHEL engineers depending upon the availability of materials/work fronts etc. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of erection / commissioning adopted in erection / commissioning of similar jobs or for any reasons whatsoever.

4.1.6
The work to be carried out under the scope of this specification covers the complete work of loading, handling, transporting, unloading, pre-assembly, erection, calibration, testing, air flushing, pre-commissioning tests, commissioning of systems, trial run of various auxiliaries, achieving various activities till handing over of the unit. The work shall conform to dimensions and tolerances specified in various drawings that will be provided during the erection. If any portion of the work is found to be defective in workmanship or not conforming to drawings or

other specifications, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by engaging other agencies or departmentally and recoveries will be effected from contractor's bills towards expenditure incurred including 30% departmental charges.

4.1.7
The terminal points as decided by BHEL shall be final and binding on the contractor.

4.1.8
The technical description of the control and instrumentation of various packages is available in Appendix-I to give general idea to tenderer about the type of equipment to be erected, calibrated, tested and commissioned.

4.1.9
During the course of erection, testing and commissioning C&I and electrical work of 1 x 77 MW CPP, certain rework/ modification/ rectification/ repairs/ fabrication etc. will be necessary on account of feedback from various thermal power stations or units already commissioned and/or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/ maintenance requirements. Contractor shall carryout such rework / modification / rectification / fabrication repairs etc. promptly and expeditiously. Daily log sheets indicating the details of work carried out, man-hours and consumables used etc. shall be maintained by the contractor and got signed by BHEL engineer everyday. Claims of contractor, if any, for such works will be dealt as per clauses 13.1 to 13.9.

4.1.10
The contractor's scope of work is further described in the clauses hereafter:

4.1.11
All tools, tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables, electrodes including oxygen, acetylene argon, nitrogen etc gases, paints etc. required for this scope of work shall be provided by the contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor’s quoted rates should be inclusive of all such contingencies. Electrodes shall be baked / dried in the electrode drying oven (range 375 – 425 deg C) to the temperature and period specified by BHEL Engineer before their use. Necessary drying oven / portable oven shall be provided by the contractor at his cost.

4.1.12
The scope of work under this tender specification covers transportation, calibration, erection, testing and commissioning, etc. of control / instrumentation and electrical equipments of the following packages.

A. Boiler Control & Instrumentation and its Auxiliaries
max DNA based system panels for FSSS, SADC, soot blowers, coal milling system, feeder remote /local, Electronic water level indicator, air heaters, electrical

panels for DC control supply, starter panel for mill lube oil /fans and field devices/ instrumentation work for above system, piping, cabling etc.

B. ESP and Its Auxiliaries

Complete Electrical and Control system for the ESP

C. Steam Turbine, Generator and Its Auxiliaries

max DNA based system panels for ATRS, EHTC, GSPC, Turbine Protections, Generator controls and protection system, instrumentation work for above system, piping, cabling etc.

4.1.13

Equipment/instruments required to be erected for this work, though not limited to but are generally as per rate schedule. For any items or class of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However the payment of these items/class of work shall be regulated on the basis of mutually agreed rate arrived at by either of the following methods, which should be done prior to undertaking the work:

A. Based on rate of identical/similar items in the rate schedule.

B. Based on the rate arrived from nearby items in the rate schedule.

C. Wherever any item rate for similar type of work or nearby item rate does not exist in the rate schedule, rate will be worked out on the basis of work element or from fundamentals of estimation or existing rates in other job.

Contractor shall provide necessary resources for completion of such work within the stipulated time schedule. Value of such work shall be included while computing the total value of work finally executed for all contractual purposes, particularly for contract variation purpose.

4.2.0 Collection of Materials

4.2.1.1

The contractor shall take delivery of equipment, materials from the storage yard/ stores/sheds of BHEL/customer. He shall also make arrangements for verification of equipment, safe custody, watch and ward of equipment after it has been handed over to him till these are fully erected, tested and commissioned and taken over by the customer. The contractor shall note that transportation of equipment to erection site, assembly yards etc. should be done by the prescribed route without disturbing the other works and contractors and in the most professional manner. Special equipment such as laboratory equipment, measuring and control equipments, gauges, panels, console inserts, switches, transmitters, controllers, power cylinders, cables, conduits etc. shall be stored when taken over by the contractor in appropriate manner as per BHEL's instructions. The contractor should also note that while taking delivery of materials from BHEL stores (open/closed), it may be necessary to handle other items which could be blocking the exit route of the materials. *This aspect shall be taken care of in the quoted rates and no extra payment shall be done in this regard*. It shall be the contractor's responsibility to arrange necessary cranes/tractors, trailer, trucks, slings, labour, etc., etc., for transport of equipment.

4.2.1.2
The contractor shall take delivery of the components, equipments and special consumables from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer.

4.2.1.3
The contractor shall hand over all parts/materials remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores. In case of any misuse or use in excess of actual design requirements, BHEL reserves the right to recover the cost of parts/materials used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.

4.2.2
Loading at storage yard, transport to site, unloading at site/working area, pre-assembly of equipments at the pre-assembly yard or at working areas for inspection, checking, erection, calibration, testing and commissioning.

4.2.3
All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments/components for checking and cleaning, fabrication of tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing of cut- outs / openings for mounting of console inserts, modules, indicators, recorders, drilling of holes for gland entries, reaming, scrapping, cable laying, dressing, fitting up etc. as may be applicable in such erection works are treated as incidentals to erection work and are necessary to complete the work satisfactorily shall be carried out by the contractor as part of the work.

4.2.4
Overhauling, cleaning, revisioning, servicing of equipment / instruments, valves etc. during erection and commissioning stages will be arranged by the contractor. However, gaskets /packing for replacement will be provided by BHEL free of cost. All equipments shall be preserved and protected before and after erection as per the advice of BHEL engineer.

4.2.5
The contractor should take all reasonable care to protect equipment and materials under his custody either in his stores or at site. Copper tubing, brass fittings, brass valves etc. forming an integral part of equipment or system are liable to greater damages / pilferages /theft / losses. It will be responsibility of contractor to arrange for adequate security round the clock for protection from such damages / pilferages / theft / losses.

4.2.6
All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc. shall be used for unloading and/or handling of the equipments without the specific written permission of the engineer. The equipment from the storage yard shall be moved to the actual site of

erection/location at the appropriate time as per the direction of BHEL engineer so as to avoid damage/loss of such equipment at site.

4.2.7

The contractor shall collect all scrap materials periodically from various elevations of the power plant, working areas of the power station, auxiliary and piping around power station and collect he same at one place earmarked for the same. Loads of scraps are to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect.

4.2.8

All the surplus, damaged, unused materials, package materials, containers, special transporting frames, gunny bags etc. shall be returned to the BHEL stores/ customer's stores by the contractor.

4.2.9

All pipes and tubes, equipments, instruments issued to contractor and kept at site for erection shall be covered with plastic caps/steel caps or shall be closed with suitable plugs by the contractor.

4.2.10

The contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before these equipment are erected in position.

4.2.11

Contractor shall plan and transport equipments/components from storage yard/sheds to erection site and erect them in such a manner and in a sequence that material accumulation at site should not lead to congestion. Materials shall be stacked neatly, preserved and stored in the contractor's shed and work areas in an orderly manner. It may be specifically noted that the space available for putting up the thermal power plant is limited and accumulation of material may lead to the necessity of shifting and restacking the materials to enable other agencies to carry on with their work or to comply with customer's requirements. If required, the contractor shall arrange shifting of surplus material expeditiously failing which the same will be arranged by BHEL and all charges together with departmental charges at 30% will be recovered from his bills.

4.2.12

Housekeeping in the erection and pre-assembly area is as important as the well-planned and orderly work. The access to site for inspection approaches by BHEL and customer engineers and leading of the material shall be made available by the contractor at all times. The shifting and re-shifting of erection materials, tools and plants and clearance of restrictions, filling of ditches, undulation near the pre-assembly and boiler area is the responsibility of the contractor. Contractor should visit the site and acquaint himself with all restrictions and difficulties that he may encounter during erection/commissioning stages.

Brief description of work

Installation of Panels

Electrical control panels, electronic control panels, unit supervisory control desk, etc., are normally supplied in suit of either one/two/three or loose shipping sections with integral base frame or loose supplied.

These panels may have to be installed as stand alone or in group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

4.3.2

Installation of panel shall include fixing of base frame, fabrication of base frame if required, levelling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubicle interconnection hardware, bus bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates and sealing of cable entries. In certain case where canopies are not supplied but have to be fabricated out of MS sheets provided by BHEL, payment will be done on square meter basis.

4.3.3

Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. which shall be part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panel have to be erected at different locations and elevation in boiler, TG hall, LT & HT switchgear room, unit control room, ESP control room etc.

4.3.4

Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.

4.3.5

Wherever the panels to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, structural steel fabrication, installation rates shall be applicable.

4.3.6

Normally the panels shall be supplied with instrument, relay, meters, electronic modules etc. mounted and pre-wired. However, if these are supplied loose / separately for safety in transit, contractor shall mount/wire such devices as part of the panel installation work and no separate rates shall be applicable unless otherwise *specially* listed in the rate schedule.

4.3.7

No separate payment shall be made for replacement of any devices like electronic modules, relays, conductors, terminal block, push buttons etc., which are found defective during pre-commissioning / post-commissioning of the panels.

4.3.8

Minor civil works like drilling, chipping, punching holes and opening in concrete floors, slabs and brick walls, grouting, related to Rack, support installation, minor civil works required for installation of control panels, Junction boxes etc., shall be included in the erection cost of such items. Also all miscellaneous civil works like chipping away and making good as necessary in floor slab/wall for cabling / earthing etc., as required are included in the scope for which no separate payment is applicable. The scope also includes supply of grouting material, if any.

4.4.0 Structural steel fabrication and installation

4.4.1

Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and same shall be used for fabrication of panel base frame, cable tray supports, canopies, instrument and junction box frames, impulse pipe/instrument air pipe supports and instruments etc.

4.4.2

This shall include cutting into size, conduiting of end connections, if required, welding, grinding of excess weld deposits, drilling of holes for mounting of device/instrument, installation at location, levelling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.

4.4.3

All the fabricated supports/frames shall be applied with one coat of primer red oxide paint before installation and two coat of synthetic enamel of prescribed shade of final paint,. If required, BHEL shall prescribe time gap between first and second coat of final paint.

4.4.4

Frame installation/cable tray accessories' installation at site may involve mounting either on concrete floor by grouting/using anchor fasteners or on steel structure by welding etc. *All consumables including anchor fasteners shall be arranged by the contractor***.**

4.4.5

In certain packages, galvanised members of junction box frames and instrument racks shall be supplied in cut to sizes and frame assemblies are required to be done as per drawing by bolting/welding. The installation rate as quoted shall include the assembling of the frames.

4.4.6

Gas cutting of tray/impulse pipe support and gas cut holes in frame shall not be allowed. Only drilled hole shall be permitted in frame etc.

4.5 Laying of pipes and tubes (impulse pipe & instrument air pipe)

4.5.1

Root valves are generally provided on process pipe line by other agencies. Prior to starting impulse pipe, contractor to identify the process point with respect to PIDs.

4.5.2

Installation of impulse pipe of CS/AS/SS material shall include cleaning, air flushing, cutting to length from the running meter, edge preparation, cold bending, welding of sockets /reducers/tee/cross/isolating valves/union nut and nipples/tail pieces etc., mounting of SS/CS valve manifolds and compression fittings, providing supports, clamping, conducting leak test/hydraulic pressure test and painting and other accessories as per instrument hook-up diagram. Piping works shall involve either arc or tig welding.
All the impulse pipes are required to be hydraulically tested after erection. The contractor must arrange for necessary equipments/consumables at his own cost for doing the same.

4.5.3
IBR certified welders shall be deployed for welding of impulse pipe and contractor shall take approval for welder and welding consumables from BHEL site engineer.

4.5.4
Laying of GI pipe for instrument air line shall include air blowing, cutting from the running meter length, threading, installation of elbows/tee/reducer/moisture traps/auto drain pot/check valves/isolating valves, supporting clamping, conducting leak test and seal welding of threaded joints.

4.5.5
Threaded joints of air pipelines shall be made leak proof by using Teflon tapes or sealing compound. All consumables shall be in the scope of contractor.

4.5.6
All fittings and accessories for impulse pipe and air line shall be provided by BHEL. Quoted rate for piping shall include cost of installation of such fittings and no separate rates are envisaged.

4.5.7
Contractor shall provide GI "U" clamps for impulse pipe and GI pipes within the quoted rates for installation of the same.

4.5.8
Impulse pipes shall be applied with one coat of primer red oxide paint and two coats of synthetic enamel of prescribed shade of final paint. BHEL may prescribe a time gap between first coat and second coat of final paint.

4.6 Cable trays/cable ducts

4.6.1
Various types of sheet metal, galvanised cable tray, i.e. Perforated, ladder type, seal metal duct, solid bottom tray, shall be provided in a standard length along with accessories like hardware, bends, reducers, coupler plate, tray covers and tray clamps etc.

4.6.2
Installation of cable tray/cable duct shall include cutting, laying, jointing, supporting, drilling holes in the support, providing tees/reducers/bends/clamps as per tray route layout. Fabrication of bends/tees/reducers from straight length,

fixing of tray covers, welding of tray on support, cleaning and application of cold galvanising paint on weld joints including supply of paint is in the scope of contractor. *Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable.*

4.6.3
In case cable trays are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instance.

4.6.4
Cable trays/ducts have to be routed underground in cable trench, over head on structure, valves, floors etc. for various applications such as cable laying, copper tubes, conduits, thermocouple, temperature gauge capillary etc.

4.6.5
Installation of Copper tubes/SS tubes/copper pipes shall include cutting into required length, laying, bending, cleaning, brazing wherever required, fixing of brass fittings like compression fittings/tees/end connectors/straight connectors/bulk heads/valves etc., supporting clamping including supply of clamps and hardware, flushing and conducting leak test.

4.7 Cable laying (power/control/instrumentation shielded cables/plug-in cables/intra-plant bus/data highway, armoured/ un-armoured, single/multi-core, PVC/HR PVC/FRLS/TEFLON/XLP insulation)

4.7.1
Cable laying include cutting to the required length, laying in overhead/underground cable trench/through pipes/flexible conduits, dressing/clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JBs, printed ferrules, termination by using crimp type copper tinned/aluminium lugs, insulated/un-insulated, termination (crimp, soldering, etc.), plug-in connections with insert type crimping, providing identification cable tags, PVC/aluminium at both the ends and at appropriate interval throughout the route length, continuity checking, insulation resistance checking, high voltage test on HT cables.

4.7.2
Entry to the panels and JBs may be at top, sides or bottom. All cables are required to be properly supported and clamped near to the JB/panel.

4.7.3
Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, prefab plug-in cables, etc., for such cases cables may have to be lifted inside the panel by either making cut-out in gland plate and providing rubber profile for sharp edge protection or alternatively, providing 4” or 6” PVC pipe coupling gland and these pipe coupling gland shall be supplied by contractor within the quoted rate of cable laying.

4.7.4

Supply of copper tinned lugs of various types (pin, ring, fork, snap-on) upto 4 sq.mm, PVC cable ties, PVC button and tapes, cable identification tag of PVC/metallic, clamping and dressing material with hardware, PVC sleeves etc. shall be supplied by the contractor within the quoted rates for cable laying. Ferruling shall be done by ferruling machines with printed termination details on single sleeves as a part of this job. The quality of material shall be got approved from BHEL engineer prior to their use on job.

4.7.5

All care should be taken to avoid abrasion, tension, twisting, kinking, stretching of cables during installation.

4.7.6

Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield. Generally shield wire is kept isolated at instrument/field device end and continuity is maintained through JBs and grounded at panel end only. While terminating the shield wire either in panel or JBs, PVC sleeves are to be used to avoid two-point earthing.

4.7.7

Wherever cables run through ducts, conduits, valves, etc., they shall be sealed using fire/weather proof compound. In addition to this, cable entry in panels, MCCs, instruments, electrical actuators etc., are also required to be sealed. The required material for doing so shall be deemed to have been included by contractor in the cable laying.

4.7.8

Many of the cable trays and cables have to be laid in cable trenches. For this purpose, the cover of the trenches have to be opened for working in site and whenever the cables are to be laid in existing cable tray, all safety precautions have to be observed.

After completing the work, the trenches have to be cleaned and covers put back into position. Contractor shall also carry out de-watering from the trenches if required and arrange pumps etc., at his cost.

4.7.9

Looping wire at terminal block of panels and electrical actuator as shown in the inter-connection diagrams or as required is to be done by contractor at no extra cost.

4.7.10

Contractor shall carefully plan the cutting schedule of each cable drum in consultation with site engineer such that wastage are minimised.

4.7.10.1

The erection contractor shall make every effort to minimize wastage during erection work. In any case, the wastage shall not exceed the following limits;

Sl No.	Item	% Wastage on issued Qty
1.	Fabrication steel	2
2.	Each size of power cables	1
3.	Each size of control/Inst cables	2
4.	Impulse pipe/tubes/GI pipes/copper tube	1

If however, the bidder quotes for more wastage than specified above, the excess portion will be considered for adjustment during the tender evaluation at the quoted supply rate of material.
If the actual wastage be more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.

4.8 Field instrumentation

4.8.1
Various type of primary/secondary indicating/recording instrument for pressure, temperature, flow, level and analytical measurement shall be supplied either loose or mounted along with the equipment.

4.8.2
Scope of work under erection/calibration/testing/commissioning shall include calibration, setting, adjustment, writing instrument tag number with paint, report making, installation, servicing, minor repairs/servicing, putting instrument into service, signal checking from field upto the functional group panels and remote indicating instrument, functional checks, interlock and protection/alarm checks by simulating the field devices, providing assistance for trouble shooting during pre-commissioning/post-commissioning till system is handed over to the customer.

4.8.3
It is the responsibility of contractor to make erection, calibration/testing protocols for various C&I equipments/devices and they should get duly certified by customer/ BHEL engineer and should be submitted to BHEL engineer regularly. However, sample formats will be given by BHEL and have to be printed by contractor in adequate numbers.

4.8.4
Contractor shall establish calibration laboratory with adequate facilities and they should arrange standard test instruments duly calibrated from recognized agencies and calibration report of the same to be submitted prior to start of calibration of the field instruments/devices.

4.8.5
Fixing and seal welding of the thermowells for temperature measurement is in the scope of mechanical contractor. However, the contractor will coordinate and assist the mechanical contractor in identifying the tapping points and fixing the same as per PIDs.

4.8.6

Installation of instrument shall also include drilling of holes and tapping for mounting of instrument and local instrument frames/panels and supply of hardware for mounting of the instrument.

4.8.7
Some devices line solenoid valves, feedback position transmitters, limit switches, air filter regulators, airlock relays, positioners etc., are supplied assembled along with mechanical equipments like pneumatic control valves, power cylinders, trip valves, dampers, etc. These will need removal, calibration/testing, refixing, adjustment, etc., and commissioning. Separate payment shall not be made for this. The rates quoted for the commissioning of these equipments (viz., pneumatic control valves, power cylinders, trip valves, dampers, etc.) should take care of the above. Also, the contractor shall remove such devices prior to erection either at site or at store to avoid damages/pilferages and keeping in safe custody and the same shall be installed prior to commissioning of such equipment. The rates quoted in the rate schedule for such items will be applicable only if the items are received as loose items and not as an integral part of mechanical equipments.

4.8.8
It shall be the responsibility of the contractor to ensure that the calibrated instruments show correct reading while installed in the system.
However, recalibration may become necessary due to reasons not attributable to the contractor, e.g. Lapse of Time after first calibration, Need for change in range/parameter, etc. If re-calibration is required due to no fault of the contractor, the rates payable for re-calibration shall be as under:

Recalibration Charges = 60% of the Percentage Stage Payment for Calibration as per split-up defined in Terms of Payment (Section-12)
The contractor shall keep record of such instrument with the reason for re-calibration and certified by the BHEL Engineer.

Note: For recalibration of skid mounted items or other systems where lumpsum rates are quoted, the recalibration charges, if admissible, will be calculated from the relevant unit rates quoted for same / similar items elsewhere in the rate schedule. The decision of BHEL Engineer shall be final and binding on the contractor.

4.8.9
For the very few cases where required, the contractor shall carry out re-orientation of bottom/top entry arrangement for process connection if needed due to site condition in existing instrument rack/enclosure/JB and re-location of existing instrument including removing of the existing tubing and re-installation of the same at appropriate location due to any change in grouping of the instrument and no extra payment shall be applicable.

4.8.10
In certain cases instruments / devices are supplied on equipment or drawn by other agencies as part of mechanical package. The same are to be received or to be collected from other agencies for keeping in safe custody to avoid damages. The same are to be erected back after calibration for which unit rate shall be applicable for erection and calibration. Contractor shall maintain record of such

instrument duly certified by BHEL engineer. However for removal of such instrument, no separate rate/payment shall be applicable.

4.9.0 Unit Control Desk

4.9.1
The installation of the unit control desk is not in the scope of this contract. However, the contractor has to install and commission loose items supplied separately for the unit control desk / control desk for completion of work included in this contract. No extra payment shall be made for installation / commissioning of such items unless specifically mentioned in the rate schedule.

4.10.0 INSTALLATION OF PANELS AND MCC

A. Electrical control panels, electronic control panels, unit supervisory control desk, 415 volt LTMCC, Analyser panels and transmitter racks/enclosure are normally supplied in suit of either one/two/three or loose shipping sections with integral base frame or loose base frame. These panels may have to be installed as stand alone or in group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

B. The panels shall be transported from stores to the place of installation in vertical position. Care shall be taken such that the switches, lamps, instruments etc. mounted on the panel does not get damaged during transit.

C Installation of panel shall include fixing of base frame, levelling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubical interconnection hardware, bus-bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates, sealing of panels/ cable entries. Where the base frame is not supplied as part of panel supply, the contractor shall fabricate the base frame from structural items at site. Payment for such fabrication will be effected on measured quantity at the rate applicable for structural steel fabrication and installation. Special material required for fireproof sealing of the panels shall be supplied by the contractor within the quoted price. Proper sealing of all the holes and cable entries (even if the cable has been laid by others) in the panel is in the contractor's scope.

D Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. Which shall be a part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc? Panels have to be erected at different locations and elevation in Boiler and STG hall, LT & HT switchgear room, unit control room etc.

E Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.

F Whenever the panels to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, structural steel fabrication & installation rate shall be applicable.

G Normally the panels shall be supplied with meters, relays, electronic modules, contractors, pushbuttons etc mounted and pre-wired. However, if such devices are supplied loose/separately for safety in transit, contractor shall mount the same as part of panel installation work and no extra payment shall be made for this.

H Supplier's instruction manuals, packing slips, door keys etc. Received along with the panels will be handed over to BHEL's engineer on opening of the panels.

I Regular cleaning of the panels as per the instruction of BHEL engineer till handing over of the set to customer is to be carried out by the contractor free of cost.

4.10.1 MAX DNA System Panels

Steam generator, turbo generator, station C&I / Balance of Plant and Electrical Control System panels are based on digital distribution control philosophy. Max system is having ethernet communication to various panels (dpu), max storian, max link and max stations and its peripherals like printer etc. Max system comprises of event monitoring, video process control, alarm management, calculation and logging, comprhensive history, reports, statistics, file archiving. The various components / devices are located in control room / panel room and shift in-charge room. The entire work of erection, testing, commissioning of the connected devices/ equipments as listed in rate schedule is to be carried out including laying of peripherals cables (either plug-in or plugs to be fabricated at site), placement of computer furniture in computer room as per layout. The computer furniture shall be supplied either assembled or in knocked down condition, which have to be assembled at site. The quoted rate shall be inclusive of cable laying, termination and placement of furniture against each devices as given in the rate schedule.

4.11 Final Painting

4.11.1

All the fabricated frames, instrument racks, Junction box frame, trays / impulse pipes, supports, panel base frame, etc., wherever applicable shall be first painted with one coat of primer paint (metal red oxide) and then two coats of synthetic enamel paint of approved shade by BHEL Engineer after thoroughly cleaning the surface of dust, rust, scale, grease, oil, etc., by wire brushing, scrapping or any other suitable method. The quoted rates should be inclusive of all these including supply of paints and consumables.

4.11.2

Other equipment like JB, Panels, transmitter racks, Local gauge boards etc., shall be painted with two coats of synthetic enamel paint. The quoted rates should be inclusive of application of two final coats of synthetic enamel paint. All the

consumables such as wire brush, other cleaning materials, painting implements, etc., is to be arranged by the contractor at his own cost. The quoted rates should be inclusive of supply of paints and consumables. All equipment painting shall be done by spray painting.

4.11.3
All the weld joints of GI cable trays and GI structural members shall be applied with a coat of cold galvanising zinc paint. The quoted rates should be inclusive of supply of paints and consumables.

4.12 Misc. Other instrument/equipment Erection, Calibration and Commissioning.

4.12.1
Wherever panels, pneumatic power cylinders and control valves and actuators have been erected by the mechanical contractor, calibration/ commissioning has to be carried out by the contractor.

4.12.2
SADC power cylinders are to be erected by contractor in coordination with other agencies as per instructions of BHEL. For SADC power cylinders, copper tubing will be supplied by BHEL. The copper tubing work from the instrument line header to the power cylinder and the internal connection to be carried out by the contractor as per site requirement. *Necessary security against pilferage is to be arranged by contractor.*

4.12.3
In the case of electronic water level indicator, electrodes may be supplied loose and the same need to be fixed in the pressure vessel as per the drawings. No extra charges will be payable.

4.12.4
Position transmitters are to be erected by contractor if supplied loose.

4.12.5
The solenoids on the oil guns will be received in mounted condition and the same will be erected by the mechanical contractor. The contractor has to provide the services required for removing the solenoids and remounting the same after servicing/adjustment. Payments will be made as per testing/commissioning portion of the rate quoted for these items and no extra charges will be payable for removal and re-fixing.

4.12.6
Dimension and weight as mentioned against control panels, MCC, etc. in rate schedule are only approximate and there may be changes in dimension and weight in actual supply of the equipment and no rate variation shall be applicable on this account.

4.12.7
Wherever brief description of the system is given under various sub-heads, it is only for the understanding system requirements. It does not indicate the total specification of work. For such system, other clauses are also applicable wherein work details are specified.

4.12.8
Supervision services for certain sub-vendor supplied packages will be in supplier's scope for installation and commissioning. However, contractor shall carry out the work as per the instruction of their engineers and also provide necessary assistance during the execution of the work.

4.12.9
Normally, cable glands on junction boxes side are received in mounted condition. While terminating the cables as per drawings, the cable glands are to be removed and fixed. Wherever cable glands are not received along with junction boxes, the cable glands as per the requirement will be provided by BHEL and the contractor has to make necessary holes/adjust the available holes in the JB for fixing these. No separate payment will be made for drilling of holes and fixing the cable glands to the junction boxes. Nameplates for JB will be supplied separately. These are to be suitably written and fixed onto the JB. Separate payment will not be made for this.

4.12.10
The push buttons and indicators in C&I systems are provided as loose with different type of connectors. The fixing of connectors and their wiring from push buttons to indicators shall be the responsibility of contractor. No separate payment will be made for fixing of connectors. The cable laying and termination charges will be paid as per applicable rate schedule.

4.13.0 Pre-commissioning/Commissioning and post-commissioning activities

4.13.1
The work is also inclusive of various commissioning activities of the boiler and turbine package along with its auxiliaries and station package. The various activities, tests, trial runs may have to be repeated till satisfactory results are obtained and also to satisfy the requirements of customer/consultant/ statutory authorities like boiler inspector, electrical inspector etc.

4.13.2
In case any malfunctioning and/or defects are found during tests, trial runs such as loose components, undue noise or vibration, strain on connected equipments etc., the contractor shall immediately attend to these defects/ malfunctions and take necessary corrective measures. If any readjustment and realignment is necessary, the same shall be done as per BHEL engineer's instructions.

4.13.3
During each stage of commissioning, if any part of the instrument needs repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim, if any, for such repair/rectification/ rework/replacement etc. for reasons not attributable to contractor will be governed by clause 13.1 to 13.9 of the specification. The parts to be replaced shall however be provided by BHEL free of cost.

4.13.4

The pre-commissioning activities will start prior to light up of boiler and various trials, commissioning operations shall continue till the unit is handed over to customer. Simultaneous commissioning activities will be in progress in various areas, checking of equipments erected, making ready for trial runs, alkali flushing, chemical cleaning, mass flushing etc. All these works need specialised gangs including electricians/instrument mechanics in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted.
The mobilisation of these commissioning gangs shall be such that planned activities are taken up in time and also completed as per schedule and the work undertaken round the clock if required. It is the responsibility of contractor to discuss on day to day / weekly / monthly basis the requirement of manpower, consumables, tools and tackles with BHEL engineer and arrange for the same. If at any time the requisite manpower, consumables, T&P are not arranged then BHEL shall make alternate arrangements and necessary recoveries with overhead charges will be made from the bills of the contractor.

4.13.5

Contractor shall cut open works if needed as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over without any extra payment.

4.13.6
In case any rework / repair / rectification / modification / fabrication etc. is required because of contractor's faulty erection which is noticed during commissioning or at any stage, the same has to be rectified by the contractor at his cost. If any improvement /repair /rework/ rectification/ fabrication/ modification due to design improvement/requirement is involved, the same shall be carried out by the contractor promptly and expeditiously. Claims if any, for such works from the contractor shall be governed by clauses 13.1 to 13.9.

4.13.7
It is the responsibility of contractor to provide for necessary labour, tools and tackles and consumables till the completion of work under these specifications even in case erection, testing and commissioning of this work is delayed due to reasons not attributable to the contractor.

4.13.8
During commissioning activities and carrying out various tests, minor items like gauges, manometers, etc., have to be temporarily erected and put in service to suit the commissioning activities. BHEL will provide the necessary gauges and equipment. Contractor has to carry out the erection, calibration, dismantling of the same. After completion of activities the temporary systems have to be removed and returned to stores. No extra charges will be payable towards these.

4.13.9
During pre-commissioning, commissioning, post commissioning and trial operation stages of various systems, certain category of manpower assistance with T&P and

consumables will have to be provided to BHEL commissioning engineers exclusively at their disposal. It shall be the responsibility of the contractor to provide following category of minimum manpower assistance including necessary consumables, hand tools, calibration equipment etc. The quoted rates shall include this.

1)	Supervisor (diploma in Electrical / Instrumentation Engg)	2 nos.
2)	Electrician (ITI)	4 nos.
3)	Instrument technician (ITI)	2 nos.
4)	Helper/fitter/welder	6 nos.

The above figures shows only minimum required personnel over and above manpower required to complete works. Contractor has to augment the manpower as and when required as per work demand and necessity at site.

4.13.10
It shall be specifically noted that above employees of the contractor may have to work round the clock and hence considerable overtime payment may be involved. No additional compensation by for the same shall be payable, irrespective of number of hours per day.

4.13.11
For electrical works, 415 volts and above, the contractor has to bring qualified electricians.

4.13.12
Certain systems will be supplied with portable programming units, which are to be connected at various locations during pre-commissioning to handing over. Necessary cabling interconnecting the programming units and other connected panels has to be carried out by the contractor and are to be dismantled after work. For the purpose of testing, monitoring, commissioning, etc., these programming units will have to be repeatedly connected and disconnected at various locations. No separate payment will be entertained for the above.

4.13.13
The contractor in addition to erection and commissioning of the AVR and Generator Protection, Control Panel is to carry out the integrated system testing as per following:

1. Relay Testing in static condition for Generator, Transformer, and associated protection system.

2. Testing and checking of control and protection system in static and dynamic system.

3. Checking the Healthiness of Insulations, Resistance, Polarization Index of individual systems / equipments, and combined system.

4. Simulation checks.

5. Relay setting and checking the stability checks of protection relays and systems in static and dynamic condition.

6. Functional checks / testing of synchronizing schemes during the static and dynamic conditions.

7. Conducting test on Generator during open circuit and short circuit conditions. Optimization of protection and relays setting / systems. Recording and monitoring measurement.

8. Functional checks of relays of protection system by primary injection and secondary injection from field devices.

9. Checks during the synchronization of the machine.

10. Compilation of test records.

11. Conducting test on Generator surge protection system and recording of measurement.

Any other tests need to be carried out during the integration of control and protection system for generator, transformer and associated equipment.

4.13.14 Calibration, Testing & Commissioning Assistance

Calibration, testing & commissioning activity as specified in this technical specification and rate schedule against various equipments, devices, systems etc. are broadly classified below. However, there may be some overlapping between the activities (erection, calibration and testing, commissioning). The classification of activity is only a guideline for understanding the total volume of work in each activity. The contractor shall have no claim for performing or providing manpower assistance for such overlapping work, which is also within the scope of the work.

A. Calibration

Verification after drawing of material of various types, range of the field devices with respect to instrument schedule, data sheet or system document.

Codification of instruments as per system tag numbers Calibration / adjustment of instrument as per system requirement / set values.

Providing head correction in case of pressure measurement as per calculated values or actual measured value for the instrument, which are used for interlock protections / monitoring. This is generally applicable for turbine / generator, lube oil systems, lube oil system of fans etc.

Verification of installation of instruments for range, type, tag number as per physical location of process point as per process, instrumentation diagram.

Checking and ensuring the proper function of instrument.

All the recorders shall be made functional with proper chart movement and ink marking.

B Erection

Drawal of material from store, verification, inspection as per shipping list, drawings and documents.

Preservation, upkeeping, safe custody of the erected equipments till handing over to the customer.

Verification of installation as per drawing and document for the correctness of cabling, JBs, impulse pipe, various field device, panels, instruments etc.
Continuity check and IR value check of cables.
Verification of correction of cable termination with respect to instrument, electrical hook-up diagram, panel interconnection diagram, JB schedule.
Checking earthing of the equipments and cable shield wire continuity.
Energizing the functional group control panels and field devices.
Flushing of impulse pipe before making the instruments process connections through.
Any leakages, damages to impulse pipe, field device connections, air connections etc. shall be fully attended by contractor.
All cable glands/piping/tubing to be fixed as per installation requirement before commissioning.

C Testing & Commissioning Assistance

Checking/verification of binary/analogue input and output signal from field and panel and upto recording/indicating instrument/MMI monitors.
Adjustment, testing, calibration of pneumatic drive (control valve, trip valve, power cylinder for gate/dampers), electrical actuator operated valve/gate/dampers of other functional elements.
Checking the operating electrical/pneumatic drive through functional group panel, remote control desk, MMI, CRT operation and repeatability and smooth operation to be checked.
Checking the interlock, protection and alarm for various process by simulation of field devices/process changes.
Functional check of sub-loop control, sub group control and auto loop and fine tuning.
Adjustment of limit switches / feedback position transmitter checking the actuator for correct Limit switch operation for correct position indication and repeatability shall be ensured.
Motor IR value measurement, bearing/winding RTD checking, drying out of motor, providing assistance for trial run of motor which includes monitoring temperature rise winding/bearing during trial run.
Contractor shall prepare calibration/testing report/protocols.
During trial run of various systems, if the performance of any instrument is found erratic, un-satisfactory and requires re-adjustment, re-calibration etc., the defect shall be attended by contractor.
Observing and checking the performance of the various devices on load/process variation. Any deficiencies/defect noticed during the variable load conditions, the same should be attended properly.
Observe the proper functioning of sub-group/sub-loop control.
Check the operation of various control in manual /auto mode for smooth functioning.
Clearing of all bad / invalid signals noticed during commissioning.
Providing necessary assistance for trial operation of the unit. Trial run activity shall continue for a month's time and smooth operation and availability of all instrument/control shall be ensured. Contractor shall provide adequate numbers of skilled manpower for this purpose.
If any small wiring correction or minor modification in control panel wiring is noticed during the commissioning, it shall be carried out as a part of commissioning activity.

D Post-commissioning

Contractor shall rectify the defect observed/informed by customer during the trial run.

Contractor shall submit the as- built drawing as per guidelines and instruction of BHEL engineer.

4.14.0 Guidelines for erection

4.14.1 Impulse Pipelines

4.14.1.1

All impulse pipelines, air lines shall be thoroughly cleaned by removing the dust, burrs etc., and any foreign matter inside the pipe/air line is to be cleaned by compressed air or any other suitable means before installation.

4.14.1.2

The routing of pipelines shall include sufficient flexibility near tappings to allow for thermal expansion of process equipment.

4.14.1.3

The pipes shall be cold bent using hydraulic bending machines only.

4.14.1.4

The horizontal impulse pipelines shall be laid with proper slopes towards the tapping point.

4.14.1.5

Supports for piping and tubing shall be adequate and in no case exceed limits shown below:-

A) 1/4" OD / 3/8" OD copper	continuous
B) 1/2" NB pipe/tube	5 ft.
C) 3/4" NB pipe/tube	5 ft.
D) 1" NB pipe/tube	8 ft.

4.14.1.6

All CS impulse line welding shall be done with welding generator/rectifier and only structural welding could be done with welding transformer.

4.14.1.7

Impulse pipes of alloy steel/SS/carbon steel etc. shall be TIG welded. Contractor shall arrange for necessary TIG welding sets, electrodes etc.

4.14.1.8

Minimum number of fittings shall be used on all lines wherever possible, to keep threaded joints to a minimum wherever threaded connections are to be made.

4.14.1.9

On completion of pipelines installation, the pipelines shall be hydraulically tested. Contractor shall arrange for hydraulic pump and standard gauges and conduct the test satisfactorily.

4.14.1.10 Testing

The impulse lines shall be isolated from instruments and tested at 2 times the maximum working pressure. The fall in pressure shall not be more than 1 kg/cm^2 or 1% of the working pressure whichever is less, in 30 minutes and there shall be no leaks at any of joints/welds when isolated from source of pressure.

4.14.1.11 Air Pipelines

All instrument air pipelines shall be isolated from the instruments and pressurised pneumatically to maximum working pressure. They shall then be isolated from the source of pressure and fall shall be less than 1 PSI in 20 minutes.

4.14.1.12 Pneumatic signal lines

All pneumatic signal lines shall be disconnected and blown through with instrument air. The line shall be blanked off and pressurised pneumatically 20 psi and checked with soap solution for leaks and attended accordingly.

4.15.1 Electrical cabling /wiring

All the cables will be properly laid in cable trays, dressed and clamped with aluminium flats. The cable will be terminated at both ends with suitable lugs and printed ferrules and will be glanded properly. Suitable equipment and consumables for ferrule printing has to be arranged by the contractor at his own cost. For cable identification, the contractor shall provide at his cost aluminium tags at regular intervals through one run of the cable.

4.15.1.1

All electrical connections shall be tested for polarity and proper connections.

4.15.1.2

Insulation test of the various circuits shall be done.

4.15.1.3

The checking of operation of individual equipment and instruments to which the cabling/wiring connected shall also be done by the contractor.

4.15.1.4

Wherever supplied, GI cable trays shall be of bolted construction only with fixing screws and coupler plates.

4.15.1.5

To the extent possible, all the trays shall be fixed in vertical orientation

4.15.1.6

Sharp bends of cable trays shall be avoided in all type of cable trays.

4.15.1.7

Installation of cable racks and supports structure shall be carried out in all the required areas. Steel embedment shall be provided in the cable trenches, ceiling slabs and concrete blocks for installing the cable racks and support structures.

A) ladder perforated type able trays shall be used in cable trenches and vertical risers.
B) Perforated type cable trays shall be used in higher elevations in boiler and TG areas.

4.15.1.8
Cable racks in the trenches and control room are to be shared with other contractors installing cables in different areas wherever required. Contractor shall cooperate with the other contractors in sharing the cable trays and proper dressing and clamping the cables.

4.15.1.9
Where power and control cables are to be laid in the same route, suitable barriers to segregate them physically shall be employed.

4.15.1.10
Space equal to the diameter of cable shall be provided between power cables of six over 50 mm in diameter.

4.15.1.11
When cables pass through floors, walls etc., it shall be passed through a pipe for mechanical protection and the pipe ends sealed suitably.

4.15.1.12
Care shall be taken to avoid short bending and kinking of conductor damaging insulation and stressing the cable beyond pulling force recommended by the manufacturer. Cable shall be protected at all times from mechanical damage.

4.15.1.13
The minimum radius of formed bend of an insulated cable shall be 12d for un-armoured cables and 15d for armoured cables where'd' is the overall diameter of the cables.

4.15.1.14
No cable shall be laid in ducts or trenches where other services such as oil pipes, steam or water pipes are laid.

4.15.1.15
Where cabling passes through brickwork or concrete work, the contractor shall provide suitable local protection against mechanical damage wherever necessary.

4.15.1.16
The layout of all cables shall be arranged to give adequate clearance from other services and cables shall be routed to avoid hot zones.

4.15.1.17
Jointing of cables shall be avoided as far as practicable. However, jointing if at all necessary shall be done by crimping type cable joints after getting approval of BHEL.

4.15.1.18

The cable schedules indicating cable sizes, tentative cables routing information will be furnished by BHEL at site to the contractor. Required steel inserts on cable trenches, ceilings of the platforms in TG hall for erecting the cables will be provided by BHEL. The contractor shall design number of cable/racks to accommodate the cables on racks/trays properly.

4.15.1.19 TERMINATION OF CABLES:

The types of cable terminations are as detailed below:

1) Power cable : Crimping hydraulic/manual
2) Control cable: Manual crimping
3) Crimped/soldered plug-in-type

Screwed type.

All console devices / computer peripherals shall be screwed, crimped, soldered plug in type.

The contractor shall arrange for special tools and skilled manpower required for any type of cable as mentioned above.

Additionally ferrule printing machine for printing of sleeved ferrules of various sizes will also be arranged by the contractor.

4.15.2.0 Earthing Installations

4.15.2.1

All equipments shall be earthed by two separate and distinct connections. Earthing terminals will be available in all equipment supplied by BHEL.

4.15.2.2
The earthing conductors shall be of mild steel/GI strip/ wires. All connections from equipment to main earthing conductors shall be made as illustrated in earthing drawing. A copy of earthing drawing shall be provided to the contractor at site.

4.15.2.3
A continuous earthing conductor shall be installed in all cable trays and securely clamped to each tray section by suitable connectors to form a continuous earthing system. When two or more trays supporting power cables run in parallel, a continuous earthing conductor shall be provided on trays only with tap offs to the control cable trays. All valve and damper motors and rapping motors will be earthed to this conductor.

4.15.2.4
All joints in the earthing system shall be welded type. Earthing connections to all equipments including motors shall be bolted type.

4.15.2.5
Earthing connections shall be free from tinning scale paint, enamel, grease, rust or dirt at the time of making joint.

4.15.2.6
Metallic sheaths, screens/shields and armour of all multicore cables shall be bonded and earthed.

4.15.2.7
Earthing conductors along their run on columns, beams, walls etc. shall be supported by suitable cleats at intervals of 750 mm.

4.15.2.8
Welded joints on GI earthing conductors shall be coated with one coat of bituminous paint in case of buried earth grid or earth flats to be laid in cable trench. For site welded GI strips/wires which are exposed these are required to be painted with one coat of cold galvanising zinc paint. Contractor to arrange the required paint and other items at his cost.

4.16.0 Instruments and equipments

4.16.1
All field mounted instruments are to be located in such a way as not to obstruct walk-ways or plant equipment access but shall be easily accessible for maintenance. Handrails shall not be used for mounting or supporting instruments.

4.16.2
Racks/stands and supports for instruments and transmitters shall be fixed on RCC column/floor by chipping and grouting or by welding to steel structure. In no case these shall be welded to floor grills.

4.16.3
The power cylinders support/base erection will be welded to steel structure or by grouting. The power cylinder will be properly aligned and linkage mechanism wherever required shall be connected to the driven equipment. All accessories for

power cylinders line air sets, solenoid valves, air lock, limit switches, if supplied loose, shall be fixed, aligned and connected up.

4.16.4
When installing flow and pressure transmitters/switches for Liquid /steam/condensate vapour services, the instrument is to be mounted below its primary element or tapping point. For gas service applications, the instrument is to be mounted above Primary element tapping point.

4.16.5
During erection and commissioning stage, the site mounted instrument shall be protected suitably. Contractor shall provide suitable security arrangement in main control room, and other areas where equipments are positioned, at no extra cost.

4.16.6
All brackets/racks and support steel work for tubing impulse lines/instruments shall be painted two coats of primer and two coats of final colour prior to installation.

4.16.7
Contractor shall arrange for own fire fighting equipments for the materials stored under contractor's custody.

4.17.0 Guidelines for handling and storage of electronic cubicles / subassemblies / loose items.

4.17.1
Immediately after unloading at site, the electronic equipment should be kept in a covered area. Handling and lifting of package should be done without jerks or impacts. Packing case should not be dropped or slid along the floor under any circumstances. Suitable forklift should be used to move the case to its final position. All above points are to be strictly followed as electronic equipments may get damaged due to vibration and shock.

4.17.2
After unloading at site, the package of the equipment shall be inspected for external damage. In case the package is damaged, package number and details of damage should be noted. The details of damage should be reported to concerned site engineer.

4.17.3
Cases should be opened/unpacked using correct nail pullers. While opening the planks, care should be taken to see that equipment inside is not damaged. Cases should not be unpacked in areas where they are exposed to rain, water/liquid splashing, dust or other harmful materials like chlorine gas, sulphur dioxide etc.

4.17.4
After opening the case, all supports provided for transport are to be removed with due care.

4.17.5

Hinged frames should not be opened when equipment is not secured to floor as this is likely to cause it to topple over. The hinged frame can be opened only if the equipment is still fixed on to bottom wooden pallet.

4.18.0 Storage

4.18.1
The equipment should be preferably in its original package and should not be unpacked until it is absolutely necessary for its installation or advised by BHEL engineer. The equipment should be best protected in its cases. It should be arranged away from walls.

4.18.2
The wooden pallet provided for packing itself can be retained for raised platform to protect equipment from ground damps, sinking into around and to circulate air under the stored equipment. This will also help in lifting packing with fork-lifter.

4.18.3
Periodic inspection if silica gel placed inside the equipment is necessary. It has to be replaced or regenerated when decolourisation takes place.

4.18.4
Due care should be taken to ensure that the equipment is not exposed to fumes, gases etc., which can affect electrical contacts of relays and terminal boards.

4.18.5
The storage room and the equipment should be checked at regular interval to ensure protection from termites, mould growth, condensation of water etc., that can damage the equipment.

4.18.6
All the equipments, materials and goods kept in the storeroom should be identified and registered in a book. Inspection report should be recorded. Any discrepancy observed should be communicated to site engineer.

4.18.7
The packing material shall be retained if the cubicle is to be repacked after inspection.

4.19 Sub-assemblies

4.19.1
All subassemblies should be kept in a separate place where it is easily accessible.

4.19.2
Subassemblies should have a protective cover in case it is stored without wooden packing/case to prevent accumulation of dust. Silica gel packets should also be kept along with it.

4.19.3
Subassemblies should not be stacked one above the other.

4.20.0 Loose items

The loose items supplied for the main equipment falls into various categories like tools, cables, prefabricated cables, console inserts, recorders, VDU/CRT, other display units, printers, sensors and transducers, cable glands, cable ducts, frames, racks, etc. These are to be categorised and stored separately.

4.21 Guidelines for handling of electronic modules

4.21.1

All the modules shall be handled by qualified persons only.

4.21.2

Electronic modules should be touched when it is absolutely essential to do so.

4.21.3

Before touching any electronic module, the operator should discharge the static electricity by earthing himself or better still, ensure constant discharge by wearing an earthed wrist strap.

4.21.4

The operator should not wear clothing made entirely from synthetic fibres, but a mixture containing at least 65% cotton.

4.21.5

The PCB should always be held by front panel or by module frame and electronic components / connectors should never be touched.

4.21.6

The electronic modules should not be placed close to television sets or CRT units.

4.21.7

Soldering irons and any other tools used must be grounded.

4.21.8

All modules using CMOS components are packed in antistatic bags when transported loose to avoid ESD failures. The antistatic bags must always be used to transport modules at site from one place to the other.

4.22 Exclusions

The following are specific exclusions from this work.

1. Erection of dampers, valves, electrical actuators.
2 Attachment welding of thermocouple pads for boiler tube metal temperature measurement, flow nozzles and control valves.
3. Erection of valves, actuators along with valves, damper actuators along with dampers, burner tilt power cylinder, seal air dampers and scanner air emergency dampers. *(However**, SADC power cylinder installation shall be in the scope of the contractor**)*
4. Erection of electro hydraulic actuators, control valves.
5. Erection of Transformers in ESP
6. Installation of thermowells and seal welding of the same.
7. Impulse piping for Turbine package as the same has been include in Mechanical Package. (Refer clause number 4.12 of Turbine Contract)

Note:

The above exclusions should not be construed as final. They are meant for general guidelines. BHEL reserves the right to include or exclude any item that is required for completing the job as per rates indicated in rate schedule. Contractor shall carry out all such jobs as per the instructions of BHEL engineer.

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-IIIA** for suggestive list of major T&P and MMD). 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. The contractor shall submit month wise deployment plan of major T&P and MMD as per format given in **Appendix-V**.

5.1.2

All the tools and tackles, calibrating instruments 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

Contractor shall maintain and operate his tools, plants, calibrating instruments etc. in such a way that major breakdowns are avoided. In the event of major breakdown, the contractor shall make alternate arrangements expeditiously so that the progress of the work is not hampered.

5.1.5

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

Air compressor, blowers, etc., required for erection purpose like cleaning of panels, impulse pipes, equipments, and for any other incidental work wherein compressed air is required, shall be arranged by contractor.

5.2 Consumables

5.2.1

The contractor shall provide all consumables required for carrying out the work covered under this scope of work except those, which are specifically indicated as BHEL scope of supply. The consumables and items to be provided by BHEL free of charges are indicated in **Appendix-II**.

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-IIIB** (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

All small fixtures of required quantity like bolts, nuts, washers etc. for fixing the instruments, clamps for dressing and clamping cables, impulse lines etc., Teflon tapes etc. required to complete the job as per good engineering practice and in all respects, shall be supplied by the contractor at his cost.

5.3.4

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.

5.4 Field Office and Stores

5.4.1

BHEL’s client will provide open space free of charges for constructing contractor's office on a temporary basis.

5.4.2

The contractor shall make his own arrangements for field office with necessary equipments, calibration laboratory tool room, office for staff, storekeeper, watch and ward etc. for the execution of the work. After the completion of work, contractor shall dismantle the above structure and hand over the land clear of all debris and temporary constructions to BHEL/customer.

5.4.3
Contractor shall establish instrument testing/calibration laboratory including test benches, instruments and adequate space for storage of instrument.

5.5 Lighting

5.5.1
Permanent lighting inside the powerhouse is to be provided by BHEL/ the customer of BHEL. Till such time such arrangements are made, the contractor at his cost shall arrange for temporary lighting. This arrangement is besides the local lighting that may be required for the execution of the work and shall also be arranged by the contractor.

5.5.2
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.

5.5.3
All temporary wiring must comply with local regulations and will be subjected to engineer's inspection and approval before connecting to supply point.

5.5.4
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 labour colony. 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.

5.6.3
Contractor will deduct the necessary amount from his employees towards provident fund and contribute equal amount as per Government of India labour laws. This amount will be deposited by contractor regularly to the Provident Fund Commissioner and get the account code. Contractor shall submit the account code duly certified by PF Commissioner to BHEL site office. Also all other employees' benefits to be borne by contractor as per the labour laws.

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 goods & 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 (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) 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.

5.7.4 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 Labourer

6.1.1

The contractor shall supply all the skilled labour and high pressure welders, carbon and alloy steel welders, gas cutters, riggers, sarangs, erectors, instrument fitters electricians, instrument technicians, instrument calibrators, etc. in addition to other skilled, semiskilled and unskilled labour required for all the work of handling and transporting from site, storage at erection site, calibration, erection, testing and commissioning and all other works envisaged in this tender. Only fully trained and competent men with previous experience on the job shall be employed. They shall hold valid certificates wherever necessary. BHEL reserves the right to decide on the suitability of the workers and other personnel who will be employed by the contractor. BHEL reserves the right to insist on removal of any employee of the contractor at any time if he is found to be unsuitable and the contractor shall forthwith remove him. Contractor should furnish the list of personnel proposed to be deployed for this job alongwith their qualification, experience in similar type of job. The actual deployment will be so as to satisfy the erection and commissioning targets set by BHEL. The contractor shall give an organisation chart indicating the staffing pattern for the work. Each area shall be adequately supported by supervisors. This is only for guidance. During execution of work if any area needs extra attention, contractor shall post engineers/supervisors/skilled/semiskilled/ unskilled workers as per the advise of BHEL engineer. Contractor shall submit his manpower deployment plan as per appendix-IVA.

6.1.2

Any sort of subcontracting/subletting of the work awarded, by the contractor is strictly prohibited.

6.1.3

If at any time, it is found that the contractor is not in a position to deploy the required workmen due to any reason; BHEL shall have the option to deploy their workmen or make alternate arrangements at the contractor's risk and cost. The expenditure incurred with overhead on this account will be recovered from the contractor's bills.

6.1.4

It is the responsibility of the contractor to engage his workmen in shifts and or on overtime basis for achieving the target set by BHEL. This target may be set to suit BHEL's commitments to its customer or to advance date of completion of events or due to other reasons. The decision of BHEL in regard to setting the erection targets will be final and binding on the contractor.

6.1.5

Contractor shall employ only qualified and experienced engineers/ supervisors for this job. They shall have professional approach in executing the work having

adequate knowledge and experience in the fields of erection, erection methodology, calibration, testing and commissioning, quality control and quality assurance procedures, planning, safety etc. required to undertake the type of work as per this tender.

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.

6.3 Industrial relations and labour laws

6.3.1

An industrial relations supervisor shall coordinate for the implementation of local labour laws, maintenance of records as required by contract labour (regulation and abolition) act and also coordinate with the local labour authorities.

6.3.2

In case the contractor fails to deploy the required engineer/supervisors, a penalty @ Rs. 800/- per man-day of non-deployment will be levied and the amount deducted from the bills.

6.3.3

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

6.3.4

The supervisory staff employed by the contractor shall ensure proper outturn 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 in coordination with other labour and staff employed directly by BHEL or other contractors of BHEL or BHEL's client.

6.4 Watch and ward

Contractor has to arrange and provide watch and ward round the clock. Any theft or damage of component due to negligence of the contractor will have to be replaced/repaired by the contractor. The areas are unit control room, field and any other place where equipments are kept (stored or installed) by the Contractor.

6.5 Proposed site organisation chart for erection/commng.

Contractor to provide necessary engineers and supervisors for the work and they shall have adequate experience in similar type of work. Adequate staffing shall be provided by contractor in the following areas:-
Overall co-ordination & execution
Boiler & aux. C&I erection, commissioning
Turbine And auxiliary C&I Erection and Commissioning
Electrical Area
Instrument calibration
Quality control
Safety
Planning, review, monitoring & reporting
Industrial relations
Material management, material identification, transport, storage & supervision.
Contractor shall deploy separate in-charge for erection & commissioning for the above-mentioned areas. Contractor shall give an organization chart indicating the staffing pattern for the above purpose. The engineer in each area shall have adequately supported by supervisors.
The above areas are indicated for guidance. During erection of work if any area needs extra attention, contractor shall post engineers/supervisors accordingly.

6.5.1
Contractor shall provide along with the offer, names and details of the engineers/ supervisors supposed to be deployed

6.5.2
Contractor should provide a team of engineers with proven experience in microprocessor based DDC systems with regard to the software as well as hardware. They should be in a position to undertake specific assignments during the start up/ post start up situation of above system as per the instruction of BHEL engineer. Contractor has to provide names of the engineers with their bio data for the scrutiny of BHEL.

6.5.3
Planning - Contractor shall have his own planning cell headed by planning engineer. He shall work out the physical erection target area wise for his engineers and also plan the achievements for milestone events. He shall also monitor the input like T&P, materials, manpower, deployment position of the various working gangs. He shall furnish all the details required by BHEL as per the relevant contract clauses.

Special Conditions of Contract
Section-7

7.0 Obligations of BHEL

7.1 Facilities provided by BHEL

7.1.1 Space for Site Office
Space for construction of site office will be provided by BHEL's customer free of charge on a temporary basis.

7.1.2 Construction Water
For construction purpose, water shall be provided free of charge at a single point near erection site. Further distribution and connection if any, shall be arranged by the contractor.

7.1.3 Electricity
For construction purposes, power connection (415V/440V) will be provided free of charge at a single point near erection site. Necessary switchboard, fuse carriers, power cables etc. shall be arranged by the contractor for connecting to the supply point. However, taxes & duties as levied by customer have to be borne by contractor.

7.1.4
BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.

7.1.5 Test Plates/Pipes for Welders Qualification Test
Test plates and Pipe pieces as considered adequate for testing contractor's welders will be supplied by BHEL free of cost. All other preparatory activities and expenses for conducting the test shall be in contractor’s scope.

7.2 Tools & Plants
7.2.1
BHEL will provide the following listed T&P free of charges for this work.
E.O.T. Crane inside TG Hall: For handling and erection of Panels

7.2.2
Special tools which are supplied by BHEL as part of maintenance tools under regular DU/DESS numbers in various product groups will be spared free to contractor and contractor shall return them after the completion of the specific work, for which the tools were spared, in good working condition.

7.2.3
Contractor shall provide the operators and fuel (excepting electricity for E.O.T. Crane) for the BHEL T&P within the quoted rates. Daily maintenance, preventive maintenance, repair & replacement in case of damage/loss/breakdown of BHEL T&P attributable to the contractor shall be carried out by the contractor at his cost. Spare Parts for replacement arising due to normal wear & tear or breakdown or accidental damage that are not attributable to the contractor will be provided by BHEL free of cost.

7.2.4
The contractor must not use these equipments for purposes other than the scope of work given in this tender specification. Misuse, if any, will result in penalty.

7.2.5
All the above equipments issued to contractor will be inspected periodically by BHEL engineer. In case contractor fails to make good the damages caused, BHEL will do the same at contractor's cost.

7.2.6
If the above items issued to contractor are found not utilised/not maintained to the satisfaction of BHEL engineer or misused, these will be withdrawn and no replacement will be done for such items.

7.2.7
Non-availability of these equipments due to breakdown, maintenance or any other reason will not be the cause for claiming extension of time.

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

Apart from day-to-day inspection by BHEL engineers stationed at site and also by BHEL's customer engineers, stage inspection of equipments etc. under calibration, erection, testing and commissioning at various stages by teams of engineers from field engineering services of BHEL's manufacturing units and quality assurance teams from field quality assurance unit/factory quality assurance unit of BHEL will also be conducted. Contractor shall arrange all labour, tools and tackles etc. for such stage inspection.

8.1.6

Any re-laying or re-termination of cables/re-erection of instruments/recalibration of instruments etc. required due to contractor's mistake or design requirement and found at any stage inspection, shall be carried out by the contractor at no extra cost.

8.1.7

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.

8.1.8
The welders' performance will be reviewed from time to time as per BHEL/IBR standards and welders not performing to the standards of BHEL/IBR will be removed from working. Contractor shall arrange for alternative welders immediately.

8.1.9
All the welders including HP welders shall carry identity cards as per the pro-forma prescribed by BHEL. Only welders duly authorised by BHEL shall be engaged on the work.

8.1.10 Stage inspection by QA engineers:
Apart from day-today inspection by BHEL engineers stationed at site and also by customer engineers, stage inspection of the equipments under erection & commissioning at various stages of erection and commissioning by teams of engineers from field quality assurance will also be conducted. All necessary inputs required for such stage inspection shall be arranged by contractor free of cost.
Any modifications suggested by QA engineers shall be carried out.
Any minor modification/repairs of defective work found during stage inspection shall be rectified free of cost by contractor.
Any major rectification or in case of repairs/re-work of defective work found during stage inspection, but not attributable to the contractor shall also be carried out. Claims of contractor if any, shall be governed as per the clauses in section 13.

8.2 Statutory Inspection

8.2.1
The scope includes getting the approvals from the statutory authorities. This includes arranging for inspection visits of electrical inspector periodically as per BHEL engineer's instructions, submitting documents etc. and following up the matter with them as and when necessary for the work involved in this scope.

8.2.2
All fees connected with the contractors for testing his welders/ men/workers and testing, inspection, calibration of his instruments and equipments, shall be paid by the contractor. It shall be contractor's responsibility to obtain approval of statutory authorities wherever applicable, for conducting of any work which comes under the purview of these authorities.

Section-9

SPECIAL CONDITIONS OF CONTRACT

Safety, Occupational Health and Environmental Management

Introduction:-

BHEL PSWR has been certified for Environmental Management under ISO 14001:1996 standard and Occupational Health & Safety under OHSAS 18001 by DNV. 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.

9.0 Responsibility of the Contractor in respect of Safety of men, Equipment, Material and Environment.

9.1 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

9.1.2 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.

9.1.3 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

9.1.4 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

9.1.5 prepare a sign board giving the following information and display it near the 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.

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

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

9.2 SPECIAL CONDITIONS

9.2.1 Safety

9.2.1.1 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.

9.2.1.1 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.

9.2.1.2 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 PPE of standard ISI make as may be prescribed

9.2.1.3 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

9.2.1.4 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.

9.2.1.5 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.

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

9.2.1.7 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.

9.2.1.8 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.

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

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

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

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

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

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

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

9.2.1.16 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.

9.2.1.17 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.

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

9.2.1.19 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

9.2.1.20 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.

9.2.1.21 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.

9.2.1.22 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.

9.2.1.23 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.

9.2.1.24 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.

9.2.1.25 **Emergency Response**

9.2.1.15.1 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 mobilization 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.

9.2.1.15.2 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 aid personnel 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.

9.2.2 OCCUPATIONAL HEALTH

9.2.2.1 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.

9.2.2.2 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

9.2.2.3 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

9.2.2.4 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 PPEs 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

9.2.2.5 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

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

9.2.2.7 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

9.2.2.8 Adequate arrangements shall be made to provide safe drinking water

9.2.2.9 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

9.2.3.0 HYGIENE and HOUSEKEEPING

9.2.3.1 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.

9.2.3.2 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.

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

9.2.4 ENVIRONMENT MANAGEMENT

9.2.4.1 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.

9.2.4.2 WASTE MANAGEMENT

9.2.4.3.1 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.

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

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

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

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

9.2.4.3.6 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**

9.3.1 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.

9.3.2 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, supervisor must attend all schedule safety meetings as would be intimated to him by the BHEL Engineer in Charge.

9.3.3 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.

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

9.4.0 TRAINING & AWARENESS

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

9.4.2 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.

9.4.3 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

9.4.4 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.

9.4.5 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

9.5.0 REPORTING

9.5.1 The contractor shall submit report of all accidents, fires and property damage, dangerous occurrences to the authorized 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.

9.5.2 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.

9.5.3 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.

9.5.4 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.

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

9.5.6 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.

9.6 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 and documentation to cover the following aspects.

- Compliance with procedures and systems
- Availability, condition and use of PPE
- 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-coordinator 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

9.7 **NON COMPLIANCE**:-

9.7.1 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**:

Sl. No.	Violation of Safety Norm	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/-
14.	Accident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
15.	Fatal Accident/Accidents Resulting in total loss in Earning Capacity	1,00,000/- per victim

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:

9.10.1 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 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 No.	YEAR	Amd. upto	Description
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 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

IS No.	YEAR	Amd. upto	Description
			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 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 No.	YEAR	Amd. upto	Description
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 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 tenderness, 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 con t in sections 4 to 15 and appendices shall prevail.

10.7
In case of discrepancy between quoted item rate and corresponding amount in the rate schedule, the **quoted item rates shall be reckoned as correct and amount recalculated**. Quoted item rates shall also prevail for arriving at the total price quoted for offer evaluation. Offers will evaluated on the total amount for the entire Rate Schedule and the work will be awarded without splitting the scope.

10.8
Bank Guarantees to be furnished by the contractor towards Security Deposit and Performance Guarantee (last 5% payment against workmanship warranty/defect liability) shall have a claim period of six months over and above the validity period required for the respective cases. BG for advance payment shall be kept valid for a period of two more months beyond the recovery period of the advance with interest thereof.

Special Conditions of Contract

Section-11

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

11.1 Mobilization Time and Contract Period

A) Mobilization Period and Major Milestones
The contractor shall mobilize his resources so as to be ready to start the contracted work within 15 days from the issue of fax/ telegraphic Letter of Intent (L.O.I.). Schedule of completion of various major milestones for the project is as under.

Boiler light up:	March 2008
Rolling & Synchronisation	May 2008
Coal Firing:	June 2008
Trial Run:	July 2008

Contract Period
The Contract Period shall be 8 **(eight) months** from the start of work. The date of start of erection of the first instrument / equipment / sub-assembly / component on its permanent designated location or foundation shall be reckoned as the start of Contract Period.

Grace Period
Grace Period of 2 (two) months beyond the Contract Period will be admissible for this contract at the discretion of BHEL.

BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule with mutual agreement. Contractor shall plan his activities and mobilise additional resources accordingly to the satisfaction of BHEL engineer within the accepted rates.

11.2
The contractor should reach site and establish his site office and mobilise to commence the work as per directions of BHEL engineer. The date of starting the work at site shall be fixed in consultation with BHEL's engineer and the same will be recorded in measurement book while entering the first RA bill.

11.3
Subject to availability of materials and other inputs, it is the responsibility of the contractor to carry out work to achieve the monthly progress and keep up the schedules.

11.4
Contractor shall draw the monthly erection programme along with BHEL engineer indicating the work to be achieved and event to be completed as per clause 11.1. Once the programme is drawn, he shall adhere to the same. Contractor shall plan and erect the materials as it is received at site. The monthly planned percentage shall take into consideration the material available at site before the start of the

month and also any material received during the month. Contractor shall mobilise his resources required to achieve the monthly programmes.

11.5 Progress Monitoring, Contract Extension and Overrun

11.5.1 Progress Monitoring

Progress will be reviewed periodically (daily / weekly / monthly) including month end review vis-a-vis the plans drawn as above. The contractor shall submit periodical progress reports, and other reports / information including manpower, consumables etc as desired by BHEL.

11.5.2 Ascertaining and establishing the reasons for shortfall

The onus probandi that the cause leading to extension of the contract period is not due to any reasons attributable to the contractor is on him (the contractor). Review of the performance as stated vide Cl. 11.5.1 above will be made considering the availability of components to be erected and other inputs / constraints over which the contractor has no control. The programme will be reviewed area-wise and the following facts will be recorded in case of shortfall at the end of every month:

A) Erection/commissioning programme not achieved owing to non-availability of fronts.

B) Erection/commissioning programme not achieved owing to non-availability of materials.

C) Erection/commissioning programme not achieved owing to non-availability of tools and plants, manpower and consumables by the contractor or any other reason attributable to the contractor.

D) Erection/commissioning programme not achieved due to any other reasons not attributable to the contractor.

11.5.3

If the completion of work as detailed in these specification gets delayed beyond the end of contract period and grace period then depending on the balance work left out, BHEL at its discretion may extend the contract period suitably.

11.5.4

A joint programme shall be drawn for the work to be completed during the extended contract period. Review of the program and record of shortfall as describe vide clause no. 11.5.2 shall be done during the extended period. The overrun charges will be paid in proportion to the achievement of the respective month vis-à-vis the plan for the month (for assessing the performance, the agreed plan shall be reduced by shortfall attributable to the BHEL). BHEL may disallow contractor's claim for overrun charges if the monthly programme as mentioned here were not made by him.

11.5.5

The part of extension attributable to the contractor, if any, in total contract extension shall be exhausted first i.e., immediately after end of grace period. This

shall be followed by the extension on account of force majeure conditions, if any, and lastly on account of BHEL.

11.5.6 Overrun Compensation

If the contract is extended beyond the contract (including grace) period for any reason other than those attributable to the contractor or force majeure conditions, the contractor will be compensated by payment of overrun charges at the rate of Rs. 40,000/- (Rupees Forty thousand only) per month. Overrun compensation will be paid for the extension attributable to BHEL only. No overrun compensation will be payable for the extension on account of reasons attributable to contractor and/or force majeure conditions. Overrun compensation for eligible period shall be in proportion to the progress achieved against the plan for respective period.

11.6 Contract Variation

11.6.1 Quantity Variation

The quantities shown in Rate Schedule are only estimated and the payment will be made on the actual quantity executed on agreed unit rate basis and no compensation or revision of rates is envisaged for any upward / downward variation in quantities.

11.6.2 Item Variation

Equipments /instruments required to be erected for this work, though not limited to but are generally as per Rate Schedule. For any items or class of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However the payment of these items/class of work shall be regulated on the basis of mutually agreed rate arrived at by either of the following methods, which should be done prior to undertaking the work:

Based on rate of identical/similar items in the rate schedule
Based on the rate arrived from nearby items in the rate schedule

Wherever any item rate for similar type of work or nearby item rate does not exist in the rate schedule, rate will be worked out on the basis of work element or from fundamentals of estimation or existing rates in other job.

11.7 Price Variation

The agreed rates shall remain firm throughout the Contract Period, Grace Period and Extensions if any. Clause no. 2.15 of general conditions of contract shall not be applicable to this contract.

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.

11.8.3
The date of completion of work for the purpose of guarantee vide clause 2.13 of general conditions will be the date on which the contract is foreclosed.

11.9 INTEREST BEARING RECOVERABLE ADVANCE

Interest bearing (rate of interest will be 1% per annum more than bank interest rate, on monthly reducing balance basis) recoverable advance limited to 5% of the contract value may be paid by BHEL at its discretion depending on the merit of the case against receipt & acceptance of bank guarantee from the contractor for the amount sought. This bank guarantee (BG) shall be valid at least for one year or the recovery duration. In case recovery of dues does not get completed within the aforesaid BG validity period, the contractor must renew the validity of BG or submit fresh BG for the outstanding amount and remaining recovery period. BHEL is entitled to make recovery of the entire outstanding amount in case the contractor fails to comply with the BG requirement as above.

Recovery of dues will be made minimum @ 10% of the admitted gross running bill amount from the first applicable running bill onwards till entire due (principal plus interest) is recovered. In the event sufficient time duration is not left for recovery @10%, the rate of recovery shall be suitably enhanced so that entire due is recovered within the contract period (including extensions granted or foreclosure if any

11.10 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

12.0 TERMS OF PAYMENT

12.1.1
The contractor shall submit his monthly on account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas from the 25th of previous calendar month to 24th of the current month.

12.1.2
Clause 2.6 of general conditions of contract shall be referred to as regards mode of payment, and measurement of the work completed.

12.1.3
Release of payment in each running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter.
The 5% thus remaining shall be on account of workmanship guarantee of work executed. The same will be released after completion of the guarantee period of **12 months** from the date of completion of entire work as certified by BHEL.
However, this amount may be released earlier (including before completion of work) subject to receipt and acceptance of bank guarantee of equal amount in BHEL's prescribed format and the BG shall be kept valid till completion of such guarantee period and an additional six months claim period. This is also subject to the condition that the contractor has started the work and also furnished/remitted the initial Security Deposit as per contract.

12.1.4
The payment for running bills will normally be released within around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

12.1.5
BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, the following details are to be furnished by the Contractor pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker:

1. Name of the Company
2. Name of Bank
3. Name of Bank Branch
4. City/Place
5. Account Number
6. Account type
7. IFSC code of the Bank Branch
8. MICR Code of the Bank Branch

BHEL may also choose to release payment by other alternative modes as suitable.

12.2 STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

12.2.1
The agreed rates for each item shall be paid progressively as per the break up given hereunder (aggregating 100%), based on the stages of completion.

SN	Sections of Rate Schedule	Calibration/ Checking	Erection	Testing and Commissioning	Final painting
1	A.1 to A.3	N.A.	55%	40%	5%
2	A.4to A.6	N.A.	NA	95%	5%
3	A.7 to A.23, A25 to A27	N.A.	55%	40%	5%
4	A24	NA	NA	100%	NA
3	B.1 to B.30	20%	40%	40%	N.A.
4	C.1 to C.14	N.A	N.A.	100%	N.A.
5	D.1 to D.14, D41	N.A.	95%	N.A.	5%
6	D.15 to D.40	N.A.	100%	N.A.	N.A.

For the items where the payment is to be made against unit of weight, the actual weight of items erected by contractor will be paid after assessing the weight on the basis of shipping list or standard engineering practice. BHEL engineer's decision will be final and binding on contractor in this regard.

12.3 Payment for the Work Completed

12.3.1
The tenderer shall quote separate rates for each item as detailed in Rate Schedule. No other form of quoted price shall be acceptable and such offers shall be liable for rejection.

12.3.2 Measurement for Payment

12.3.3
In Rate Schedule, all inclusive unit rates have been called for entire scope of work for respective item including erection, calibration, testing and commissioning as applicable for various device and instrument and payment shall be made as per split up furnished in the table earlier in this section.

12.3.4
For all payment purpose, measurement shall be made on the basis of physical verification. Physical verification/measurement shall be made by Contractor in presence of BHEL engineer. Contractor shall maintain records for system-wise utilization of material.

12.3.5
All the surplus, scrap and serviceable materials shall be returned by the contractor to BHEL stores as per the instruction of engineer

12.3.6
All the cables returned to stores should carry an aluminium tag indicating the size and type of cables. Cable of more than five-meter length is termed as “serviceable material”.

12.3.7
Any item returned to stores shall be clearly identified and tagged for its serviceability or any defects in the returned items.

12.3.8
Wherever additional instrumentation work has to be carried out for performance guarantee test, the same has to be executed by the contractor as per the applicable rates already provided in the Rate Schedule.

Special Conditions of Contract
Section-13

13.0 Extra Charges for Modification and Rectification

13.1
If extra works for modification, rework, revamping, or in brief, any work done to change the state existing to a stage desired, and also fabrication, if any, are needed due to any change in or deviation from the drawings and design of equipment, operation/ maintenance requirements, mismatching, transit damages and other allied works which are not very specifically indicated in the drawings, but are found essential for satisfactory completion of the work, are done, no extra charges will be paid. The tenderers are requested to take this aspect into account and the quoted rate should include all such contingencies.

13.2
It may also be noted that if any such said extra works arise on account of the contractor's fault it will have to be carried out by the contractor free of cost. Under such circumstances, any material and consumable required for this purpose will also have to be arranged by the contractor at his cost.

13.3
However, BHEL may consider for payment as extra, for such of those works detailed in clause 13.1 which require more than 24 manhours and such payment will be regulated by the terms, conditions and stipulations contained in the clauses 13.4 and/or 14.2.1 to 14.2.11. It may be specifically noted that the decision of BHEL as to whether such payment is due shall be final and binding on the contractor.

13.4
BHEL may, at their absolute discretion, consider payment for extra work as found by them as justifiable for such of those works specified in clause 13.1 which require major modification, major repair, major reworks, major rectification etc. provided each work requires more than 24 manhours. It may also be noted that only those works which are identified as major and warrant extra payment and certified as such by the project manager and accepted by the designers and/or competent authority of BHEL, will be considered for extra payment.

13.5
Such extra works arising out of transit, storage and erection damages, payment, if found due, will be regulated by clauses 14.2.1 to 14.2.11.

13.6
All the extra work carried out should be done by a separate gang which could be identified for ascertaining the mandays. No diversion of regular gang for such extra works will be permissible and no delay or slow progress should be caused due to executing extra works. Hence, the question of granting extension of time for this reason should not arise. Daily log sheets in the proforma prescribed by BHEL should be maintained and shall be signed by the contractor's representative and BHEL engineer. No claim for extra work will be considered/entertained in the absence of the said supporting documents i.e., daily log sheets, etc. It may,

however, be noted that signing of log sheets by BHEL engineer does not mean the acceptance of such works as extra works eligible for payment of the acceptance of number of mandays needed for the work. Also contractor shall compile the extra work done regularly and submit the same within 30 days after completion of extra work.

13.7
BHEL retains the right to award or not to award any of the major repair/major rework/major modification / major rectification / major fabrication works under clauses 13.1 to 13.6 to the contractor, at their discretion without assigning any reason for the same.

13.8
Payment for works that are accepted as additional by BHEL will be made as per rate under.

Single average man-day rate of 8 hours, including overtime if any, and other site expenses, incidentals, including consumables, tools and tackles and supervision required will be **Rs. 240/-** (Rupees two hundred and forty only). No payment will be made if an item of work lasts less than 24 manhours.

SECTION-14

SPECIAL CONDITIONS OF CONTRACT

14.0 Insurance

14.1 Marine, Storage cum Erection (MCE) Insurance and Repairing Damages

14.1.1
BHEL/client has an MCE insurance cover, inter-alia, for all the permanent project equipments/components supplied by BHEL under scope of this work by way of a transit and storage cum erection policy covering liability against damages/ losses etc.

14.2 Reporting Damages and Carrying out Repairs

14.2.1
Checking all components/equipments at siding/site and reporting to transporter and /or insurance authorities of any damages/losses will be done by BHEL.

14.2.2
Contractor shall render all help to BHEL in inspection including handling, re-stacking etc, assessing and preparing estimates for repairs of components damaged during transit, storage and erection, commissioning and preparing estimates for fabrication of materials lost/damaged during transit, storage and erection. Contractor shall help BHEL to furnish all the data required by railways, insurance company or their surveyors.

14.2.3
Contractor shall report to BHEL in writing any damages to equipments/ components on receipt, storing, and during drawl of the materials from stores, in transit to site and unloading at place of work and during erection and commissioning. The above report shall be as prescribed by BHEL site management. Any consequential loss arising out of non-compliance of this stipulation will be borne by contractor.

14.2.4
Contractor shall carry out fabrication of any material lost/damaged as per instructions from BHEL engineer.

14.2.5
BHEL, however, retains the right to award or not to award to the contractor any of the rectification/rework/repairs of damages and also fabrication of components.

14.2.6
All the repairs/rectification/rework of damages and fabrication of materials lost, if any, shall be carried out by a separately identifiable gang for certification of man-hours. Daily log sheets should be maintained for each work separately and should be signed by contractor's representative and BHEL engineer. Signing of log sheets does not necessarily mean the acceptance of these as extra works.

14.2.7
All rectification, repairs, rework and fabrication of components lost, which are minor and incidental to erection work (consuming not more than 100 man-hours on each occasion) shall be treated as part of work without any extra cost.

14.2.8
Insurance cover under this policy will generally be as per clauses 2.10.1 to 2.10.4 of General Conditions of Contract unless and otherwise specified differently in the Special Conditions.

14.2.9
In case the loss/damage is not attributable to the contractor, Payments of all extra works on account of repair / rectification / reworks of damages and fabrication of materials lost will be as per provisions of Section-13 of SCC.

14.2.10
In case the repairs/rectification/rework and fabrication of materials lost, the work has been done by more than one agency including the contractor, the payment towards extra charges will be on pro-rata basis and the decision of BHEL in this regard is final and binding on the contractor.

14.2.11
In case of theft / damage / loss of materials due to **repeated/continued instances of negligence/failure** attributable to the contractor, the expenses incurred on account of repair/ replacement of such components including BHEL's overhead expenses as applicable (presently @ 30%) in excess of the amount realized from the underwriters, if any, shall be recovered from the contractor. Recovery will be limited to Normal Deductible Franchise (DF)/Excess as per applicable Insurance (TAC) tariff guidelines for every incidence of loss/damage.

14.2.12
In case any insurance claim does not become tenable due to **willful** negligence/ damage/loss attributable to the contractor, the total cost of repair/replacement including BHEL overhead expenses shall be recovered from the contractor.

14.3 Insurance by the Contractor and Indemnification of BHEL

14.3.1

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.

14.3.2
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 & Security Deposit

15.1 EARNEST MONEY DEPOSIT:

EARNEST MONEY DEPOSIT FOR THIS TENDER WILL BE Rs. 1,00,000/- (RUPEES ONE LACS ONLY).

ONE TIME EMD WILL BE Rs. 2 LACS.

EMD SHALL 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.**

15.1.1 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.

II) 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.

15.1.2 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 IN THE MANNER SPECIFIED AS FOLLOWS.

15.2.2 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).

V) 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.

VI) 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.

VII) 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 REMITTED (EITHER BY CASH/DD OR **BG FOR MAXIMUM 50%** OF TOTAL SD) BEFORE START OF THE WORK AND THE BALANCE 50% MAY BE RECOVERED FROM THE RUNNING BILLS.

VIII) 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.

IX) 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.

15.2.3 SECURITY DEPOSIT SHALL NOT BE REFUNDED TO THE CONTRACTOR EXCEPT IN ACCORDANCE WITH THE TERMS OF THE CONTRACT.

Appendix- I

List of Systems and Equipment in Scope of Contract

Details (wherever required) of the items listed in the Rate Schedule
Please Note:

1. All the items are generally to be erected and commissioned by the contractor, unless specifically mentioned otherwise.
2. In such cases where systems are described with component lumpsum rates are to be quoted. No separate payment will be made for the component items of those systems, although these systems may have certain items for which separate unit rates are also available elsewhere.

Sl No A.1 to A.3: Control panels and accessories.
These are microprocessor based sophisticated electronic control panels and accessories. Lumpsum rate to be quoted.
Sl No A.4
DC starter box for scanner fan dimension approx 800x400x1200, weight approx 100 KG.
Sl No A.5: Pulveriser Lube oil skid
The scope of work includes removal of instruments, calibration, refixing, checking cable connection from JB to instruments, motor connection, meggering and improving IR value of motor etc. and commissioning the skid.
Equipment per set:
DP/Pressure Switch – 10 Nos
Temperature Switches- 4 Nos.
RTD – 2 No.
Pressure/DP Gauge- 6 Nos.
Temperature Indicators- 4 Nos.
Flow Indicators- 4 Nos.
Lumpsum rate per set is to be quoted.

Sl No A.6: Fan Lube oil skid
The scope of work includes removal of instruments, calibration, refixing, checking cable connection from JB to instruments, motor connection, meggering and improving IR value of motor etc. and commissioning the skid
The approximate total quantity of instruments *for all the 12 Nos. skids put together* is given below:
Pressure/DP Gauges - 88 Nos.
Temperature Gauges – 36 Nos.
DP Switches – 12 Nos.
Pressure Switches - 50 Nos.
Level Switches - 12 Nos.
Lumpsum rate per set is to be quoted.

Sl No A.7: Feeder Control Cabinet

- Lump sum rate is to be quoted.

Sl No A.8: ERV Controller
The controller box to be erected near the ERV and impulse piping to be done. It has 220V DV rated pressure switches inside which are to be calibrated.

Dimension: 350 x 290 x 180 mm; weight: 5 kg each. Lumpsum rate per set is to be quoted.

Sl No A.9: Electronic water level indicator (EWLI)
Electronic Water Level Indicator EWLI comprises of the following:
Pressure vessel with loose supplied electrodes (24 nos). Pressure vessel will be erected by mechanical contractor.
2 Nos. of Ascertor Units (Local) with Display, each of dimension: 600 x 350 x 600 mm; Weight: 25 kg each
4 Nos. of Remote Display Unit (100 x 90 x 234 mm) (Two numbers at operating floor and two numbers at control room)
Interconnecting cables between local panel and 24 electrodes (included in cabling BOM)
Lumpsum rate per set is to be quoted.

Sl No A.10: Air Heater Rotor stoppage box
Rotor Stoppage Alarm Box- including sensors (magnetic switch), timer relays, interconnecting cables etc. Lumpsum rate per set is to be quoted.

Sl No A.15: HEA Exciter System
H.E.A. Excitor box along with retractor assembly, flexible spark rod, spark tip, flexible HT cable assembly, S.S. Hose (1 Mtr long, 6.35 mm ID), Air Filter Regulator, HEA Exciter etc. Lumpsum rate per set is to be quoted.

Sl No A.16: Flame Scanner head assembly
It includes erection of fibre optic cable of length 120", Lens Barrel Assembly, Miniature 6 way Junction Box etc. Lumpsum rate per set is to be quoted.

Appendix-II

Consumables/Items to be provided by BHEL free of charge

Metallic Cable glands

Cable lugs more than 4sqmm size

Structural Steel for permanent supporting of equipment/components/instruments that form part of permanent installation.

Appendix-IIIA

List of major testing & measuring instrument/ tools and tackles to be deployed by contractor.

SN	Description	Quantity
I. MMD (Instruments)		
01	Dead weight tester rated 400 and 700 kg/cm2 with weights and test gauge facility. Make 'Budenberg or 'Ravika'	1 no. Each
02	Oil temperature bath suitable to calibrate the instruments range 0 – 200 deg. C with standard temperature gauges and thermostatic control	2 nos.
03	Muffle furnace – 800 deg. C with standard temperature gauges	1 no.
04	Standard gauges 12" dial size make "Budenberg" or "H Guru" or "Odin"	
	– 1-0 kg/cm2 pressure gauge(vacuum gauge)	1 no.
	0 – 5 or 6 kg/cm2 pressure gauge	1 no.
	0 – 10 kg/cm2 – do –	1 no.
	0 – 25 kg/cm2 – do –	1 no.
	0 – 60 kg/cm2 – do –	1 no.
	0 – 100 kg/cm2 –do –	1 no.
	0 – 250 kg/cm2 – do –	1 no.
	0 – 600 kg/cm2 – do –	1 no.
	0.2 to 1 kg -- do --	1 no.
05	Manometers (+/-) 1000 mm water column With hand bulb for lab and small manometers for field purpose.	2 nos.
06	Manometer (+/-) 500mm mercury column with hand bulb for lab and small manometer for field purpose.	1 no.
07	Inclined manometer (+/-) 300 mm water column	1 no.
08	Portable air compressor with drier and regulator make "Toshniwal" / "Khosla" rated for 7 to 10 kg/cm2	2 nos.
07	Soldering iron "Soldron" make 25 watt	6 nos.
09	Vacuum pump	1 no.
10	Multimeters	
A)	Digital, 3 1/2 digit Motwane/HIL/Fluke	10 nos
B)	Analog: Motwane make	2 nos.
C)	Digital, 4 1/2 digit Motwane/HIL/Fluke	4 nos.
11	Standard milliamps / millivolts source of reputed make. Range 0 to 60 ma and 0 to 100 mv	4 nos.
12	Insulation tester hand operated 250V / 500V / 1000V rated mains/battery operated	1 no. Each
13	DC power supply 0-50 VDC, 5 A make "Aplab" or equivalent (variable source)	5 nos

SN	Description	Quantity
14	Single phase variac 250 V, 8 amp	1 no
15	3 phase variac rating 5 amps	1 no.
16	Glass thermometer 0-120 deg. C, 0-200 deg.c and 0-600 deg.c	1 no. Each
17	Tong tester AC 5/10 and 25/60/300 amp of reputed make	1 no. Each
18	Tong tester DC 30/60/300 amp	1 no.
19	Secondary current injection kit upto 300 amp	1 no.
20	Tarpaulin fire proof	5 nos.
21	DC shunt 400 amp 75 mV	1 no.
22	Tachometer non-contact type 0 to 4000 rpm	1 no.
23	Industrial type vacuum cleaner	1 no.
24	RTD/Pt 100 source	2 nos.
25	Decade resistance box	2 nos.
26	Teletalk 2 wire system	6 sets
27	Equipment and consumables for LPI/MPI test on impulse pipes	1 set
28	Function generator	1 no

Note:

MMD/T&P listed above are for the regular works only. However, separate sets of T&P and MMD are to be arranged and provided with commissioning assistance gang. If contractor fails to arrange the testing instruments as listed above, BHEL will arrange the same at the risk and cost of Contractor. Contractor shall get the MMD calibrated at approved laboratory traceable to NPL and submit calibration certificate prior to deployment of same at site and periodical calibration of the same to be arranged by contractor as per procedure of BHEL.

SN	Description	Quantity
II. Handling equipment		
1	Turn buckles	As per reqmt
2	D-shackles	
3	Steel wire ropes	
4	Manila ropes	
5	Chain pulley block/turfer	
III. Major T&P		
1	Pipe bending machine – 2” size	2 nos
2	Grinding machine	2 nos
3	Drilling machines 1/4”, 1/2”, 3/4” & 1”	1 no. Each
4	Copper tube bender and cutter sizes 6mm, 8mm, 1/2”, 1/4”	1 no. Each

SN	Description	Quantity
5	Dye sets for threading upto 2” pipe.	2 nos
6	Spirit level	2 nos.
7	Tap sets for both BSP and NPT threads upto 1” each	1 set each
8	Measuring instruments like micrometers and callipers	1 set each
9	Welding generators	3 nos.
10	Welding transformer	2 nos.
11	TIG welding set	1 no.
12	Mechanical tool kit for fitters	6 sets.
13	Electrician tool kit	6 sets.
14	Crimping tool upto 2.5 sq.mm cable	4 nos.
15	Flood light fittings	4 nos.
16	Fire extinguishers as required	1 set.
17	Distribution boards with power cable complete as required	1 set
18	Painting brush	As per reqmt.
19	Fire proof tarpaulin	As per reqmt.
20	Safety belts and safety helmets	As per reqmt.
21	24V AC transformer & hand lamps	4 nos.
22	Ferrule printing machine	2 nos
23	Electrode drying ovens	As required

Note:

The list of instruments / equipments to be brought by the contractor as shown above is only indicative. Any other instruments / equipments required for the execution of the work is to be necessarily arranged by the contractor. The testing/calibration instruments that are being used shall be duly calibrated in the interval prescribed by BHEL engineer from the BHEL-approved agencies. And test certificate to be furnished.

Appendix-IIIB

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	GI “U” clamps with nuts and washers for impulse and GI pipe clamping.
6	Round aluminium tags (30mm dia x 3mm thick)
7	Teflon tape and insulation tape.
8	“Holdtight” Compound, Tefflon Tape, Bitumen Tape for GI pipe coupling.
9	Paints required for primer coating and for protective coating from BHEL approved vendors only.
10	Solder wire (60/40)
11	Protocol/calibration report sheets as per BHEL format.
12	Panel/JB sealing compound material (for cable entry from bottom/top of panel).
13	PVC cable tie, aluminium strip and hardware for clamping of cables, copper tube, temperature gauge capillary.
14	Copper lugs upto 4 sq.mm. PVC sleeve of different size, PVC button & tape

Appendix-IV

Month-wise manpower deployment (number to be indicated category-wise in each month) by the contractor.

SN	Category	Months											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Resident manager												
2	Engineers												
3	Supervisors												
4	Electrical Instrumentation Industrial Relation/Safety												
5	Riggers												
6	Fitters												
7	HP welders												
8	Struct. Welders												
9	TIG welders												
10	Electricians												
11	Instrument technicians												
12	Store keeper												
13	Semiskilled & unskilled workers												
14	Watchmen/security												

Note:

Month-wise number of persons to be indicated.

Above deployment plan will be discussed prior to award of work and necessary changes will have to be made by contractor as per discussion, if required. Any additional deployment required during execution of work will have to be made by contractor for meeting various schedules/targets set by BHEL without any additional compensation.

Date

Signature of tenderer with seal

Appendix-V

Deployment plan for major tools and plants/instruments (monthwise quantity to be indicated for each category) by the contractor.

SN	Category	Months												Present Location
		1	2	3	4	5	6	7	8	9	10	11	12	
01	Welding generators													
02	Welding transformer													
03	TIG welding sets (air cooled)													
04	Standard milli amps source /milli volt source													
05	Low pressure calibrator													
06	Pipe bending machine													
07	Grinding machines													
08	Drilling machines ¼", 1/2", 3/4", 1"													
09	Dead weight tester													
10	Oil temperature bath													
11	Furnace 600 deg.c													
12	Standard gauges 12" dia size													
13	Manometers													
14	Portable air compressor													
15	Portable vacuum cleaner													

Note: Signature of tenderer with seal

Also, the tenderers shall indicate the list of other tools and plants to be deployed for this project separately. Above deployment plan will be discussed prior to award of work and necessary changes will have to be made by contractor as per discussion, if required. Any additional deployment required during execution of work will have to be made by contractor for meeting various schedules/targets set by BHEL without any additional compensation.

Appendix-VI

Analysis of unit rate quoted

Sl. No.	Description	Percentage of Unit Rate	Remarks if any
01	Site facilities viz., electricity, water, workshop and other infrastructure.		
02	Salary & wages		
03	Consumables		
04	Depreciation & maintenance for T&P/ instruments and other items		
05	Establishment & administration expenses of site		
06	Retrenchment benefit		
07	Extra work incidental to erection		
08	Overheads		
09	Profit		
TOTAL		100%	

Signature of the tenderer with seal

APPENDIX-VII

CONCURRENT COMMITMENTS

SL. NO	FULL POSTAL ADRESS OF CLIENT AND NAME OF OFFICER IN-CHARGE	DESCRIPTION OF THE WORK	VALUE OF THE CONTRACT	COMMENC-EMENT DATE	SCHEDU-LED COMPLE-TION	% COMPL-TD. AS ON DATE	ANTICIPA -TED COMPLN. DATE	REMARKS

DATE:

SIGNATURE OF THE BIDDER

APPENDIX–VIII

DETAILS OF 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