TENDER SPECIFICATION

No. BHE/PW/PUR/ IOCI-CLE/610

FOR

Handling at Storage Yard/ Stores, Transportation to Site, Calibration, Erection, Testing, Commissioning, Final Painting and Handing over of Electrical and Control & Instrumentation Works of Co-Generation Plant comprising of HRSG(2 x 100 TPH), Frame 6B Gas Turbine (2 x 30 MW) and their Auxiliaries, Piping etc.

AT

INDIAN OIL CORPORATION LIMITED
GUJARAT REFINERY, JAWAHAR NAGAR
VADODARA (GUJARAT)

PART I - TECHNICAL BID

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

C O N T E N T S

SL.NO.	DESCRIPTION	SECTION/ APPENDIX NO.	NO. OF PAGES
	ENCLOSED		
B	TOOLS & PLANTS TO BE BROUGHT BY CONTRACTOR	APPENDIX-II	2
C	CONSUMABLE TO BE ARRANGED BY CONTRACTOR	APPENDIX-IIA	1
D	CONSUMABLES/ITEMS TO BE PROVIDED BY BHEL FREE OF CHARGE	APPENDIX-IIB	1
22.	MANPOWER DEPLOYMENT PLAN BY THE CONTRACTOR	APPENDIX-III	1
23.	DEPLOYMENT PLAN OF MAJOR T&P AND MMD BY THE CONTRACTOR	APPENDIX- IV	1
24.	DETAILS OF CONCURRENT COMMITMENT	APPENDIX-V	1
25.	CONDUCTOR/ ENCLOSURE SIZE AND WELDING JOINT DETAILS FOR GTG BUS DUCT	APPENDIX-VI	1
26.	CREDENTIALS AND EXPERIENCE OF THE OUTSOURCCED PARTY	APPENDIX-VII	1
27	ANALYSIS OF UNIT RATES	APPENDIX-VIII	1
27	PRICE BID		@

LEGEND:

$: Included in Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled **"NIT+GCC-610".**

@: Issued as separate hard copy booklet 'Tender Specifications Part-II (Price Bid-610)'. Hosted in BHEL web page (www.bhel.com) as file titled **"PRICE BID-610"**

Note:

- Rest of the tender documents are included in Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled "**TECH BID-610"**
- **# Safety codes and regulations to be observed at IOCL site is separately enclosed,** and Hosted in BHEL web page (www.bhel.com) as file titled "**SAFETY CODE-610"**

BHARAT HEAVY ELECTRICALS LIMITED

(A GOVERNMENT OF INDIA UNDERTAKING)
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345-KINGSWAY, NAGPUR 440 001

TENDER SPECIFICATION DOCUMENT ISSUE DETAILS

TENDER SPECIFICATION No. BHE/PW/PUR/IOCI-CLE/610

NAME OF THE WORK: Handling at Storage Yard/ Stores, Transportation to Site, Calibration, Erection, Testing, Commissioning, Final Painting and Handing over of Electrical and Control & Instrumentation Works of Co-Generation Plant comprising of HRSG(2 x 100 TPH), Frame 6B Gas Turbine (2 x 30 MW) and their Auxiliaries, Piping etc.

AT

INDIAN OIL CORPORATION LIMITED
GUJARAT REFINERY, JAWAHAR NAGAR
VADODARA (GUJARAT)

EARNEST MONEY DEPOSIT: Please see Special Conditions of Contract.

LAST DATE FOR TENDER SUBMISSION:	Please obtain updated information from web page "http://www.bhel.com" → Tender Notifications → View Corrigendums.

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING **PART-I** AND **PART-II** ARE ISSUED TO:

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

Dy. General Manager (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

The Bidder must submit their tenders as required in two parts in separate sealed covers prominently superscribed as part-I Technical Bid and part-II Price Bid and also indicating on each of the covers the tender specification number and due date and time as mentioned in the tender notice.

Part-I (Technical Bid) cover-I

Except rate schedule, all other schedules, data sheets and details called for in the specification shall be enclosed in part-I "Technical Bid" only.

Part-II (Price Bid) cover-II

All indications of price shall be given in this part-II "Price Bid".

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 superscribed and submitted to Dy. Gen Manager (Purchase) at the above mentioned address before the due date as indicated. **EMD shall not be included in this cover.**

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

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

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

Contractor should have sound financial stability.

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

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

Clarification if any on tender, shall be obtained by the Bidder before submitting their offer.

Offers must be submitted without any deviation.

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

Bidder shall note that their offer will be considered subject to the approval of BHEL's customer.

PROJECT INFORMATION

1.0.0 INTRODUCTION, LOCATION & FEATURES OF SITE

Bharat Heavy Electricals Ltd. has received a turnkey contract to set up a 2 X 30 MW, GTG based Co-generation Plant from Customer (M/s. Indian Oil Corporation Limited) who is setting up " RESIDUE UPGRADATION AND MS & HSD QUALITY IMPROVEMENT FACILITIES (IRUP) PROJECT at their existing IOCL, Gujarat Refinery, Jawahar Nagar, Vadodara (Gujarat, Pin Code-391320) premise. The project being installed under this specification is in their existing project premise and M/s Indian Oil Corporation Ltd. has appointed M/s. Toyo Engineering India Ltd. as their Project Management Consultant (PMC)

The project name as "EPCC-7 Package comprises of the GT & HRSG Units.

The proposed project site is located at a distance 10 KM from Vadodara City. The nearest railway station is Vadodara (Gujarat). The nearest airport is at Vadodara, which is approx. 15 KM away from the site.

Site ambient condition informations:

1. Barometric Pressure:

(i)Normal :1008.2 mbar
(ii)Minimum :1000.7mbar
(iii)Maximum:1013.2mbar

2. Site elevation: 37.7meters above the sea level

3. Ambient Temperature:
(i) Minimum Temperature (winter dry bulb):4.4Degree Centigrade
(ii) Maximum Temperature (summer dry bulb):46.7DegreeCentigrade
(iii) Relative humidity: 21%
(iv) Relative humidity: 89%

4. Rain Fall: Maximum rainfall: 77mm (rainy season is from July to September)
5. Wind Speed experienced during a cyclone in November 1982: 125Km/Hr. for 2 Hours, 90 Km/Hr.; average N-W (320 degree N)

Wind Velocity (gust wind): Max.61 Km/Hr.

(i) 20-61 Km/Hr.-4 days annually
(ii) 1-19 Km/Hr.-289 days annually
(iii) Under 1 Km/Hr.-72 days annually

Above information furnished are for general guidance of Contractor. Contractor is advised to visit the site and appraise himself about the conditions of site and infrastructure available in the area for fulfilling their commitments under the contract.

CHECK LIST

(VIDE PARA 1.3 OF SECTION-I OF GENERAL CONDITIONS OF CONTRACT)

1	NAME OF THE TENDERER WITH ADDRESS		
2	NATURE OF THE FIRM	LIMITED / PARTNERSHIP / PROPRIETARY	
3	EMD DETAILS (Rs. 2.0 LACS BY DD ONLY OR ONE TIME EMD)		
4	VALIDITY OF OFFER (REQUIRED 6 MONTHS FROM TENDER OPENING DATE)		
5	MOBILIZATION TIME (NOT ONE MONTH FROM FAX LOI)		
6	WHETHER NO DEVIATION CERTIFICATE FURNISHED	YES	NO
7	TENDERER HAS VISITED THE PROJECT SITE AND ACQUAINTED WITH THE SITE CONDITIONS	YES	NO
8	DETAILS OF CONCURRENT JOBS ARE FURNISHED (AS PER RELEVANT APPENDIX)	YES	NO
9	HEAD QUARTER'S ORGANISATION IS FURNISHED	YES	NO
10	PROPOSED SITE ORGANISATION IS FURNISHED	YES	NO
11	FINANCIAL STATUS OF THE COMPANY (ANNEXURE 'A' OF GCC) IS FURNISHED	YES	NO
12	PROFIT & LOSS ACCOUNT FOR PRECEDING THREE YEARS IS FURNISHED	YES	NO
13	LATEST SOLVENCY CERTIFICATE FROM THE BANKER IS FURNISHED	YES	NO
14	LATEST INCOME TAX CLEARANCE CERTIFICATE OR COPY OF PAN CARD ACCOMPANIED BY 'IT RETURN' COPY IS FURNISHED	YES	NO
15	MANPOWER DEPLOYMENT PLAN (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO
16	MONTHWISE DEPLOYMENT PLAN FOR MAJOR T&P (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO

17	ANALYSIS OF UNIT RATES QUOTED (AS PER RELEVANT APPENDIX) IS FURNISHED	YES	NO
18	POWER OF ATTORNEY ENCLOSED IN FAVOUR OF PERSON MAKING OFFER.	YES	NO
19	DETAILS OF SIMILAR WORK DONE IN LAST SEVEN YEARS (AS PER RELEVANT APPENDIX) AND SUPPORTING DOUCMENTS FURNISHED.	YES	NO
20	PROGRAMME FOR THE SUBJECT WORK FURNISHED	YES	NO
21	BIDDER HAS FMILIARIZED HIMSELF WITH ALL RELEVANT LOCAL LAWS & CONDITIONS.	YES	NO
22	WHETHER ALL THE PAGES OF THE TENDER DOCUMENTS ARE READ, UNDERSTOOD AND SIGNED	YES	NO
23	WHETHER THE FOLLOWING DETAILS PERTAINING TO YOUR BANK ACCOUNT DULY ENDORSED BY THE BANK HAVE BEEN FURNISHED {TO ENABLE BHEL RELEASE PAYMENTS THROUGH ELECTRONIC FUND TRANSFER (EFT/RTGS) AS SPECIFIED IN SECTION 12 } 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 NOTE: In case Bank endorsed certificate regarding above has already been submitted earlier, Kindly submit photocopy of the same	YES	NO

NOTE : STRIKE OFF YES OR NO, AS APPLICABLE

DATE : SIGNATURE OF TENDERER

DECLARATION SHEET

I,……HEREBY CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO THE TENDER SPECIFICATION NO.**BHE/PW/PURIOCI-CLE/610** ARE TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE. I HAVE GONE THROUGH THE SPECIFICATIONS, CONDITIONS AND STIPULATIONS IN DETAIL AND AGREE TO COMPLY WITH THE REQUIREMENTS AND INTENT OF THE SPECIFICATION. I FURTHER CERTIFY THAT I AM DULY AUTHORIZED REPRESENTATIVE OF THE UNDER-MENTIONED TENDERER AND A VALID POWER OF ATTORNEY TO THIS EFFECT IS ALSO ENCLOSED.

AUTHORISED REPRESENTATIVE'S SIGNATURE WITH
NAME AND ADDRESS

DATE:

TENDERER'S NAME AND ADDRESS

CERTIFICATE OF NO DEVIATION

TENDER SPECIFICATION No. BHE/PW/PUR/IOCI-CLE/610

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 & CLARIFICATIONS.

SIGNATURE OF THE TENDERER

DATE:

SECTION-3

OFFER OF THE CONTRACTOR

To
DGM (PURCHASE)
BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345, KINGS WAY
NAGPUR 440 001

DEAR SIR,

I/WE HEREBY OFFER TO CARRY OUT THE WORK DETAILED IN TENDER SPECIFICATION NO. BHE/PW/PUR/IOCI-CLE/610 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 TENDERERS
2. GENERAL CONDITIONS OF CONTRACT
3. SPECIAL CONDITIONS OF CONTRACT
4. OTHER SECTIONS, APPENDICES, SCHEDULES AND DRAWINGS.

I/WE HAVE DEPOSITED / FORWARDED HEREWITH THE EARNEST MONEY DEPOSIT FOR A SUM OF RS.2,00,000/- (RUPEES TWO LAKHS 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 FURNTHER 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 TENDERER:
DATE : ADDRESS:

WITNESSES WITH THEIR ADDRESS

SIGNATURE	NAME	ADDRESS
1.		
2.		

SECTION – 4

SPECIAL CONDITIONS OF CONTRACT

4.0 SCOPE OF WORK:

4.0.1

The Scope of Work under These Specifications Covers the Complete Work of Handling of Storage Yard/Stores, Transporting to site, Calibration, Pre-Assembly, Erection, Pre-Commissioning Checks & Tests, & Commissioning and Handing Over of Electrical and Control & Instrumentation of 2 X 30 MW, GTG based Co-generation Plant Having:

- 2 x Frame 6 B Gas Turbine and its Auxiliaries
- 2x 100 TPH HRSG and It's Auxiliaries
- Piping
- Electrical items
- Instrumentation and Control items

The Scope of Work, in general, covers Electrical And C&I System of Gas Turbine, HRSG, Generator Transformers, Bus Duct, Auxiliary Systems Like Lube Oil and Jacking Oil System, Regenerative and Feed Cycle, EHTC and AVR and HRSG, Turbine & Generator Supervisory Controls, Electrical Systems, Lighting Etc.

The Work Shall Conform to dimensions, Limits, and Tolerances specified in various Drawings/ Documents that will be provided during the Erection/ Commissioning including final Painting of all equipments included in this work.

The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc of ongoing works, the contractor shall establish his own computer(s) and printer(s) at his site office, along with suitable operator(s), consumables, etc.

The scope of work is further detailed in the specifications hereinafter.

4.0.2

The intent of specification is to provide erection services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient erection and commissioning of the plant shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

4.0.3

The terminal points decided by BHEL shall be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.

4.0.4

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 cooperate with personnel of customer's, contractor's, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

4.0.5
Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL. The BHEL engineer depending upon the technical requirements, availability of materials and fronts will decide this. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods adopted in erection of similar sets elsewhere.

4.0.6
The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely completion of the work.

4.0.7
All necessary certificates and licenses, permits & clearances required to carry out this work are to be arranged by the contractor expeditiously at his cost.

4.0.8
All tools, tackles, fixtures, equipments, materials handling and transportation except those specifically to be provided by BHEL, manpower, supervisors/ engineers, consumables etc., required for this scope of work shall be provided by the contractor. These tools & plant, equipments, men & material shall remain at site throughout the duration of contract and extension thereof, if any. Diversion/removal of these shall be done only on the approval of BHEL. for further details refer sections-5, 6 & 7.

4.0.9
During the course of erection, testing and commissioning certain rework/ modification/ rectification/ repair/ fabrication etc., will be necessary on various accounts. Contractor shall carry out such rework/ modification/ rectification/ fabrication/ repair etc., promptly and expeditiously. The contractor shall maintain daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc.. Claim of contractor if any, for such works will be governed by clauses 13.1 to 13.8.

4.0.10
All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipments/ components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, fitting up etc., as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

4.0.11
The contractor shall take delivery of the components, equipments, chemicals, and lubricants etc from the BHEL stores/ storage yard. Complete and detailed account of these shall be submitted to the BHEL.

4.0.12
Contractor shall plan and transport equipments, components from storage to erection site so as to avoid material accumulation at site. Contractor shall stack materials neatly at site and his stores. Where necessary, materials at site may have to be shifted and re-stacked for various reasons as incidental to work.

4.1 WELDING, NON-DESTRUCTIVE TESTING ETC.

A) Installation of equipment involves good quality welding, NDE checks etc.

B)
1) Welding of high pressure joints shall be done by IBR certified high pressure welders who have been permitted by CIB of concerned state for deployment at site of work.

2) Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.

C) All the welders (structural and high pressure) shall be tested and approved by BHEL engineer before they are actually engaged on work though they may possess the IBR/Other certificate. BHEL reserves the right to reject any welder without assigning any reason.

D) The welded surface shall be cleaned of slag and painted with primer paint to prevent corrosion. For this paint will be supplied by the contractor.

F) Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications. Certain types of coated welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the coated welding electrodes have to be carried in portable ovens.

4.2 TESTING, PRE-COMMISSIONING, AND COMMISSIONING:

4.2.1
Testing, pre-commissioning, & commissioning will involve, though not limited to these: setting/adjusting, Testing, proving, trial runs, etc. of various equipments and systems installed. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

4.2.2
All the above tests should be repeated till all the equipments satisfy the requirement/ obligations of BHEL to their client and also the relevant statutory authorities.

4.2.3
The contractor shall immediately attend to defects noticed during tests, trial runs, pre-commissioning, commissioning such as loose components, undue noise or vibration, strain on connected equipment etc. Readjustment and realignment as called for shall be done as per BHEL's instructions. Claim, if any, for these works from the contractor shall be governed by clauses 13.1 to 13.8.

4.2.4
i) Contractor shall cut/open work, if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

ii) Similarly, during the course of erection, if certain portion of equipment's erected by the contractor has to be undone for enabling other contractors/agencies of BHEL/customer to carry out their work, contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other contractor's/ agencies of BHEL/customer as

per BHEL engineer's/agencies of BHEL/customers instructions. Claims, if any, in this regard shall be governed as per clauses 13.1 to 13.8.

iii) Certain instruments may have to be installed temporarily/ in temporary installations for specific requirements. Contractor shall install, after due calibration if required, such instruments for which payment shall be regulated as per respective item rates. Contractor shall remove these instruments and return to BHEL/Client's stores after the use. No separate payment will be made for removal and returning of such instruments.

4.2.5
The testing/calibration / commissioning activities shall start prior to synchronization of GTG sets. The contractor shall provide adequate manpower, including supervision, of required skill level in various area of work with necessary consumables, tools and tackles etc., as part of commissioning till handing over of the unit to BHEL's customer.

4.2.6
It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning and commissioning period alongwith or without BHEL engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors. Also please refer 4.12.

4.2.7
The contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the contractor.

4.3 GENERAL RESPONSIBILITY OF THE CONTRACTOR

4.3.1 **Preservation & protection of components**

Contractor shall at all stages of work preserve equipments/materials in his custody, including those erected. Necessary preservation agents, except the primer & paint, for the above work shall be provided by BHEL.

4.3.2
The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

4.3.3
Contractor shall collect all scraps/unused materials/packing etc periodically from various areas of work site, dispose the same at one place earmarked at site or shift the same to a place earmarked in BHEL / client's store. In case of failure of Contractor incompliance of this requirement, BHEL will make suitable arrangement at the contractor's risk and cost.

4.3.4
The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilization of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.

4.3.5 Wastage allowance

Power and control/ instrument signal cables:

Wastage allowance for power & control/ instrument signal cables shall be as follows:

Power Cables	1.5%
Control & Instrumentation Cables	2.0%

Cable cut-pieces in lengths 10 m & above in both the above categories will be considered as useable and shall be taken in to account for computing net issued quantity when returned to BHEL stores/storage yard.

4.3.6
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, payment of these items/class of work shall be regulated on the basis of rate arrived at by either of the following methods:

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.

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.

4.4 FINAL PAINTING

4.4.1
The contractor shall provide all the primer, paint, and other consumables like brush, cleaning agents etc. All T&P, manpower, supervision is in contractor's scope. Painting shall be carried out as per colour scheme approved by BHEL/ BHEL customer.

4.4.2
All exposed metal parts of the equipment including piping, supports, structures, etc., as applicable shall be painted after thoroughly cleaning the surface from dust, rust, grease, oils, scales, etc, by wire brush, scrapping, etc as specified. The above parts shall then be painted with two coats of synthetic enamel paint over the shop primer/paint. Also, where the shop primer/paint has peeled off, the affected area shall be cleaned thoroughly by the specified method and then primed. Similarly, certain components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications, primed with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification. The color, shade etc; shall be as per specification. Primer and paint shall be sourced only from the following manufacturers or any other manufacturers approved by BHEL.

1) Berger Paints (I) Ltd.
2) Asian Paints ltd.
3) Goodlass Nerolac Paint Ltd.

4) Jenson & Nicholson Ltd.
5) Shalimar paints Ltd.

In order to have consistency in painting system, it is preferable that all the supplies are sourced from one single manufacturer.

The primer shall be compatible with the final coat paint schedule.

4.4.3
In addition, color banding, legend and identification marking; direction of flow/rotation marking etc. is part of the work.

4.4.4
Contractor shall ensure that all steel structure used for electrical installation shall be painted with one coat of Red Oxide Zinc Chromate primer and two coats of Aluminium Alkyd paints of approved shade for indoor installations. However for outdoor installations and corrosive areas like Battery room / DM plant etc, contractors shall carry out hot dip Galvanisation.

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

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

4.5.1 Installation of panels and HT/LT Switchgear

A. Electrical control panels, Electronic Control panels, Unit Supervisory Control DESK, HT/LT Switchgear, 415 Volt LT MCCS, 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, leveling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubicle interconnection hardware's, 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 rates. 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 HRSG, SGTG 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.

J. 24 / 48 Volt DC Interposing Relay along with mounting base shall be supplied separately for mounting in the various feeders of 6.6 KV HT switchgear boards and 415 Volt MCC Board / Switchgear Panel Boards for uni-directional / bi-directional drives, solenoid valves. 2 Nos. interposing relay may be required to be mounted in each feeder. Internal wiring for these relay shall be pre-wired in the feeders, wires to be terminated on relay terminals. Contractor shall mount the same and terminate the wire as part of panel installation work and no extra payment shall be made for this work.

4.5.2 **STRUCTURAL STEEL FABRICATION AND INSTALLATION**

A. Structural steel material like MS angles, channels, beams, flats, plates etc. Shall be supplied in running meter and the same shall be used for fabrication of panel base frame, cable tray supports, Canopies for instruments/panels/ drives/JB's/Push Buttons etc., Instrument/Junction box frames, Impulse Pipe/Instrument Air Pipe supports and instruments etc.

B. This shall include cutting to size, contouring of ends for connections if required, Welding, Grinding of excess weld deposits/burrs, drilling of holes for mounting of device/instrument, installation at location, leveling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.

C. All the fabricated supports/frames for instruments, trays, pipes, electrical equipments, etc., shall be epoxy painted after sand blasting and surface preparation as per painting specifications. Paints and other associated items are in the scope of the contractor.

D. Frame 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. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, contractor shall arrange all the required material including cement/grout mix, shuttering, labour etc., and meet all other requirements as part of work.

E. In certain packages, members of frames/rack for mounting of junction boxes/ instruments may be supplied readymade. These have to be assembled prior to installation. The installation rate as quoted shall include assembly of the frames.

F. Gas cutting of tray/impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted.

4.5.3 LAYING OF PIPES/TUBES (IMPULSE PIPE)

A. 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 three/five valve manifolds and compression fittings, condensate pot/equalizing vessel, providing supports, clamping, conducting leak test/hydraulic pressure test, painting and other accessories as per instrument hook-up diagram. Piping works shall involve either arc or TIG welding.

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.

B. 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 as no separate rate is envisaged.

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

4.5.4 INSTRUMENT & SERVICE AIR PIPING (SS/GI PIPE)

Laying of pipe (SS/GI) 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 etc. Threaded joints of air pipeline shall be made leak proof by using Teflon tapes or sealing compound. Seal welding of threaded joints may be called for if required. This shall be done within the quoted rate.

4.5.5 COPPER TUBING/PIPE/SS TUBE

Installation of Copper Tube/SS Tube/Copper pipe shall include cutting into required length, laying, bending, cleaning, brazing wherever required, fixing of 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. Suitable tube cutters, benders and deburring tools will be used for such jobs.

4.5.6 **CABLE TRAYS/CABLE DUCTS**

A. Various types of sheet metal, Galvanised Cable Tray, i.e. Perforated, Ladder type, sheet metal duct, solid bottom trays, pre-fabricated structural trays etc., will be supplied in standard lengths alongwith accessories and hardware viz coupler plate, tray covers and tray clamps etc.

B. Installation of cable tray/cable duct shall include cutting, laying, jointing, fixing tee/reducers/ bends/clamps, fixing of tray covers, hardware, welding of tray supports as per tray route layout etc.

C. Fabrication of bends/tee/ reducers from straight length is within the scope of work and rate quoted shall be inclusive of this. All site welds of cable trays shall be painted with approved primer and cold galvanizing paint, which shall be arranged by the contractor.

D. In case, structural cable trays, bends, tees, reducers etc., 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 instances.

E. Cable trays/duct etc may have to be routed underground in cable trench, overhead on structure, along the walls, floors etc. for various applications.

4.5.7 Cable Laying (Power / Control / Instrumentation shielded cables / Triad Cable / plug-in cables / UTP cables for Ethernet / armored / Un-Armored, single / multi-core, PVC/HR PVC / FRLS / Teflon / XLP insulation)

A. Cable laying (erection) will include:

Cutting to the required length, laying in overhead/underground cable trench/ through pipes/flexible conduits. Cable rollers have to be used as per requirement. The contractor shall prepare the drum schedule in order to minimize the wastage.

Dressing/Clamping in tray etc.

Drilling of holes in gland plates in panels and junction boxes for the entry of cable.

Cable glanding, splicing, dressing of spliced wire inside the panel and JBs

Providing printed ferrules. Wherever required ferrules shall be one-piece heat shrinkable type. **Contractor has to arrange for suitable ferrule printing machine(s).**

Termination by using crimp type lugs copper tinned/ aluminium (insulated/ un-insulated).

Providing identification cable tags, aluminium at both the ends and at appropriate interval (30m) throughout the route length. Tags to be arranged by the contractor.

Continuity checking, insulation resistance checking, High Voltage test on HT cables, as applicable.

HT and LT Power cable trefoil clamps (Die cast Aluminium of good quality) are to be arranged by the contractor within the quoted rates.

B. Entry to the panels, JB may be from top, side or bottom. All cable shall be supported and clamped near the panels/JBs.

C. Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, suitable alternative arrangement as specified by BHEL/consultant shall be done. Pre-Fab plug-in cables, for such cases, cables may have to be lifted inside the panel either making cut-out in gland plate and providing Rubber profile for sharp edge protection or alternatively, provide 4/6” PVC pipe coupling gland and these pipe coupling gland shall be supplied by contractor within the quoted rate of cable laying.

D. Copper Tinned lugs of various type (pin, ring, fork, snap-on), PVC cable ties, PVC ferrules (printed), PVC buttons and tapes, cable identification tag of metallic, clamping and dressing material with hardware, PVC sleeves etc. Shall be supplied by the contractor within the quoted rate for cable laying. The quality of material shall be got approved from BHEL engineer prior to their procurement.

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

F. 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 getting earth at panel end only. While terminating the shield wire either in panel or JBs, PVC Sleeves is to be used to avoid two-point Earthing. Supply of PVC sleeves of appropriate colour is in contractor's scope.

G. Wherever cable ducts/tray, conduits pass through fire barriers such as walls, floors etc., the openings/ passage shall be sealed using fireproof/ weatherproof sealing compound. Similarly cable entry in panels, MCC/HT/LT Breakers, Instruments, Electrical Actuators etc are also required to be sealed. These shall be done as per the specifications of BHEL. Required consumable shall be in contractor scope of supply within quoted rate for cabling.

H. Normally, cables glands on junction boxes side are received mounted. While terminating the cables as per drawings, the cable glands to be removed and fixed. Wherever cable glands are not received alongwith junction boxes, no separate payment will be made for fixing the cable glands to the junction boxes including drilling of holes.

J. For single core HT power cable BHEL will provide the trefoil clamps.

K. Many of the cables may have to be laid in the cable trenches. For this purpose, the cover of trenches has to be opened for working inside. All safety precautions have to be observed while laying the cables in the trench. After completing the work, the trench has to be cleaned and covers put back into position. The contractor, if required, shall do de-watering of trenches.

L. Underground cabling of about 500 meters for road / flood lighting fixtures on swaged pole will be necessary. Following works involved over & above normal cable laying works shall be included within the scope

Excavation of earth 300 mm width & 600 mm depth
Sand bedding around the cable 100 mm to 150 mm (including supply of sand.
Keeping protection bricks through out the cable length (including supply of bricks).
Back filling.

M. Terminations:

The types of cable terminations are as detailed below:
1) Power cable: Crimping hydraulic / Manual
2) Control cable: Manual crimping
Crimped/soldered plug-in-type Screwed type.
All console devices / computer peripherals shall be screwed, crimped, soldered plug in type.

UTP cable with RJ 45 connector.

The contractor shall arrange for special tools and skilled manpower required for any type of cable termination (like fiber optic jointing kit and RJ45 crimping tool etc) as mentioned above.

Additionally ferrule printing machine(s) for printing of sleeved ferrules of various sizes will also be arranged by the Contractor, as mentioned above under 4.5.7, a 05.

4.5.8 Field instrumentation

A. Various type of primary/secondary/ indicating/ recording instrument for pressure, temperature, flow, level, speed, turbo-supervisory and analytical measurement shall be supplied either loose or mounted alongwith the equipment.

B. Scope of work under calibration, erection// testing/ commissioning shall include calibration, setting, adjustment, supply and fixing of instrument tag plates as specified by BHEL, report making, installation, servicing, minor repairs, putting instrument into service, signal checking from field upto the functional group panels and remote indicating/recording instrument, functional checks, interlock and protection/alarm checks by simulating the field devices, trouble shooting during pre-commissioning/ commissioning and till the unit is handed over to the customer.

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

D. It is the responsibility of contractor to make erection, calibration/ testing and commissioning protocols for various equipments/devices installed by them and they should get duly certified by customer/BHEL engineer and should be submitted to BHEL engineer regularly.

E. 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.

F. For such of those instruments/devices such as temperature gauge/switches, pressure gauge/switches, transmitter pressure/flow/ level/DP, level probe/switch etc, which are received, assembled with mechanical equipments and are to be calibrated, only calibration rate will be paid as per applicable rate for respective instruments/devices. No payments shall be made for removal and re-fixing of such instruments.

G. If re-calibration is required due to no fault of the contractor, then rates payable for re-calibration would be 75% of the original quoted rate for the respective instrument.

H. Installation of thermowells and seal welding of the same is not in contractor’s scope. Similarly installation of root valves is not in the contractor’s scope.

4.5.9 Mark VI panels, MAX control panels, Man-Machine-Interface

GT, HRSG, 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 (RPU), 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, comprehensive 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 lay out. 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 assembling / placement of furniture against each devices as given in the rate schedule. Loose devices like recorders, indicators, and monitors are supplied loose.

4.6 Power Transformers

A. Generator Transformer, Station transfomer and Auxiliary transfomers:

Transformer tank will be supplied filled with oil upto the core end winding level or gas filled. Accessories like radiators, conservator tank, pipes, fittings, hardware, gaskets, BUCHHOLZ relay, Marshalling box, relief vent, valves, pumps, cooling fans, cabling between marshalling box, bushings, radiator headers/fans, LT/HT cable box, rollers, tap changer, electrical control unit, bushing turrets and oil in 200 Ltrs. Barrels shall be supplied loose. The erection and testing of transformer shall include the following work and activity: -

Generator Transformer, Station Transfoemr and Unit Auxiliary Transformers main assembly(transformer tanks) shall be made available to the contractor about 100 meters away from the respective foundation, further transport and shifting to the foundation shall be in the scope of this work. The shifting operation may require dragging, fixing of wheels, rollers and turning of transformer to a suitable location enroute to suit the layout. The contractor shall arrange wooden sleepers, winches, jacks, rails and crane etc at his cost for this operation. However accessories shall have to be shifted from stores.

The transformer should be handled in such a manner so that no jerk is transferred to the core and winding and internals of the transformer.

Contractor has to transport the various transformers, transformer tanks & accessories of transformers other than GT, ST and UATs from BHEL stores/ Storage yard to respective foundations. The approximate distance from BHEL Stores / Storage yard is 2.0 to 3.0 KM.

Placement on plinth, alignment with respect to the foundation and lay out drawings.

Internal inspection to verify the intactness of core end winding, tape changer leads, off-load switch, measurement of core and core bolt insulation.

After internal inspection, the transformer shall be kept under vacuum for a period to be decided by BHEL engineer, after which pre-treated oil is to be filled up to required level.

Each drums of oil is to be tested for BDV and if BDV is less, then each drum should be filtered separately.

Contractor has to arrange storage tank of 10-Kiloliter capacity with internal surface sand blasted and painted with minimum one coat of oil resistant paint. Oil from drums is to be transferred to the storage tank and filtration to be carried out to achieve the required BDV value. This treated oil is to be filled in the transformers and auxiliaries. However, for low capacity transformer, a separate storage tank for mass filtration is not required.

All the accessories shall be assembled/mounted as per OGA drawings and these should be thoroughly cleaned prior to installation.

Drying out of transformer and filtration of oil in cooling bank, pipe line, diverter tank of tap changer etc. To be done with ultra vacuum filtering machine of adequate capacity. Drying out process shall be carried out round-the-clock and contractor shall deploy trained manpower for this purpose.

During dry out process, contractor has to plot the curve for insulation resistance value/time/oil temperature. Hourly reading to be recorded till completion of the dry out.

The criteria for deciding completion of drying out shall be breakdown value of oil, ppm value of oil, resistivity of oil, transformer winding, insulation resistance value of winding and polarization index.

The filter machine capacity if found to be inadequate, or in case of failure of existing machine, an alternative arrangement shall be done to meet the required result and time schedule.

Contractor shall arrange required testing equipments for carrying out electrical test like voltage ratio, turn ratio, vector group, magnetic balance, winding resistance measurements, BDV value of oil, tan delta measurement of bushings & winding, insulation resistance, measurement of oil PPM and resistivity. The contractor shall arrange for testing of oil samples for PPM/ Resistivity etc. At BHEL approved testing laboratory at his own cost.

The contractor shall arrange for attending to the leakage noticed at any stage till handing over of the unit. Gasket/ packing blanks will be provided by BHEL, which, if required, shall be cut to, required profile and size.

DRY TYPE TRANSFORMERS

Dry type transformers are supplied in sheet metal enclosure with natural/forced air-cooling. The contractor shall carry out all electrical tests, excepting oil test, as applicable for “generator transformer”.

Auxiliaries power transformer
Transformer tanks shall be supplied filled with oil upto the core and winding level or gas filled. Accessories like radiators, conservator tank, pipes, fittings, hardware, gaskets, BUCHHOLZ relay, marshalling box, relief vent, valves, cabling between marshalling box, bushings, LT/HT cable box, rollers, electrical control unit, and oil for topping-up in 200 Ltrs. Barrels shall be supplied loose. The erection and testing requirements as specified for “generator transformer” shall be applicable except vacuum pulling.

4.7 HIGH VOLTAGE ISOLATED PHASE BUS DUCT FOR GTG

Generator isolated bus duct is connected to low voltage side of power transformers and main bus duct shall have tee off connection for unit auxiliary transformer, LAVT Cubicles, Excitation transformer and air pressurisation equipment. Bus duct consist of round hollow aluminium alloy conductor and supported inside aluminium enclosure with post insulator. Flexible connections and expansion joints are provided at terminals and intermediate point to alleviate stresses. Ring type protection current transformer will be mounted inside the Bus Duct.
Isolated phased bus duct shall have tape connection for potential transformer, Surge protector etc. Housed in a metal clad cubicle, UAT and excitation transformer, NG Cubicle/resistor Cubicle. Various electrical tests have to be performed before and after erection.

Bus duct enclosure conductor is a continuous type. Conductor, enclosure, makeup pieces, shunt pieces etc. Have to be welded at site.

Scope of work

Erection and testing of Bus Duct includes transportation of bus duct materials from BHEL stores to site, preparatory work, supporting structure installation, placement of bus duct sub-assemblies/equipment, alignment, edge preparation of conductor/ enclosure, welding of conductor/enclosure/shunt pieces/makeup pieces, seal off bushing, wall frame assembly, neutral and line side starting link, earthing, mounting of CTS/PTS, copper flexible, copper rubber bellows, weldable flexible, installation of Air Pressurising Unit and its associated piping work and cable etc.

The Scope Would Include Neutral And Phase Bus Duct IR Value Measurement, Bus Duct Mounted CT's Testing, Loop Testing of CTs Secondary Cabling by Secondary And Primary Injection Of Busduct, Contact Resistance Measurement for all Busduct joints, HV Testing of Phase and Neutral Busduct, Space Heater Circuit Testing and Charging, LAPT Cubicle IR Value Measurement, PTs Testing. Surge Capacitor Testing, LA Meggaring, PT Secondary Circuit Checking by Secondary and Primary Injection Testing, LAPT Cubicle Space Heater and Illumination Circuit Testing, Testing of Neutral Grounding Transformer for Ratio, IR Value and Resistance; Testing of Neutral Grounding Resistor for IR Value and Resistance, Space Heater and Illumination Circuit Charging for NGT/NGR Cubicle, Busduct Charging, LAPT Cubicle Charging.

Pre-fabricated GI Supporting members shall be supplied in loose and to be erected as per lay out drawing. Foundation pockets and embedded plate inserts shall be provided as per lay out drawing (on floor for bottom support and on bottom of concrete slabs). Contractor shall weld the supports on insert plate and shall carry out grouting including supply of grout materials after complete alignment/bolting of structural members. If any modification required in supporting structure due to site conditions, the same shall be carried out without any extra cost. All welded joints shall be applied cold galvanizing zinc paint within the quoted rates.

Required aluminium welding of conductor, enclosures, shunt, make up pieces, aluminium flexible etc as detailed in Drgs. has to be carried out by contactor. MIG welding shall be applicable. Contactor shall arrange necessary welding equipment/ accessory in sufficient number, filler wire, argon gas and other required consumables at his cost.

During erection of bus duct/enclosure, makeup pieces and shunts, if any modifications needed to match the alignment shall be part of work and no extra payment shall be made.

All bolted joints and flanges shall be tightened with torque wrench to the approved torque. Wherever bolted joints, the same shall be cleaned and a layer of anti-oxidation paints shall be applied.

Top chamber/adopter box for line and neutral side, hood assembly at UAT, hood assembly at excitation transformer and at LAVP cubicle end shall have drilled hole in flange. If any mis-match of the hole in above with respect to the counter flange/welded studs provided on UAT, LAVT and excitation cubicle, the contractor shall drill new holes if required.

Proper sequence shall be followed during erection to avoid any mis-match and alignment problem.

Prior to installation of bus duct assemblies in position, the various component like conductor, insulator shall be inspected and cleaned and insulation resistance to be measured and recorded. If any insulator found damaged, the same shall be replaced.

Electrical test on current transformers and potential transformers shall have to be carried out prior and after installation. The tests are insulation resistance measurement, winding resistance, polarity test, magnatisation characteristic, and ratio test, water ingress and air leak test etc. on assembled bus ducts.

Minor civil work as chipping, leveling of foundation, providing pockets, drilling/enlargement of holes in structure, bus bar etc. which are incidental to the erection of bus duct shall not be treated as extra.

All miscellaneous items such as disconnecting links, flexible, shorting bars, hardware, conduits for wiring, marshalling box, CTs and PTs wiring through conduit, earthing materials, bus bar fish plates etc. are part of bus duct installation. Hence separate breakup quantity is not given in BOM.
Round makeup pieces for main and tee off duct shall be supplied in two halves and it involves but circumferential and horizontal welding at parting plain.
Air tightness and water tightness test have to be carried out on completion of bus duct installation. In case of any leakages, contractor has to rectify and bring to the required level of air tightness/water tightness without any extra cost.
High voltage test of bus duct is to be carried out as per the instruction of BHEL engineer. Contractor shall arrange necessary test equipment/instrument for conducting various electric tests at his own cost.
Contractor has to carry out final painting as per standard colour coat recommended by BHEL. Paints and consumables shall be in contractor's scope.
On welding joints, DPT test is required to be conducted.
Shunt pieces shall be supplied in two halves & to be welded between two phase bus duct at transformer end. The shunt pieces to be welded on both the side on matching plain and bus duct circumference and horizontal plain.
conductor/ enclosure size and welding joint details for gtg bus duct. Refer appendix –vi

Contractor shall conduct 20 % radiography and 100% NDT test on welded joints.

Any enclosed drawings are for estimation and tendering purpose only. Contractor has to ascertain quantum of work involved. The BOQ as furnished in this tender specification for Isolated Phase Bus Duct & Segregated Phase Bus Duct are tentative / approximate. **Contractor has to ascertain the quantum of work involved and quote the lumpsum value, as called in the rate schedule, without any additional compensation for any variation in length or numbers of joints.**

4.8 INTEGRATED TESTING OF CONTROLS AND PROTECTIONS & RELAY TESTING

Integrated testing of control and protection of generator, generator transformer, unit aux. Transformer, bus duct, station transformer and HT breaker
Integrated electrical testing/commissioning of generator control and protection relay panels, LT MCC, HT Breakers, other electrical panels and associated equipment shall involve various activities like relay testing/setting, simulation checks, testing of energy meters, on/off line functional checks on integrated system.
The brief scope of work under the "integrated testing/ commissioning of generator controls and protections relay panel & associated equipments" is defined as below, but not limited to the following.

Relay testing in static condition for generator, transformers, and associated system by secondary current injection at different current and recording the time duration.

Testing and checking of control and protection interlock scheme in static condition and simulation of protection device contact from internal and external devices.

Measurement of Insulations, Winding Resistance, Polarization Index of winding of Generator & associated equipment/ system, DC resistance test & Impedance test on rotor, Brushless excitation system at the time of rotor insertion as well as during pre-commissioning stage / commissioning stage/ post commissioning stage.

Relay setting and checking the stability of protection relays in static and dynamic condition during the OCC (open circuit characteristic) & SCC (short circuit characteristic)

Functional checks / testing of synchronizing schemes during the static and dynamic by simulation / back charging of generator transformer conditions.

Monitoring & recording the various parameters during open circuit and short circuit conditions test on generator & associated field equipment like generator transformer, unit auxiliary transformer. Recording and monitoring measurement.

Testing of protection current transformer for ratio test by primary injection, magnetization characteristic, polarity test, and IR measurement. Functional checks of relays of protection system by primary injection.

Testing of potential transformer for ratio test by voltage ratio, polarity test, insulation resistance measurement etc, testing of surge capacitors, PT isolator in PTPS cubicle etc. (theses are housed in generator side line & neutral cubicle).

Measurement of Insulation resistance of individual equipment and connected together.

Tan delta test on generator & other equipments as required.

Calibration of energy meters, tri-vector meters, voltmeters, ammeters, current & power transducers etc.

Providing temporary shorting link on bus duct or any other location while testing & normalisation after the test.

Testing & commissioning generator circuit breaker.

High voltage test on inter connecting cable between generator and line/ neutral side cubicle.

Testing of relays, meters, internal devices, functional checks of electrical panels LT MCC, HT breakers and other panels/ equipments.
HV test on bus duct bus bar, resistance measurement etc.

Contractor shall discuss & finalize testing procedure with BHEL engineer in-charge for the test to be conducted on generator control & relay panel testing. Drawing & documents shall be provided by BHEL at the time of testing. BHEL decision in this regard shall be final and biding on the contractor.

Checking & testing of neutral grounding transformer & resistor.

Compilation of test records.

In case contractor has not done similar work, they are free to tie –up with experienced agency who has carried out similar nature of work and having adequate resources i.e. Experienced manpower, T&P / testing/ measuring instruments. Contractor shall submit documents in support of such tie –up arrangement of such parties along with the offer. Credential of such parties shall be submitted with technical bid along with tie-up MOU.

It is to be noted in general that for any testing of protection relays, MCC etc., where the contractor is not sufficiently experienced, they shall arrange for the services of suitable agencies for carrying out the work, within the quoted rates.

a) In case of party quoting for the work have their own resource or resourced capability to take up relay testing etc. At site, **the evidence of same is to be annexed to the technical bid**

OR ALTERNATIVELY

b) As indicated, contractor is free to tie up with experienced agency that has done similar work. The following parties are recommended by BHEL as agencies capable of carrying out these activities:

i. M/S ELCON ENGG
701, CENTRE POINT, ALKAPURI
R C DUTT ROAD, VADODARA 390007
CONTACT PERSON: SHRI ARVIND MEHTA
PH NO 0265-2359152

ii. PINNEL POWER SYSTEM
PILLAIYAR KOIL STREET
JAFFER KHAN PET
CHENNAI 600083
PH NO 044-24718925, 24891975.

iii. CONSULT INDIA, MUMBAI
CONTACT PERSON: SHRI JINGRE.
PH NO 022-25333727

iv. HI TECH ENGINEERING SERVICES
PLOT NO 127, 5TH CROSS STREET, AVM COLONY
VIRUGAMBAKKAM
CHENNAI 600092
CONTACT PERSON: SHRI S. SUBRAMANIEM
PH NO 044-23763520

v. VOLTECH ENGINEERS
ARUNODAYA APARTMENTS,

FLAT B-4, I FLOOR,

27, 2ND MADLEY ST,

T.NAGAR, CHENNAI

CONTACT PERSON: GEETHA

PH NO: 044-28341230

In such event where the relay testing facilities are outsourced by the bidder, the tie-up action taken in this regard by the bidder should be clearly mentioned in their offer (technical bid) and it should be made clear that from which of the above recommended parties such services shall be sourced.

In case the tie-up for the above is with some other party other than those recommended by BHEL, then sufficient proof of the credentials and experience of the party in this field of work shall be annexed to the technical bid.

415 VOLT LT SWITCHGEAR / MCC & DC DISTRIBUTION BOARD ETC

1. Checking of installation for correctness.
2. Mechanical functional checking/ adjustment of individual breaker.
3. Measurement of Insulation resistance of individual breaker, complete switchgear board and combined insulation resistance of individual breaker with cable connected to drives.
4. Testing of Protection Relay, Thermal over relay, Power transducers, Energy/ Ammeters, Voltmeters, Power factor, frequency, tri-vector meters & metering etc. in static & dynamic condition relay
5. Conducting test such as Insulation Resistance measurement, Ratio, polarity, magnetisation characteristic, winding resistance on CT and PT.
6. Checking of electrical control & protection interlock of individual breaker and integration with other system.
7. Calibration of energy meters, tri-vector meters, voltmeters, ammeters, power current & voltage transducers etc.
8. Provide assistance for checking the electrical operation of individual breakers from remote panels / MMI package(maxDNA system).

4.8 A

The following major works also shall be in the scope of the Contractor

1. Generator stator winding resistance and PI value measurement / check
2. Generator rotor winding resistance, impedance, IR value measurement before and after rotor insertion.
3. Generator Bushing HV test
4. Main exciter winding resistance, IR value measurement / check

5. PMG winding resistance, IR value measurement / check
6. Testing and commissioning of generator and exciter accessories viz., heaters, blowers, stroboscope, diodes, enclosure lighting, potential measurement of bearings (TE &EE) etc
7. Meggering during drying out of generator.
8. Meggeriing of generator bushing and its accessories. This test has to be conducted many times during erection and commissioning stages

Other than the above, minor testing / checks will also be involved in the generator area, which are also in the scope of the contractor. *Any instruments / tools etc required for carrying out the above shall be arranged by the contractor within the quoted rates*.

4.9 Generator Circuit Breaker

GT generator circuit breaker is horizontal, floor/beam mounted, isolated phase, circuit breaker with isolators, circuit breakers, earth switches, link mechanisms for gang operation of all the three phases together. High precision alignment requirement of 0.00mm accuracy is required for aligning the frames and the breakers. Micro ohm meters for measuring contact resistance, event recorders for record of opening and closing timing of breakers with micro second accuracy will be required during commissioning.

4.10 415V MOTOR CONTROL CENTERS (MCC) & DC/AC DISTRIBUTION BOARDS

Motor control centres are double front draw –out/non-draw type consisting of circuit breakers units, contractor/starter, switch fuse units, MCC, Protection & metering relays/ instruments etc. arranged in multi tier construction. These PCC and MCC are mainly supplied to cater to the requirements of drives, valve actuators etc.

DC distribution Boards is single front non-draw out type consisting of circuit breakers, contactors, starters, fuse units, MCB etc arranged in multi-tier construction. Shall be located in LT switchgear room to cater the dc supply requirement.

The scope of work for the LT switch board and DCDB covers receipt of materials from stores, transportation to the respective location, erection, testing, commissioning and handing over.

Rubber mats shall be supplied by BHEL for HT/LT switchgear and the same shall be laid wherever required as part of work.

4.11 MISC. OTHER INSTRUMENT/ EQUIPMENT CALIBRATION, ERECTION, TESTING, AND COMMISSIONING

A. contractor shall carry out testing & commissioning of panels, electrically operated valves, pneumatic control valves, pneumatic trip valves, solenoid valves, limit switches, HT/LT motors including drying out, and any other integral devices forming part of various mechanical skids/equipments, & piping etc.

B. The scope of commissioning of electrically operated actuators for valves, dampers, gates etc., will include meggering, adjustments of mechanical/ electrical or electronic position transmitters, setting of limit/torque switches, cable checking, internal wiring checking, cleaning / heating for increase in IR value, local/remote operation, replacement of limit/torque switches if required, etc.

C. The scope of commissioning of devices like solenoid valves, feedback position transmitters, limit switches, air filter regulators, airlock relays, positioners etc., which are integral part of pneumatic control valves / power cylinders / trip valves electrically operated valves etc., will involve adjustments / servicing, calibration etc. As incidental to work, contractor shall remove such devices prior to erection either at site or at store to avoid damage/pilferage and for keeping in safe custody. These shall be installed at appropriate stage as instructed by BHEL. The above removal and refixing will be done within the quoted rates.

D. Whenever additional instrumentation work viz gauges, transmitters, temperature elements and laying of impulse piping, is to be carried out for performance guarantee test, the same has to be executed by the contractor as per the rate applicable already provided in the rate schedule.

E. Certain instrumentation like pressure switches, pressure gauges, dial thermometers, transmitters etc. are received in assembled condition as integral part of equipments. Dismounting, calibration, and re-erection of such instruments, where required for safe keeping or any other purpose as instructed by engineer, is in the scope of work. Only the rate applicable for calibration for respective instrument item will be paid.

F. All batteries for various AC and DC systems are to be taken into service as per standard method of initial charging and discharging, recording specific gravity values, etc. Contractor has to make arrangement for suitable loads during charging / discharging cycle.

Battery charging/discharging is a continuous process and skilled manpower shall be deployed by the contractor round-the-clock.

Contractor shall arrange suitable load, cables, safety equipments and consumables for discharging the battery during charging and discharging cycle at his cost.

Contractor shall provide skilled manpower for periodic maintenance after the battery are fully charged for the activities such as checking of electrolyte level, specific gravity, topping up with distilled water and cleaning till the set is handed over to customer and record of the same shall be maintained and submitted before handing over of the system.

4.12 Calibration, testing & commissioning

Calibration, testing & commissioning activity as specified in this technical specification and rate schedule against various equipments, devices, systems etc. are broadly described hereunder. However, there may be some overlapping between the activities, i.e. Erection, calibration and testing, commissioning. The classification of each activity is only a guideline for understanding the 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 work.

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, trouble shooting during pre-commissioning/post-commissioning till system is handed over to the customer.

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.

A. Calibration

Verification of instruments for range, type etc; 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 measuring instruments.
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 functioning of instruments.
All the recorders shall be made functional with proper chart movement and ink marking.

Preparation of computerised calibration certificates in the formats specified by BHEL Engineers and getting those signed by the customer is in the scope of the contractor.

Completion of erection and commissioning protocols with customer.

B. Erection

Drawal of material from store, verification, inspection as per shipping list, drawings and documents.
Preservation, upkeep, safe custody of the erected equipments till handing over.
Verification of installation as per drawing and document for the correctness of cabling, JBs, impulse pipe, various field device, panels, instruments etc.
Continuity check & IR value 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 leakage damages to impulse pipe, field device connections, air connections etc. Shall be fully attended by contractor.

Wherever thermowells are supplied along with temperature gauges, thermocouples, temperature switches, thermostats, etc., the contractor has to co-ordinate with the mechanical contractor for identification and fixing of thermowells on the pipeline. However actual fixing of thermowells on pipeline and seal welding shall be done by mechanical contractor and is not a part of instrument installation.

C. TESTING & COMMISSIONING

Checking/verification of binary/analog 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 etc), electrical actuator operated valve/gate/dampers of other functional elements.
Checking and operating electrical/pneumatic drive through functional group panel, remote control desk, PMS/MMI, CRT operation and repeatability and smooth operation to be checked.
Checking the interlock, protection and alarm for various processes by stimulation of field devices/process changes.
Functional check of sub-loop control, sub group control and auto loop and fine-tuning.

Adjustment of limit switches/feed back position transmitter checking the L.S. of actuator for correct position indication and repeatability shall be ensured.
HT/LT motor IR value measurement, bearing/winding RTD checking, checking the HT load connector, 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, the performance of any instrument found erratic, un-satisfactory are required re-adjustment, re-calibration etc. Contractor shall attend to the defects.
Observing and checking the performance of the various devices on load/process variation. Any deficiencies/defect noticed during the variable load conditions, the same shall be attended promptly.
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 defective signals arising during commissioning and during trial operation of unit.
Any wiring correction or minor modification in control panel wiring noticed during the pre-commissioning, it shall be carried out.

4.13 Earthing installations

4.13.1

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

4.13.2

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 / as per instruction of BHEL engineer.

4.13.3

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.

4.13.4

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

4.13.5

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

4.13.6

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

4.13.7

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

4.13.8

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 paints and other items at his cost.

4.14

The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc of ongoing works, the contractor shall establish his own computer(s) and printer(s) at his site office, along with suitable operator(s), consumables, etc*. Non-establishment of above equipment will attract penalty @ Rs 10000 (Rs Ten thousand only) per month.*

BHEL uses its own software SOMS (Site Operation and Management System) for total project execution and billing. The contractor shall also provide adequate and suitable manpower for updating / entries into SOMS in BHEL computers at site.

4.15 TROUBLESHOOTING DURING PLANT OPERATION

During pre commissioning / commissioning stages when the plant will be under various stages of operation, it will be necessary to have continuous (day and night) presence of suitable manpower along with required tools to attend to any defects etc that may arise during such operation. The contractor will be required to put such personnel in shifts in both electrical and C&I area. The bidder must also take this aspect into consideration.

4.16 Exclusions

The following are specific exclusions from this work.

1. Attachment welding of thermocouple pads for boiler tube metal temperature measurement and fixing of thermowells in the pipelines.
2. Erection of flow nozzles.
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 and control valves. *(However, SADC power cylinder installation will be in the scope of the contractor)*

   Note:

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

SECTION-5

SPECIAL CONDITIONS OF CONTRACT

5.0 Obligations of the contractor (tools, tackles, consumables etc.)

5.1 Labour colony

BHEL / BHEL's customer will not provide any facility in this regard. Contractor shall make his own arrangements for accommodation of his labour and other staff.

5.2 Tools and tackles

5.2.1 The contractor shall provide all required tools and plants, inspection, measuring and test equipments and handling & transportation equipments for transportation of material / equipments from BHEL/ customer stores/ storage yard to erection site for the scope of work covered under these specifications.

Contractor shall arrange suitable capacity of crane for loading of material at BHEL storage yard / re-handling of material, unloading at work place and erection related works and suitable capacity of truck/trailer for transportation of material.

5.2.2 Where required the contractor's tools and tackles deployed for the work may have to have approval of BHEL.

5.2.3 Timely deployment of adequate quantity of T&P is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned programme and to achieve the milestones.

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

5.2.5 In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make the alternate arrangement at the risk and cost of the contractor.

5.2.6 The T&P to be arranged by the contractor shall be in proper working condition. The operation shall not lead to unsafe condition. The movements of cranes, and other equipment should be such that no damage/breaking occurs to foundation, equipment, material and men. All arrangements for the movement of his T&P etc. shall be the contractor's responsibility.

5.2.7 Normally, for welding only the use of welding generators may be permitted. The use of welding transformers/rectifiers will be subject to the approval of BHEL engineer.

5.2.8 The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of measuring instruments (MMD). Test/ calibration certificates shall be furnished to BHEL. IMTE shall be calibrated only at

accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL.

5.3 Consumables

5.3.1 The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those, which are specifically indicated as BHEL scope.

5.3.2 Prior approval of BHEL engineer with regard to certain consumables may be required. Test reports/certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

5.3.3 Primers, Paints etc.

The contractor shall provide Primer (ROZC as per IS:2074), Synthetic Enamel Paint (IS:2932) and Aluminum Paint – as necessary for respective painting area for the scope of painting work indicated in Section-4 as well as for protection of site weld joints and gas cut locations. Contractor shall also arrange to provide the required thinner and other consumables, T&P and implements etc. required for application of Primer and Paints. All primers, paints and thinners shall be sourced by contractor only from BHEL approved manufacturers. Some of them are as listed under.

1) M/s Asian Paints
2) M/s Berger paints
3) M/s Jenson & Nicholson
4) M/s Shalimar Paints
5) Any other BHEL approved manufacturer.

5.4 Welding Electrodes, Filler Wires for MIG/TIG Welding and Gases

5.4.1 Contractor at his cost shall arrange all the required welding electrodes as approved by BHEL. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding manufacturer, type and brand name of welding electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL regarding type of electrodes, batch number, date of expiry etc. Batch test certificates shall be made available to BHEL for verification & records.

BHEL reserves the right to reject the use of any electrodes, if found non-acceptable because of bad quality, deterioration in quality due to improper storage, shelf-life expiry, unapproved type/brand etc

5.4.2 All the required gases for welding and gas cutting like Oxygen, Acetylene, Argon (welding quality), Nitrogen etc. shall be arranged by the contractor at his cost.

5.4.3 If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability of consumables from the contractor's side BHEL

will make alternate arrangements at the risk and cost of contractor. The expenditure incurred with overheads will be recovered from the contractor.

5.4.4 TEST PIECES FOR WELDERS QUALIFICATION TEST.
The Contractor shall supply materials for Test Pieces for qualification of structural welders. Contractor shall also prepare the test coupons from such materials. All expenses in respect of welders' qualification test shall be to the contractors account.

5.5 Field Office

5.5.1 The contractor shall make his own arrangements for field office and stores for accommodating necessary equipments, tools room for execution of the work. Only open space will be provided by BHEL's customer free of charges within the project premises as per the availability of space.

5.5.2 On completion of work, all the temporary buildings, structures, pipelines, cables, etc shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the same will be arranged to be removed and expenditure thereof will be recovered from the contractor. The decision of BHEL engineer in this regard shall be final. However, the scope of dismantling and leveling the area is limited only to the contractor's site office, yard and other spaces occupied by the contractor.

5.6 Area Lighting

Contractor shall arrange adequate floodlights, hand lamps and area lighting. Provision of distribution lines for lighting from the single point to the required place with proper distribution boards, observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor including all the materials like cables, fuses, switch boards etc

5.7 Construction Power & Water

5.7.1 **BHEL/client will <u>not</u> provide any construction power**. **Contractor shall arrange and deploy suitable capacity captive DG set and Diesel Powered Welding M/c** in adequate quantity for the entire scope of work and services. All expanses in this regard shall be borne by the contractor.

Bidder shall clearly indicate the Rating and quantities of such equipment in the T&P Deployment plan (refer Appendix-IV of our Tender Specification Part –I. The contractor shall provide all necessary cables, fuses, switches, switchboards, MCCB, energy meters etc, and any other installation as specified by statutory authority in this regard for further drawl of power. Obtaining approvals / clearance of such installations, prior to their being put to use or as may be specified, shall be the responsibility of the contractor.

5.7.2 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.

5.7.3 Customer will provide water for construction purpose at a single point on chargeable basis @ Rs. 2/ per kilolitre. Further, taxes, duties, levies, charges, if any, shall also be borne by the contractor. All arrangements for further distribution with necessary meter and metering arrangement has to be made by the contractor.

5.8 Contract Labour

5.8.1 The contractor in the event of his engaging 10 or more workmen will obtain independent license 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.

5.8.2 Provident Fund

Contractor will deduct the necessary amount from his employees towards provident fund and contribute equal amount as per government of India labour laws. Contractor regularly to the provident fund commissioner and get the account code will deposit this amount. Contractor shall submit the account code duly certified by pf commissioner to BHEL project in-charge.

5.8.3 Contractor shall also comply with the provisions of ESIS act in vogue and submit evidence thereof to BHEL site in-charge. All other expenses such as employees' benefits to be borne by the contractor as per the labour laws. Contractor shall produce necessary certificates towards their compliance with such statutes and payment of all statutory dues.

5.8.4 Contractor shall also comply with the requirements of local authorities/ project authorities calling for police verification of antecedents of the workmen, staff etc

5.8.5 Where applicable, provisions of workman compensation act shall be adhered to.

5.8.6 BHEL/customer may insist upon witnessing the regular payment to the labour. They may also like to verify the relevant records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL/ Customer.

5.9 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.

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.

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.

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.

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.

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.

5.10 Submission of Periodical Reports

Contractor shall submit periodical reports in respect of following aspects of operation:

1) Consumption of welding electrodes and gases
2) Consumption of construction power
3) Manpower reports
4) Progress reports – periodically
5) Field calibration reports

BHEL at site will inform formats for these reports.

5.11 It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer/ BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permit for working beyond normal working hours.

5.12 ELECTRICAL INSPECTORATE'S APPROVAL /STATUTORY INSPECTION

5.12.1 Contractor shall have/obtain valid Electrical Contractors License to carry out the Erection, Testing & Commissioning work on High/Low Voltage Electrical Equipments from the appropriate statutory authority of the concerned state or Central Electricity Authority, as the case may be. All fees and expenses in this regard shall be in the contractor's account.

5.12.2 Contractor shall arrange inspection of concerned Statutory Authority for the installation, testing & commissioning of High / Low voltage equipments covered under the scope of work in this tender specification and obtain their approval in appropriate format prior to charging of the equipments.

5.12.3 Contractor shall be responsible for all necessary liasioning work with Statutory Authority towards the certification of installation / works. BHEL will pay Statutory Fees in respect of inspection of installations as per demand note/challan issued by the statutory authority. All other expenses shall be borne by the Contractor. BHEL/ BHEL's Customer shall be providing technical assistance, drawing & document for submission to Statutory Authority. Contractor shall provide all logistics services in this regard.

SECTION-6

SPECIAL CONDITIONS OF CONTRACT

6.0 **Contractor's Obligation with Regard to Employment of Supervisory Staff and Workmen**

6.1 The contractor shall deploy all the skilled/semiskilled/ unskilled labour including highly skilled workmen etc. These workmen should have previous experience on similar job. They shall hold valid certificates wherever necessary. 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 a tentative deployment plan of his manpower as required vide Appendix-II. Also the actual deployment will be so as to satisfy the erection and commissioning targets set by BHEL.

6.2 It is the responsibility of the contractor to engage his workmen in shifts and or on overtime basis for achieving the targets 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 and commissioning targets will be final and binding on the contractor.

6.3 Contractor shall deploy only qualified and experienced engineers/ supervisors. They shall have professional approach in executing the work.

6.4 The contractor's supervisory staff shall execute the work in the most professional 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.

6.5 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. Also in general they should see that the works are carried out in a safe and proper manner and in coordination with other labour and staff employed directly by BHEL or other contractors of BHEL or BHEL's client.

6.6 **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/ESP control room and field.

6.7 **Industrial Relations and Labour Laws**

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 and any other such authorities under whom this work falls.

6.8 If at any time, it is found that the contractor is not in a position to deploy the required engineers/supervisors/workmen due to any reason, BHEL shall have the option to make alternate arrangements at the contractor's risk and cost.

6.9 Site Organization.

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.

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.

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.

Contractor should provide a team of engineers with proven experience of erection, testing/ commissioning of electrical equipments as specified in tender specification. They shall be in a position to undertake specific assignments during the start up/ post start up/stabilization.

The contractor shall deploy adequate laboures and supervisory staff in the following areas.

A) Overall planning, monitoring & control

B) Equipments Erection

C) Welding & NDT & Stress Relieving operators, induction.

D) Testing & Commissioning

E) Quality Control and Quality Assurance

F) Materials Management

G) Safety, Fire & Security

H) Industrial Relations and Fulfillment of Labour Laws and Other Statutory Obligations.

Contractor shall furnish an organization chart indicating the staffing pattern for the above functions. Contractor shall provide the names and details of engineer/ supervisors at the time of mobilization to BHEL as per the proposed organization chart.

SECTION-7

SPECIAL CONDITIONS OF CONTRACT

7.0 OBLIGATIONS OF BHEL

7.1 FACILITIES TO BE PROVIDED BY BHEL

Refer Appendix IIB

7.2 SPACES FOR FIELD OFFICE

Refer Section-5 in this regard.

7.3 CONSTRUCTION WATER

Refer Section-5 in this regard.

7.4 CONSTRUCTION POWER

Refer Section-5 in this regard.

7.5 OTHER MATERIALS AND CONSUMABLES:

BHEL shall not provide any material/consumables except those specifically mentioned in the footnote as indicated in **Appendix –II** and tender specification.

7.6 TEST BLANKS (PLATES & PIPES)

Test pieces for qualification of structural welders shall be supplied by the contractor.

7.7 FILLER WIRE FOR TIG WELDING

All the welding consumables shall be arranged by contractor.

7.8 Special tools which are supplied by BHEL Manufacturing Divisions under regular DU/DESS numbers in various product groups as part of maintenance tools which are to be handed over to customer may be issued to the contractor free of charges for specific activities, at the discretion of BHEL. Contractor shall return them after the completion of the specific activity, for which the tools were spared, in good working order.

SECTION-8
SPECIAL CONDITIONS OF CONTRACT

8.0 Inspection/Quality Assurance/Quality Control/ Statutory Inspection

8.1 Various inspection/quality control/quality assurance procedures/methods at various stages of erection and commissioning will be as per BHEL/ customer quality control procedure/codes and other statutory provisions and as per BHEL engineer's instructions.

8.2 Preparation of quality assurance log sheets and protocols with customer/ consultants/statutory authority, welding logs, NDE records, testing & calibration records and other quality control and quality assurance documentation as per BHEL engineer's instructions, is within the scope of work/specification. These records shall be submitted to BHEL/customer for approval from time to time.

8.3 A daily logbook of all measurements and testing/calibration should be maintained by contractor on the job for detailing inspection details of various equipments**.**

8.4 The performance of welders will be reviewed from time to time as per the BHEL standards. Welders' performance record shall be furnished periodically. Corrective action as informed by BHEL shall be taken in respect of those welders not conforming to these standards. This may include removal/ discontinuance of concerned welder(s). Contractor shall arrange for the alternate welders immediately.

8.5 All the welders shall carry identity cards as per the proforma prescribed by BHEL only welders duly authorized by BHEL/customer/consultant shall be engaged on the work.

8.6 Contractor shall provide all the measuring monitoring devices (MMD) required for completion of the work satisfactorily. These MMD shall conform to job requirement in respect of measurement range, accuracy level & any other specification. The indicative list of MMD required for this work and to be made available by the contractor is given in relevant appendix. The list will be reviewed by BHEL and the contractor shall meet any augmentation needed.

8.7 The MMD deployed by the contractor shall, at all stages of work, have valid and current calibration. BHEL shall be done the calibration of these MMD from the agencies accredited/ approved. Copy of calibration certificates in respect of these MMD has to be submitted to BHEL. Periodical status report regarding validity of calibration has to be submitted to BHEL. Re-calibration/ re-validation shall be done periodically as per BHEL specifications. Contractor shall conform to the specifications of BHEL regarding storage of the MMD.

8.8 Re-work necessitated on account of use of invalid MMD shall be entirely to the contractor's account. He shall be responsible to take all corrective actions, including resource augmentation if any, as specified by BHEL to make-up for the loss of time.

8.9 In the course of work BHEL may counter/ finally check the measurements with their own MMD. Contractor shall render all assistance in conduct of such counter/final measurements**.**

8.10 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.

8.11 Stage Inspection By FES/QA Engineers

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

8.12 **Statutory Inspection of Work:**

8.12.1 The work to be executed under these specifications has to be offered for inspection, at appropriate stages of work completion, to various statutory authorities for compliance with applicable regulations.

8.12.2 The work related statutory inspections, though not limited to, are as under:

- Inspectorate of the Chief Electrical Inspector of GUJRAT OR Central Electricity Authority as per statute.
- Any other authority connected to this work.

The scope includes getting the approval of the installations from the statutory authorities, which includes arranging for inspection visits of statutory authority periodically as per BHEL engineer's instructions, submitting documents, radiographs etc. and following up the matter with them. Contractor shall also make all arrangements for offering the products/systems for inspection, as applicable, to the concerned authority.

8.12.3 It shall be contractor's responsibility to obtain approval of statutory authorities, whenever applicable, for conducting any work which comes under the purview of these authorities.

8.12.4 BHEL will pay fees for visits, inspection fees etc. of these statutory authorities. Please refer Section-5 for working arrangement for payment of fees in this regard. All other expenses shall be borne by the contractor. In case these inspections have to be repeated due to reasons attributable to the contractor and fees have to be paid again, the contractor has to pay such additional charges.

8.12.5 It shall be the responsibility of contractor to obtain license from chief electrical inspector, Maharashtra for carrying out high voltage work. Contractor shall also comply with the provisions of the latest Electricity Act, including the amendments thereof.

8.12.6 The contractors shall pay all fees connected with testing of his welders/ workers and testing, inspection & calibration of his MMD and T&P.

8.13

The quality management system of BHEL, Power Sector – Western Region (PSWR) has already been certified and accredited under ISO 9002 standards in this regard. The basic philosophy of the quality management system is to define the organizational responsibility, work as per documented procedures, verify the output with respect to

acceptance norms, identify the non-conforming product/ procedure and take corrective action for removal of non-conformance specifying the steps for avoiding recurrence of such non-conformities, & maintain the relevant quality records. The non-conformities are to be identified through the conduct of periodical audit of implementation of quality systems at various locations/stages of work. Suppliers/vendors of various products/services contributing in the work are also considered as part of the quality management system. .as such the contractor is expected not only to conform to the quality management system of BHEL but also it is desirable that they themselves are accredited under any quality management system standard.

Field Quality Assurance

Contractor shall carry out all activities conforming to the approved Field Quality Plan (FQP) as revised from time to time. Total quality shall be 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 the services of quality assurance engineer as per the relevant clauses.

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 endeavor 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

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**

9.2.1.25.1 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 neighboring
- 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.

9.2.1.25.2 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 focused

- 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

9.2.4.2.1 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.

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

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

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

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

9.2.4.2.6 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.

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

9.3.4 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.

9.3.5 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 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.

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 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.

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

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

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.

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**:

SN	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/-

SN	Violation of Safety Norm	Fine (in Rs)
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 13430	1992		CODE OF PRACTICE FOR SAFETY DURING ADDITIONAL CONSTRUCTION AND ALTERATION TO EXISTING BUILDINGS

IS No.	YEAR	Amd. upto	Description
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

IS No.	YEAR	Amd. upto	Description
			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 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

IS No.	YEAR	Amd. upto	Description
			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 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 No.	YEAR	Amd. upto	Description
IS 940	1989		PORTABLE FIRE EXTINGUISHERS WATER TYPE (GAS CARTRIDGE)
IS 9457	1980		SAFETY COLOURS AND SIGNS
IS 9679	1980		CODE OF SAFETY FOR WORK ENVIRONMENTAL MONITORING
IS 9706	1997		CODE OF PRACTICE FOR THE CONSTRUCTION OF AERIAL RPEWAYS FOR THE TRANSPORTATION OF MATERIAL
IS 9759	1981		GUIDELINES FOR DEWATERING DURING CONSTRUCTION
IS 9815	1989		SERVO MOTOR OPERATED LINE VOLTAGE CORRECTOR (SERVO STABILISER)
IS 9944	1992		RECOMMENDATIONS ON SAFE WORKING LOAD FOR NATURAL AND MAN-MADE FIBRE ROPE SLINGS
IS 996	1979		SINGLE PHASE ELECTRIC MOTORS
ISO 3873	1977		SAFETY HELMET

SECTION-10

SPECIAL CONDITIONS OF CONTRACT

10.0 DRAWINGS AND DOCUMENTS

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

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

10.3 The data furnished in various sections and appendices and the drawings enclosed with this tender specification describe the equipment to be installed, tested and commissioned under this specification, briefly. However, the changes in the design and in the quantity may be expected to occur as is usual in any such large scale of works.

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

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

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

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 and Work Order placement.

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.

SECTION-11

SPECIAL CONDITIONS

11.0 TIME SCHEDULE, MOBILIZATION, PROGRESS MONITORING, PRICE VARIATION, OVER RUN ETC.

11.1 TIME SCHEDULE & MOBILIZATION

11.1.1 INITIAL MOBILIZATION AND TENTATIVE SCHEDULE

CONTRACTOR SHALL REACH SITE, MAKE HIS SITE ESTABLISHMENT AND BE READY TO COMMENCE THE TOP PRIORITY ACTIVITIES WITHIN ONE MONTH FROM THE DATE OF FAX LETTER OF INTENT OR AS PER DIRECTIONS OF CONSTRUCTION MANAGER OF BHEL.

THE CONTRACTOR HAS TO SUBSEQUENTLY AUGMENT HIS RESOURCES IN SUCH A MANNER THAT THE ENTIRE WORK IS COMPLETED TO ACHIEVE THE FOLLOWING TENTATIVE SCHEDULE:

1) SYNCHRONIZATION OF GTG	MAR 2009
2) COMMISSIONING OF HRSGS	APRIL 2009
3) SAFETY VALVE FLOATING AND STEAM BLOWING	APRIL 2009
4) TRIAL OPERATION OF HRSGS AND GTG & THEIR AUXILIARIES	MAY 2009
5) PERFORMANCE GUARANTEE TEST OF THE UNIT	MAY 2009

THE DATE OF ERECTION OF FIRST EQUIPMENT BY THE CONTRACTOR, AS CERTIFIED BY BHEL ENGINEER, WILL BE THE START OF ERECTION.

11.1.2
In order to meet the completion schedule for above major milestones in general, and all other intermediate targets set during the course of execution, contractor shall arrange all necessary resources in consultation with BHEL.

11.1.3 CONTRACT PERIOD

The total contract period will be **8 (eight) months** from the date of start of erection.

11.1.4 GRACE PERIOD

Grace period of **two months** beyond the end of contract period may be granted by BHEL at its discretion for completion of the contract work.

11.2 PROGRESS MONITORING, CONTRACT EXTENSION AND OVER RUN

11.2.1 PROGRESS MONITORING

Progress will be reviewed periodically including month end review vis-à-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.

11.2.2 ASCERTAINING AND ESTABLISHING THE REASONS FOR SHORTFALL

The onus probandi that the causes leading to extension in 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. 11.2.1 above will be made considering the availability of components to be erected and other 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 ant other reasons not attributable to the contractor.

11.2.3 CONTRACT EXTENSION

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

11.2.4
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. 11.2.2 shall be done during the extended period. The over run 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 over run charges if the monthly programme as mentioned here not made by him.

11.2.5
The part of extension attributable to the contractor, if any, in total contract extension shall be exhausted first ie immediately after end of grace period. This shall be followed by the extension on account of force majeure conditions, if any, and then on account of BHEL.

OVERRUN COMPENSATION

If the contract is extended 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. 25,000/- (Rupees twenty thousand only) per month. Overrun compensation will be paid for the extension attributable to BHEL. No overrun compensation will be payable for the extension on account of reasons attributable to contractor and/or force majeure conditions.

11.3 PRICE VARIATION

Agreed rates shall remain firm throughout the contract period and extensions their of No. Price variation /adjustment shall be applicable for this contract. .

11.4 Contract Variations

11.4.1 Variation In Weight/Quantities

Weights of various Equipments, Quantities of various items of work covered under these specifications & indicated in relevant Appendices and Rate Schedule are likely to vary. For

any upward or downward variation in the quantities, the rates accepted shall be applicable without any variation. Payment will be made by BHEL for the actual executed quantities.

11.4.2 Additional Item

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:

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

Wherever any item rate for similar type of work or nearby item rate is not existing 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. INTEREST BEARING RECOVERABLE ADVANCE

Interest bearing (rate of interest shall be prime leading rate of SBI plus 2% per annum, 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 by the time contractor reaches 90% billing of total value of work executed & within the contract period (including extensions granted or foreclosure if any).

11.6 DEFINITION OF WORK COMPLETION

The contractor's scope of work under these specifications will be deemed to have been completed in all respect, only when all the activities are completed satisfactorily and so certified by BHEL site in charge. The decision of BHEL in this regard shall be final and binding on the contractor.

11.7

The work under the scope of contractor will deem to have been completed in all respect, only when all the activities in these specifications are completed satisfactorily and so certified by BHEL engineer. The decision of BHEL in this regard shall be final and binding on the contractor.

SECTION-12
SPECIAL CONDITIONS OF CONTRACT

12.0 TERMS OF PAYMENT

12.0.1
The contractor shall submit his monthly RA account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar month.

12.0.2
Clause 2.6 of general conditions of contract shall be referred to as regards mode of payment, and measurement of the work completed.

12.0.3
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, on specific request of vendor, this amount may be released on pro rata basis for the value of work executed and accepted by BHEL, along with any RA Bill and onwards, subject to receipt and acceptance of bank guarantee of equal amount in BHEL's prescribed format. 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.

12.0.4
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.

12.0.5
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:

9. Name of the Company
10. Name of Bank
11. Name of Bank Branch
12. City/Place
13. Account Number
14. Account type
15. IFSC code of the Bank Branch
16. MICR Code of the Bank Branch

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

12.1 STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

The agreed rates for each item shall be paid progressively as per the break up given hereunder (aggregating 100%), based on the progress of work in each month.

SL NO	TYPE OF PAYMENT (Refer Rate Schedule)	CALIBRATION	ERECTION	TESTING AND COMMISSIONING	FINAL PAINTING
1	A	NA	55%	40%	5%
2	B	NA	60%	40%	NA
3	C	NA	60%	40%	NA
4	D	NA	55%	40%	5%
5	E	NA	60%	40%	NA
6	F	NA	100%	NA	NA
7	G	NA	100%	NA	NA
8	H	NA	95%	NA	5%
9	I	NA	60%	40%	NA
10	J	NA	95%	NA	5%
11	K	NA	95%	NA	5%
12	L	NA	55%	40%	5%
13	M	NA	55%	40%	5%
14	N	NA	55%	40%	5%
15	N2	45%	55%	NA	NA
16	N3	NA	95%	NA	5%
17	O	NA	NA	100%	NA

12.1.1

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.

12.2 MEASUREMENT OF THE WORK COMPLETED

12.2.1

The Bidder shall quote separate unit rates for each item as detailed in Rate Schedule. Payment will be made by BHEL according to agreed item rates, break up of stage payments and actual executed quantities.

12.2.2

In rate schedules, 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.

12.2.3

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

12.2.4
All the surplus, scrap and serviceable materials shall be returned by the contractor to BHEL's stores as per the instruction of engineer.

12.25
All the cables returned to stores should carry aluminium tag(s) indicating the size and type of cables. Cable of more than five -meter lengths is termed as "serviceable material".

12.2.6
Any item returned to stores shall be clearly identified and tagged for its serviceability or any defects in the returned items.

12.27
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.

12.2.8
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 BIDDER SHALL QUOTE A LUMPSUM AMOUNT FOR THE COMPLETE BOQ & THE INDIVIDUAL ITEM RATE SHALL BE IN PROPORTION TO THE WEIGHTAGES SPECIFIED IN BOQ. PAYMENT WILL BE MADE BY BHEL ACCORDING TO THE DERIVED ITEM RATES, BREAK UP OF STAGE PAYMENTS AND ACTUAL EXECUTED QUANTITIES.

12.3.2 MEASUREMENT FOR PAYMENT

12.3.3
IN RATE SCHEDULES, 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 MEASUREMENT. PHYSICAL MEASUREMENT SHALL BE MADE BY CONTRACTOR IN PRESENCE OF BHEL ENGINEER. CONTRACTOR SHALL MAINTAIN RECORDS FOR UTILIZATION OF MATERIAL SYSTEM-WISE.

12.3.5
ALL THE SURPLUS, SCRAP AND SERVICEABLE MATERIALS SHALL BE RETURNED BY THE CONTRACTOR TO BHEL'S STORES AS PER THE INSTRUCTION OF ENGINEER

12.3.6

ALL THE CABLES RETURNED TO STORES SHOULD CARRY ALUMINIUM TAG(S) 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.

SECTION-13

SPECIAL CONDITIONS OF CONTRACT

13.0 EXTRA CHARGES FOR MODIFICATION AND RECTIFICATION

13.1
If extra works (requiring less than 40 man-hours) for modification, rework, revamping, in brief, any work done to change the state existing to a stage desired and also fabrication, all or 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 Bidder is requested to take this aspect into account and the quoted rate should include all such contingencies.

It may be noted that for field instruments (viz., transmitters, gauges, switches, RTD, thermocouples,), recalibration charges will be 75% of the calibration rate. The above will qualify as extra work only if the requirement of recalibration is not due to any fault of the contractor. Proper records signed by BHEL engineer must be attached against each recalibration.

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 be 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 40 man-hours and such payment will be regulated by the terms, conditions and stipulations contained in the clauses 13.4 and or 14.2.1 to 14.2.10. 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. It may also be noted

13.4
However, BHEL may consider for payment as extra, for such of those works detailed in clause 13.1 which require more than **40 man-hours** and such payment will be regulated by the terms, conditions and stipulations contained in the clauses 13.4 to13.8 and/or 14.2.1 to 14.2.10 as the case may be. 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. It may also be noted that only those works, which are identified as major and warrant extra payment and certified as such by the site engineer and accepted by the designers and/or competent authority of BHEL, will be considered for extra payment.

13.5
For extra works arising out of transit, storage and erection damages, payment, if found due, will be regulated by clauses 14.2.1 to 14.2.10.

13.6
All the extra work should be carried out by a separately identifiable gang, without affecting routine activities. Daily log sheets in the pro-forma 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 ie. Daily log sheets. It may, however be noted that signing of log sheets by BHEL engineer does not mean the acceptance of such works as extra works. All admissible claims shall be submitted to BHEL

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

13.8
Extra works that arise on account of contractor's fault will have to be carried out by the contractor free of cost including the supply of material and consumables

13.9
After eligibility of extra works is established and finally accepted by BHEL engineer/designer, payment will be released on competent authority's approval at the following rate.

Man-day rate for eligible extra works :

Single average man-day rate, including overtime if any, and other site expenses and incidentals, including consumables, tools and tackles, for carrying out rework / repairs / rectification / modification / fabrication for a man-day of 8 hours as may arise during the course of erection will be **Rs 240/-** (Rupees Two hundred forty **only)**

As mentioned above, no payment will be made if an item of work lasts less than 40 man-hours.

SECTION-14

SPECIAL CONDITIONS

14.0 INSURANCE

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

BHEL/client has an MCE insurance cover, inter-alia, for all the permanent project equipments/components supplied by BHEL under scope of this work under 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, reworks and fabrication of components lost, which are minor and incidental to erection work (consuming not more than 40 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.

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 negligence or 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 shall be recovered from the contractor. Recovery will be limited to Normal Deductible Franchise (DF) / Excess as per applicable Insurance (TAC) tariff guidelines. However, in case such insurance claim is summarily rejected by the underwriters due to willful damage/loss on the part of the contractor, the total cost of repair/ replacement shall be recovered from the contractor.

14.3 Insurance by the contractor and indemnification of BHEL

BHEL have taken a 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. However, the bidders 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.

Contractor shall obtain and operate suitable insurance policies to cover the risk pertaining to the assets/properties and personnel belonging to or deployed by him.

SECTION-15

SPECIAL CONDITION OF CONTRACT

15.0 EARNEST MONEY DEPOSIT , SECURITY DEPOSIT & BANK GUARANTEE

15.1 Earnest Money Deposit:

i) EMD for this tender is Rs. 2,00,000/- (Rupes Two lakhs only).

ii) Bidders who have already deposited One Time EMD of Rs. 2.00 lakh are exempted from submission of EMD for this tender. However a copy of 'One Time EMD' certificate issued by BHEL/PSWR, Nagpur shall be enclosed along with the Offer.

iii) EMD is to be paid in cash (as permissible under Income Tax Act), Pay order or Demand Draft in favour of Bharat Heavy Electricals Limited and payable at Nagpur.

iv) No other form of EMD remittance shall be acceptable to BHEL.

15.1.1 EMD by the bidder will be forfeited as per Tender Documents if

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

ii) The bidder 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.

15.1.3 In the case of unsuccessful bidders, the Earnest Money will be refunded to them after acceptance of tender by successful bidder

15.2 Security Deposit

15.2.1 Security Deposit shall be furnished by the successful bidder. 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 should be furnished before start of the work by the contractor.

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. 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 bidder shall be converted and adjusted against the cash Security Deposit excepting for such bidder who has remitted One Time EMD.

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

15.3 BANK GUARANTEE

i. It is the responsibility of the bidder to get the Bank Guarantees revalidated/extended for the required period as per the advice of BHEL Site Engineer / Construction Manager. BHEL shall not be held liable for issue of any reminders regarding expiry of the Bank Guarantees.

ii. In case extension/further extensions of any Bank Guarantees are not required, the bidders shall ensure that the same is explicitly conveyed through the Construction Manager to BHEL PSWR/HQ, Nagpur

iii. In case the Bank Guarantees are not extended before the expiry date, BHEL reserves the right to invoke the same by informing the concerned Bank in writing, without any advance notice/communication to the concerned bidder.

iv. **Bidders to note that any corrections to Bank Guarantees shall be done by the issuing Bank, only through an amendment in an appropriate non judicial stamp paper.**

v. Bidders to ensure that the Bank Guarantees submitted are exactly as per format given in the Tender documents.

vi. The Original Bank Guarantee shall be sent directly by the Bank to BHEL under Registered Post (Acknowledgement Due). However, in exceptional cases, where guarantee is directly received by Vendor, the Vendor shall instruct the Bank to send an unstamped duplicate copy of the guarantee directly to BHEL under Registered Post (Acknowledgement Due).

Appendix- I

Details (wherever required) of items listed in the rate schedule

Please Note:

1. All the items in general are to be erected and commissioned by the contractor, unless specifically mentioned otherwise.
2. In such cases where systems are described with component quantities (viz., Vibration monitoring systems, Lube Oil skids, etc., etc.) 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.
3. The dimensions and weights mentioned are only approximate. No extra claims will be entertained due to change in dimensions/weight.

- Sl No N1.31 to N1.32:

Steam and Water analysis system

The scope of work includes all equipments including recorders etc, which may be fitted in any of the panels. Ph, sensors (4 nos.) conductivity analyzer (4 nos.), silica analyzer, multi channel (2 nos.), etc. and sensors for these analyzers will be supplied loose with integral / prefab cables, to be mounted and wired up in relevant panels.

- Sl No. B.1

Modification and Expansion in existing 11 KV Switchboard:

Supply, Erection, Testing & Commissioning by Vendor for Modification job in 3 Panels, And Expansion by 1 panel in existing 11 KV switch gear is by PSWR/site.

APPENDIX–II

TENTATIVE LIST OF MAJOR TOOLS & PLANTS & MMD TO BE BROUGHT BY THE CONTRACTOR

A. T&P FOR ELECTRICAL/C&I WORKS

SN	DESCRIPTION	MINIMUM QUANTITY
01	TRANSFORMER OIL PURIFICATION PLANT WITH VACUUM PUMP FOR EVACUATION OF TRANSFORMER ALONGWITH ACCESSORIES & HOSES. A) CAPACITY 5000/6000 LTR PER HOUR B) CAPACITY 2000/2500 LTR.PER HOUR C) CAPACITY 750/1000 LTR. PER HOUR	 1 NO. 1 NO. 1 NO.
02	TRANSFORMER OIL TRANSFER/STORAGE TANK WITHSTANDING FULL VACUUM CAP. 10 KILOLITRES	2 NOS
03	PRIMARY INJECTION KIT UPTO 10000 AMPS	1 NO.
04	SECONDARY INJECTION KIT WITH INTEGRAL TIMER FOR RELAY TESTING	1 NO.
05	1 Phase/3 PHASE VARIAC	1 NO. EACH
06	SINGLE PHASE VARIAC 28 AMPS	1 NO.
07	TRANSFORMER TURNS RATIO TEST KIT	1 NO.
08	HV TEST KIT AC, 0 –50 KV &DC, 0- 100 KV PREFERSBLY WITH DRY TYPE TRANSFORMER	1 NO. EACH
09	TRANSFORMER OIL BDV TEST KIT 0-100 KV WITH 2.5MM AIR GAP.	1 NO.
10	PORTABLE AIR COMPRESSOR WITH DRIER AND REGULATOR MAKE “TOSHNIWAL”/”KHOSLA” RATED FOR 7/10 KG/CM2	1 NO.
11	SOLDERING IRON “SOLDRON” MAKE 25 WATT	2 NOS.
12	VACUUM PUMP	1 NO.
13	MULTIMETRES	
	V) DIGITAL 3 1/2 DIGIT OF REPUTED MAKE b> ANALOG MOTWANE MAKE c> DIGITAL 4 1/2 DIGIT OF REPUTED MAKE	6 NOS. 3 NOS. 2 NO.
14	STANDARD MILLI AMPS/MILLIVOLTS SOURCE MAKE RANGE 0 TO 60 mA AND 0 TO 100 mV	2 NO.
15	INSULATION TESTER HAND OPERATED 25OV/500V/1000 V RATED MAINS/BATTERY OPERATED	1 NO. EACH
16	INSULATION TESTER MAINS OPERATED 2500/5000V	2 NO.

SN	DESCRIPTION	MINIMUM QUANTITY
17	DC POWER SUPPLY 0 TO 250 V DC, 5 A MAKE “APLAB” OR EQUIVALENT (VARIABLE SOURCE)	2 NO
18	PHASE SEQUENCE INDICATOR	1 NO.
19	FREQUENCY SOURCE 45 TO 55 HZ WITH 110V	1 NO.
20	TONG TESTER AC 5/10, 25/60/300 AMP RANGE REPUTED MAKE	1 NO. EACH
21	TONG TESTER DC 30/60/300 AMP	1 NO.
22	STOP WATCH	1 NO.
23	CONTAINER FOR TRANSFORMER OIL SAMPLING	10 NOS.
24	TARPOLIN FIRE PROOF	As required
25	DC SHUNT 400 AMP 75 MV	1 NO.
26	3 PHASE SHIFTER	1 NO.
27	INDUSTRIAL TYPE VACUUM CLEANER	1 NO.
28	MICRO OHM METER	1 NO.
29	DECADE RESISTANCE BOX	2 NOS.
30	TELETALK 2 WIRE SYSTEM	6 SETS
31	PORTABLE BLOWER WITH HEATING ARRANGEMENT	1 NO.
32	TORQUE WRENCH (12-60Nm, 50-225 Nm)	1 NO EACH
33	WATTMETER AC/DC 0-125-250V, 0-5-10A	1 NO
34	OSCILLOSCOPE	1 NO
35	TACHOMETER NON CONTACT TYPE 0 to 4000 RPM	1 NO
36	TAN DELTA TEST KIT	1 NO
37	OIL SPECIFIC GRAVITY AND PPM MEASURING INSTRUMENT	1 NO
38	RHEOSTAT	3 NOS
39	POLARITY TEST KIT	1 NO
40	NON – CONTACT TYPE DIGITAL THERMOMETER	1 NO
41	RELAY TESTING KIT	1 NO
42	FERRULE PRINTING MACHINE	1 NO
43	PHANTAM LOAD KIT	1 NO
44	Dead weight tester rated 400 Kg/cm2 and with weights and test gauge facility. Make ‘Budenberg or ‘Ravika’	1 no.
45	Oil temperature bath suitable to calibrate the instruments range 0 – 200 deg. C with standard temperature gauges and thermostatic control	2 nos.
46	Muffle furnace – 800 deg. C with standard temperature gauges	1 no.
47	Standard gauges 12” dial size make “Budenberg” or ”H Guru”	

	or “Odin”	
	A) – 1-0 kg/cm2 pressure gauge(vacuum gauge) B) 0 – 5 or 6 kg/cm2 pressure gauge C) 0 – 10 kg/cm2 – do – D) 0 – 25 kg/cm2 – do – E) 0 – 60 kg/cm2 – do – F) 0 – 100 kg/cm2 –do – G) 0 – 250 kg/cm2 – do – H) 0 – 600 kg/cm2 – do – I) 0.2 to 1 kg -- do --	1 no. 1 no. 1 no. 1 no. 1 no. 1 no. 1 no. 1 no. 1 no.
48	Manometers (+/-) 1000 mm water column With hand bulb for lab and small manometers for field purpose.	2 nos.
49	Manometer (+/-) 500mm mercury column with hand bulb for lab and small manometer for field purpose.	1 no.
50	Inclined manometer (+/-) 300 mm water column	1 no.
51	Glass thermometer 0-120 deg. C, 0-200 deg.c and 0-600 deg.c	1 no. Each
52	RTD/Pt 100 source	1 nos.
53	Decade resistance box	1 sets.
54	Function generator	1 no.
55	Vacuum pump for Power Transformer	1 no.

Note:
Instruments shown above are for the regular works only. However, separate sets of tools and instruments are to be arranged and provided to commissioning gang. If contractor fails to arrange the testing instruments as listed above, BHEL site will arrange the instruments at the cost of contractor. Contractor to submit calibration report from recognized agency prior to deployment of same at site and periodical calibration of the same to be arranged by contractor as per procedure of BHEL.

B. T&P FOR MECHANICAL WORK

SN	DESCRIPTION	MINIMUM QUANTITY
	HANDLING EQUIPMENTS	
1	TURN BUCKLES	AS PER REQMT
2	'D' SHACKLES	AS PER REQMT
3	STEEL WIRE ROPES	AS PER REQMT
4	MANILA ROPES	AS PER REQMT
5	CHAIN PULLEY BLOCK/TIRFUR	AS PER REQMT
	MAJOR T&P	
1	PIPE BENDING MACHINE – 2" SIZE	2 NOS
2	ELECTROHYDRAULIC PIPE BENDING MACHINE	1 NO.
2	GRINDING MACHINE	4 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
5	DYE SETS FOR THREADING UPTO 2" PIPE.	2 NOS
6	SPIRIT LEVEL	2 NOS.
7	TAP SETS FOR BOTH BSP AND MPT THREADS UPTO 1" EACH	1 SET EACH
8	MEASURING INSTRUMENTS LIKE MICROMETRES AND CALIPERS	1 SET EACH
9	WELDING GENERATORS	3 NO.
10	WELDING TRANSFORMER	3 NO.
11	TIG WELDING SET	2 NO.
12	MECHANICAL TOOL KIT FOR FITTERS	4 NOS.
13	ELECTRICIAN TOOL KIT	4 NOS.
14	CRIMPING TOOLS	4 NOS.
15	FLOOD LIGHT FITTINGS	5 NOS.
16	FIRE EXTINGUISHERS	3 NOS.
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 A/C TRANSFORMER & HAND LAMPS	4 NOS.
22	MIG WELDING MACHINE WITH ACCESSORIES AIR COOL TYPE	2 NOS.
23	CRIMPING TOOL HYDRAULIC UPTO 600 SQ.MM	1 NO.
24	TORQUE WRENCH SET	1 SET
25	ELECTRODE DRYING OVENS	AS REQUIRED
26	FERRULE PRINTING MACHINE	2 NOS.
27	HYDRAULIC JACKS 250T CAPACITY/100T	4 NOS.EACH
28	TUFFER CAPACITY 15T	2 NOS.
29	CHAIN PULLEY BLOCKS 5/10T	1 NO.EACH

30	MOBILE PICKUP / CARRY CRANE (SUITABLE CAPACITY)	AS PER REQMT.
31	TRUCK / TRAILER	AS PER REQMT.

OTHER THAN THE ABOVE, ONE COMPUTER, PRINTER AND OTHER NECESSARY PERIPHERALS WILL HAVE TO BE MAINTAINED BY THE CONTRACTOR IN HIS SITE OFFICE.

NOTE:

THE LIST OF INSTRUMENTS / EQUIPMENTS TO BE BROUGHT BY THE CONTRACTOR AS SHOWN ABOVE SECTIONS A AND B **ARE ONLY INDICATIVE**. ANY OTHER INSTRUMENTS / EQUIPMENTS REQUIRED FOR THE EXECUTION OF THE WORK IS TO BE NECESSARILY ARRANGED BY THE CONTRACTOR WITHIN THE QUOTED RATES.

THE TESTING/CALIBRATION INSTRUMENTS WHICH ARE USED TO BE DULY CALIBRATED IN THE INTERVAL PRESCRIBED BY BHEL ENGINEERS FROM THE REPUTED AGENCIES DECIDED BY BHEL AND TEST CERTIFICATE TO BE FURNISHED.

APPENDIX–IIA

CONSUMABLES TO BE ARRANGED BY CONTRACTOR

1. PRINTED FERRULES.

   PVC NUMBERED FERRULES ALSO TO BE ARRANGED FOR SUCH PLACES WHERE PRINTED FERRULE CANNOT BE USED.

2. CRIMPING TYPE COPPER LUGS UPTO SIZE 4 SQMM,
3. CABLE IDENTIFICATION TAGS
4. CABLE DRESSING & CLAMPING MATERIAL,
5. PVC CABLE TIES
6. G.I. CLAMPS FOR IMPULSE PIPES/ AIR LINES/COPPER TUBING, TEFLON TAPES FOR SEALING ETC.
7. WELDING ELECTRODE & OTHER CONSUMABLE.
8. ALL PRIMER AND PAINTS UNDER THE SCOPE
9. FASTNERS FOR INSTRUMENT MOUNTING.
10. ANCHOR FASTNER

NOTE: - The above listed consumable is only indicative, however the contractor shall arrange consumables as per work requirement.

BHEL shall provide only cable glands, cable lugs above 4 sq mm size and HT cable jointing kits.

Appendix-IIB

Consumables/items to be provided by BHEL free of charge

01 Metallic Cable glands

02 Steel for support frame of permanent equipment.

03 For single core HT power cable BHEL will provide the trefoil clamps

APPENDIX–III

FORMAT FOR MONTHWISE MANPOWER DEPLOYMENT PLAN

(CATEGORYWISE NUMBERS TO BE INDICATED FOR EACH MONTH)

SL. NO.	CATEGORY	MONTH							
		1	2	3	4	5	6	7	8
01	RESIDENT ENGINEER								
02	ERECTION ENGINEERS								
03	COMISSIONING ENGINEERS								
04	ERECTION SUPERVISORS								
05	COMISSIONING SUPERVISORS								
06	QUALITY ASSURANCE ENGINEER								
07	SAFETY ENGINEER								
08	MATERIALS MANAGEMENT SUPERVISORS								
09	STRUCTURAL & OTHER WELDERS								
10	STORE KEEPERS								
11	ELECTRICIANS/ INSTRUMENT TECHNICIAN								
12	SEMISKILLED/ UNSKILLED WORKERS								
	MONTH WISE TOTAL								

APPENDIX–IV

FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

SL. NO.	DESCRIPTION & CAPACITY OF T&P	MONTHS							
		1	2	3	4	5	6	7	8
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									

APPENDIX-V

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 –VI

CONDUCTOR/ ENCLOSURE SIZE AND WELDING JOINT DETAILS FOR GTG BUS DUCT

GTG BUS DUCT

1. **ENCLOSURE SIZE**

Main bus duct	-780mm O/D x6.35 mm thick AL sheet
Tap Off Bus Duct	- 680 mm O/D x 4.78 mm thick AL sheet

2. **CONDUCTOR SIZE**

Main Bus Conductor	-2x254x92.2mm x 13.18 mm thick Channel (Box formation)
Tap Off Conductor	-114.3O/D x 97.18 I/D (Tubular)

3. **WELD JOINTS CONDUCTOR**

Main Bus Duct	- 19 Nos.
Tap Off	-04 Nos.

4. **WELDED JOINTS ENCLOSURE**

Main Enclosure	- 44 Nos.
Tap off Enclosure	- 24 Nos.

APPENDIX VII

RELAY TESTING FACILITY

(Mark the appropriate option)

Relay testing facility will be provided by:-

Sl No.	**Options**	**Mark the appropriate option**
1	By Bidder	
2	Any of the agencies recommended by BHEL	
3	Outsourced to the agency other than those recommended by BHEL	

NOTE :

1. Incase option 1 is chosen, the bidder have to submit the evidence of their resources and resourced capability to take up the relay testing along with their offer.
2. Incase option 3 is chosen, the bidder have to submit sufficient proof and credentials of experience of the party along with their offer.

DATE SIGNATURE OF BIDDER

APPENDIX-VIII

ANALYSIS OF UNIT RATE QUOTED

SN	DESCRIPTION	% OF QUOTED RATE	REMARKS
01	SITE FACILITIES VIZ., ELECTRICITY, WATER OTHER INFRASTRUCTURE.		
02	SALARY AND WAGES + RETRENCHMENT BENEFITS		
03	CONSUMABLES		
04	T&P DEPRECIATION & MAINTENANCE		
05	ESTABLISHMENT & ADMINISTRATIVE EXPENSES		
06	OVERHEADS		
07	PROFIT		
	TOTAL	100%	

DATE: SIGNATURE & SEAL OF THE BIDDER